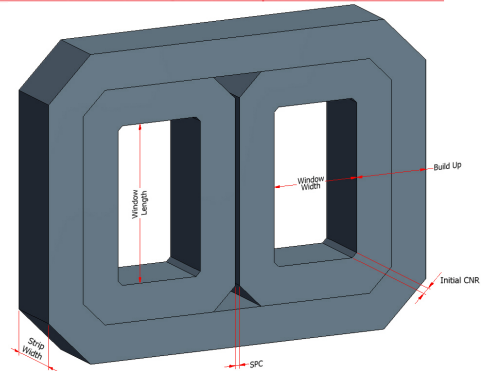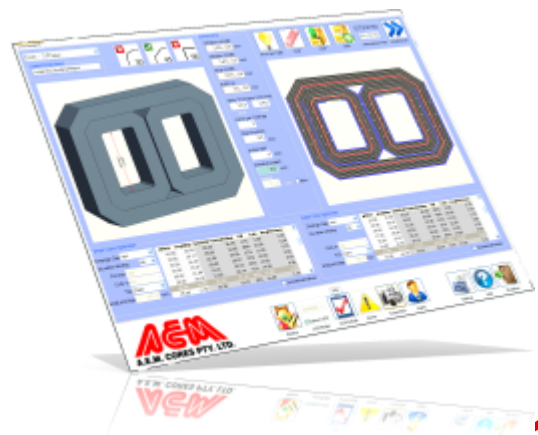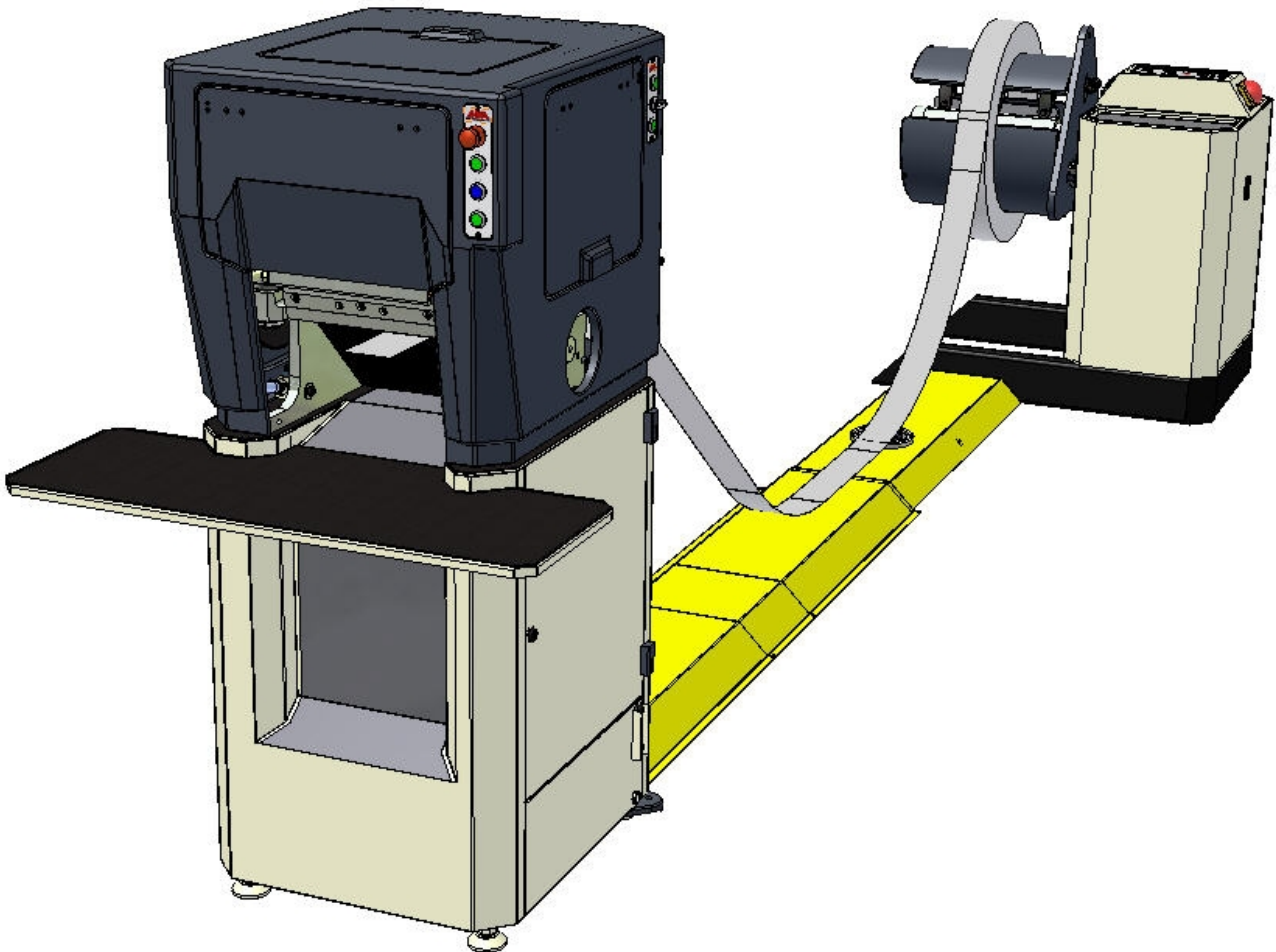# Designing

And

Making

Cores

With UCS

UNICORE Control Software
Innovation in Transformer Core Design and Manufacture

The UNICORE machine is a computer controlled strip forming machine used to manufacture fully formed, single or double cut, single or three phase wound core type cores from electrical steel.

UNICORES are built up from the inside out, each lamination is accurately produced so it nests perfectly with the one before and the one after. Various core types and face geometries are available.

UNICORE Control Software (UCS) is a software package that is used to design UNICORES and then supervise the manufacture of UNICOREs on a UNICORE machine. It also monitors machine maintenance.

Designing and Making Cores with UCS

Printed: Wednesday, 17 February 2010 in Adelaide, South Australia

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AEM CORES PTY LTD

UNICORE

Designing and Making Cores with UCS

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1 Introduction

UNICORE is an innovative development in transformer core manufacturing technology introduced in 1998. Unicore Control Software (UCS) is a software application which designs UNICOREs and then supervises the manufacture of those cores on AEM UNICORE machines.

UCS gives both the core designer and machine operator increased options for defining Unicore features and controlling the manufacturing process.

1.1 Owners of UCM2000

Owners of the UCM2000 will notice a big difference in the way this new generation UCS operates with the UNICORE machine.

The new Unicore machines incorporate many significant design changes. These changes required a complete recreation of the software inside the machine and the software outside the machine - UCS.

UCS or Unicore Control Software, is a completely new software application designed to make the creation of core designs and the manufacturing process far easier and more efficient.

For those operating earlier UCS 1.X and 2.X (for the UCM2000), UCS will be a totally new experience.

> UCM2000 Owners - UCS is not suitable, and not compatible with your UCM2000.

> UCS 1.x for the UCM2000 and UCS, can be run at the same time and on the same computer.
>
> Use ALT-TAB to switch between them.

1.2 Changes From Previous Versions

This section briefly details the major changes from previous versions of the UCS software.

Version 1.6 contains just over 400 updates, changes and additions. It is the largest update to UCS ever made. The result is a far superior piece of software with enhanced features which we are sure you will enjoy using.

Many of the changes are brought about by customer feed back - either by customer's emailing our support line support@aemcores.com.au or by customer's talking to our Agents 57 who have then passed on suggestions and requests. If you have a suggestion or a need, please let us know.

- Changed installation location to c:\UCS.
- Installer program removes any earlier UCS3000 installation but leaves your

core files intact. It also makes copies of them in the new c:\UCS\Filing Cabinet directory. You will need to re-examine your designs and test build a sample core before making a batch to ensure that the resulting core matches your desired specifications.

- New core Dee Core added.

- New Triangle Core added.

- DUO cores now support 30 degree corners.

- Butt Cores now support 30 degree corners.

- Help system - this manual is available online.

- Rework of communications between UCM and UCS showing more status indicators which will help us diagnose communications issues. We experience very few communications issues, however they seem to be the most difficult for UCM owners to resolve, yet the cause of them usually is quite simple and very rarely hardware failure.

- New Winding Indent replacing Bobbin Indent

- A major revision of the trigonometry of the corner combinations and core faces has resulted in significantly improved core "nesting", shape and dimensional accuracy. For user's of the Unicore 2000 machine - the tightness factor has been eliminated in this new UCS.

- Operators are no longer required to hand edit core design files. You don't need to remember what program needs loading and there aren't a range of programs to select from. UCS tells the Unicore Machine what to make for you.

- No longer required to manually upload to the Unicore Machine (UCM). This is carried out automatically.

- UCS is in constant communication with the Unicore Machine monitoring many operational parameters.

- New production control screen giving the operator and supervisors much more information about what's going on.

- UCS will count cores manufactured to keep track of batch quantities.

- UCS permits restarts of cores anywhere in the core - Evans component cores included. You can start making laminations for any core part way through any build up.

- Lamination repeating - if a lamination or many laminations are detected to be damaged from defects in strip, handling issues, or even running out of strip, UCS will let you simply click repeat or specify the number of laminations to repeat.

- You can repeat laminations from measured build up. If you have a large build up and you are not sure about your count of laminations, you can measure the build up you have and enter it - UCS will instruct the Unicore Machine to start building the core from the next lamination.

- New screen shot facility - if you need to record the information on the UCS screen - simply click on the screenshot button or press F11. UCS will capture the contents of the screen. The screen shots are named with a timestamp automatically. This means that by repeatedly hitting F11 you can capture sequences of screen captures. This can be a great help when diagnosing a problem.

- A separate screenshot viewer to let you load and look at the screen shots.

- Extensive customisable settings for core parameters. UCS ships with default settings that suit a wide range of operators. If your requirements are different, you can set them to suit your needs. Buttons next to each setting permit instant return to their factory setting.

- UCS communicates maintenance information with your UNICORE Machine. Each time you commence a batch of cores UCS will make sure that the maintenance on the machine is up to date. A correctly maintained machine will give the best quality cores in the shortest possible times, which means premium quality cores with lower manufacturing costs.

- Detailed production information including elapsed time are displayed whilst manufacturing cores

- Save file format change - old UCS3000 (R700 and below) save files will load, but you may need to revisit some parameters in order to move to the production page. Don't forget to save the core once you have changed the required parameters.

- New Core Designer screen fields and layout.

- Core Manufacture Time Estimator. As you design a core the Estimator will tell you approximately how long it will take to manufacture. Knowing your labour and material costs, this will help you prepare costing's and customer quotes.

- Some parameters (for example Build Up) have had their upper and lower limits changed to support the needs of customers.

- Lamination Table tab removed - moved to a button on the Core Designer and Production Page

- New Production screen layout, better progress indication

- No longer need to select a UCM in the production screen

- Jump controls refined

- UCM register read out moved to UCM Details page

- New UCM temperature monitor

- New Operating hours display

- We have added a software protection device.

AEM CORES PTY LTD

UNICORE

Designing and Making Cores with UCS

Part

II
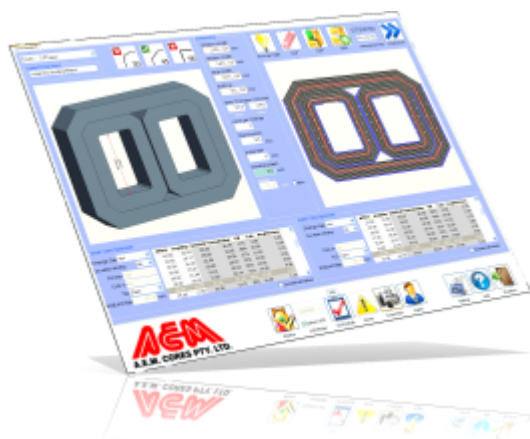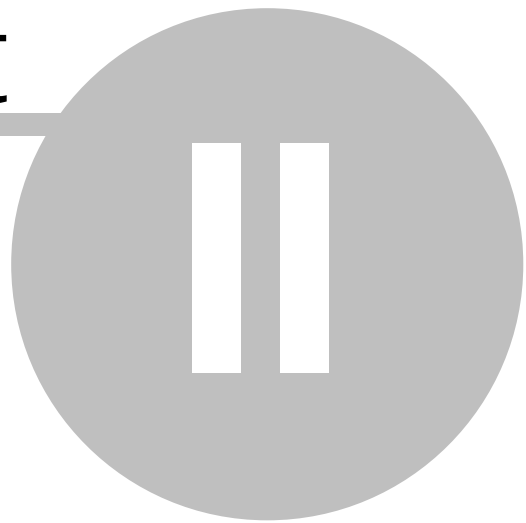
2   Software License

Your installation of the AEM Cores Pty. Ltd. software is deemed to be your acceptance of the terms and conditions of this license agreement.

General guidelines for Use

1. The contents of this software are copyright protected.

2. This software may only be used in conjunction with the AEM Unicore Machine.

3. This software may be subject to change without notice.

4. Customers receive AEM Cores Pty. Ltd. software when they purchase a Unicore Machine. The enclosed software has been generated and tested thoroughly at AEM Cores Pty. Ltd. However, based on the complexity of the software and our product range, it is nearly impossible to develop software solutions that run without any errors in all applications and are absolutely complete. There is no warranty extended that any version of the software is complete, correct and up to date.

5. There may be no alteration, reverse engineering, further development or translation of the software. AEM Cores Pty. Ltd. offers no support and assumes no liability for any software which has been modified from the original software.

Liability

1. AEM Cores Pty. Ltd. explicitly is not liable for any problems arising from entering the wrong data based on misunderstood prompts, incorrect input data, and/or incorrect or imprecise default values.

2. Only qualified personnel should use this software. Please note the software will default to certain settings and it is your responsibility to recognise whether these settings are suitable for your applications. Please contact your local agent or AEM Cores Pty. Ltd. if you have any questions.

3. AEM Cores Pty. Ltd. is not liable for the lack of economic success, lost profits, indirect damages, indirect losses due to defects and claims by third parties.

4. Any part of this license which is prohibited or unenforceable in any jurisdiction is ineffective to the extent only of the prohibition or unenforceability in that jurisdiction. This does not invalidate the remaining provisions of this agreement in that jurisdiction.

5. This license agreement is governed by South Australian law and the parties submit to the jurisdiction of the South Australian courts.

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III
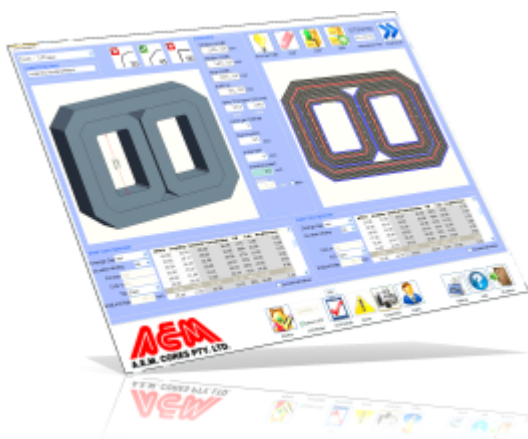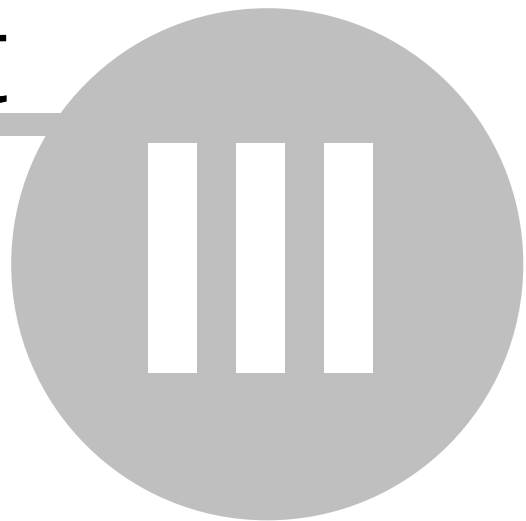
3 Safety Notice

When working with the Unicore Machine and Decoiler

HEARING AND
EYE PROTECTION
MUST BE WORN

DUST MASK
MUST BE WORN

FOOT PROTECTION
MUST BE WORN

HAND PROTECTION
MUST BE WORN

When performing maintenance on the Unicore Machine and Decoiler.

All Maintenance MUST be performed with the Unicore Machine powered OFF
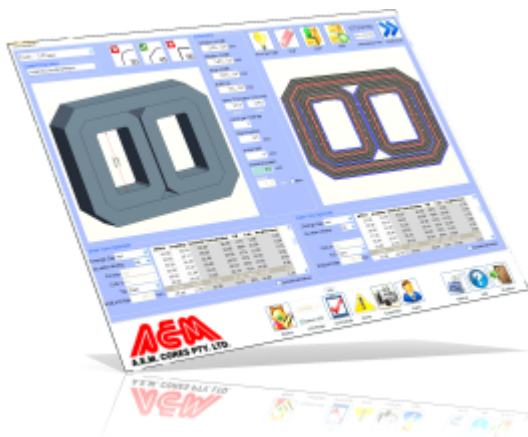
All maintenance MUST be performed by qualified Engineering Staff

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UNICORE

Designing and Making Cores with UCS

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IV

4   Manual Conventions

Symbol	Meaning
	In the printed manual, this is the page number containing the referenced topic. The online version of this manual does not have these symbols. The following is an example:
	Software Setup 151 page
	This is an extremely important warning. Not following this instruction may result in injury to operators or damage to machinery.
	Important Information advisory
	This item can be adjusted in the Software Setup 165 page.
	The factory default setting for this item.

AEM CORES PTY LTD

UNICORE

Designing and Making Cores with UCS

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5   Getting Started

5.1   Installation

The computer supplied with your UNICORE Machine will have had UCS software loaded in the factory. Your UNICORE Machine and the computer went through their acceptance testing together - so you know it will all work when it is unpacked.

Your agent, or the AEM technician who commissioned your new UNICORE Machine will have been aware of any last minute software updates and as part of the commissioning process will install any upgrades necessary.

So there is no need to install any software.

If you wish to install UCS on another computer in order to create core designs, ask the AEM Agent who commissions your machine to do it for you.

5.2   System Requirements

UCS requires a minimum screen resolution of 1280x1024 to display. UCS will NOT work with smaller displays, it doesn't not have the ability to redraw the complex Core Designer screen on smaller displays. AEM Cores recommends a 19inch 1280x1024 LCD display for best results. Computer equipment meeting this specification is supplied with the Unicore Machine.

UCS will run on:

- Windows 2000, XP, and Vista.

- Windows 9X is NOT supported.

- any Pentium4 class computer hardware with at least 512Mb of ram.

- **A correctly set computer clock.**

- Screen resolution of 1280x1024

- About 200mb of free disk space

- A pre-installed pdf reader, AEM recommends the free versions of Foxit or Adobe Reader.

5.3   Do I need to Upgrade?

From time to time we update and add features to UCS.

These updates fall into 2 categories:

1. Critical updates - We have become aware of an issue which must be addressed - you may not be aware of the issue. It may be an issue for example that occurs in a core face that you don't use.

2. New features updates - We are adding and plan to add new features to UCS from time to time. This type of upgrade should be performed only if

you would like the benefit of the new feature offered.

However, we will not be supporting older versions of UCS following the release of a new version. So if an issue arises in an old version, we will make sure that it is fixed in the latest version of UCS and request that you upgrade.

Why not upgrade?

Updating software can lead to computer issues and this can lead to machine down time. If UCS wont run - you cant make cores. So pick your time to upgrade carefully, bearing in mind any contractual production deadlines you may have.

We test the UCS software thoroughly before it is released for use in production, however UCS enables millions of core combinations and obviously we cant test every one of those. We do test each feature of UCS and we test with core designs that have had issues arise with them in the past.

We will only request you to upgrade the UCS software when we are aware of an issue - that perhaps you are not aware of, which must be addressed

If you are building all the cores you wish to build and you are not experiencing any issues - and you are not excited by new features on offer - there really is no need to upgrade.

> **STOP** As a precaution, choose the time to install software upgrades with regard to your production schedule. AEM Cores tests all software before releasing it, but like all software upgrades, unforeseen problems may occur. If they do, contact us will all the detailed information you can.

5.4   Upgrade Checklist

The upgrade from UCS3000 to the new UCS is major. There is a possibility of disruption to production schedules. Make sure that you plan your upgrade allowing time for any issue to be resolved.

Before upgrading

Before you upgrade UCS from any version, it is important to record what you are doing, so that you can confirm and change your designs after the upgrade has completed.

UCS offers a very easy way to record settings: use screen shots to record settings and choices you have made

Prior to the upgrade, take the following steps to help minimise disruption:.

- The upgrade is not easily undone, and cannot be undone without an AEM Cores Staff member attending the machine.

- Familiarise yourself with the core faces you use and determine if there are changes that affect your designs. You may need to consider the effect of new settings, or contact AEM Cores for some advice on how best to

configure the settings for your particular design, manufacturing process or application.

- Your core files will be migrated, but each one will need to be opened and checked before they can be used to manufacture. It is suggested that once you have edited the core, you manufacture a sample to confirm that the core is acceptable before allowing production staff to manufacture batches.

- Your UCM will receive a software upgrade. This is not reversible without an agent present.

- Power must be on and not interrupted.

- Once you have upgraded your UCM you cannot use UCS3000 anymore - this is why the installer removes it.

- Nothing will prevent or warn you if you try UCS3000 with an upgraded UCM but the results will be unacceptable and in some cases unpredictable. It is most likely that you will not be able to establish communications between UCS and your UCM and thus you will no longer be able to manufacture cores.

- Capture the Core Designer for all of your important core designs. Don't bother with one-off designs.

- Make sure you have access to a sample of any very important cores for comparison.

- Capture the Settings page. This will record all of your customisations.

- Capture the UCM details screen. Again this will record any custom settings

Make a backup copy of the files in the following directories

- Filing Cabinet

- screen shots - this will further protect your earlier records.

- Make a gap in your production schedule.

- Don't upgrade software part way through a batch of cores for a customer.

- Plan on some engineering time to make samples of your production cores and confirm any changes to settings.

If everything goes well the upgrade will take a few minutes.

UCS Software Settings

During the upgrade your previous Software Settings are discarded. You will need to configure any custom settings you have made.

UCM Software Upgrades

Your UCM has software in the onboard computer system which we will update from time to time. The on-board UCM software and UCS are issued as pairs. They must be run in pairs. If you upgrade your version of UCS, it will upgrade your UCM as well.

> **STOP** Following the upgrading of your UCM on board software, you must not use an older version of UCS on another computer. Be sure to upgrade all of your computers that are used with a UCM.

Following the installation of a new version of UCS you may see a different communication pattern on startup. This will soon result in a dialogue box showing that your UCM is being upgraded, with a bar showing progress.

This process doesn't take very long and you don't need to do anything except leave the software to finish the upgrade.

When UCS returns to normal operation, click the UCMDetails button and check the Software version box 178. This will reveal the new software version number that has been installed on your machine.

UCM Configuration Settings

During an upgrade, your UCM settings will be retained, But you should examine the settings and check any new settings that may have become available. A quick check in this manual for each setting to confirm that the setting has no new conditions or options is advised.

Saved Core Files

Saved core files located in the old UCS3000 Filing Cabinet, are not deleted by the installation program.

When upgrading from UCS3000 to the new UCS, core files are copied from the UCS3000 installation only if they do not exist in the new UCS installation. This means that all installers for UCS will migrate core files from UCS3000 once, and not on subsequent installations of later versions of UCS.

Loading Old Saved Core Files

We have tested the loading of saved core files from all the versions of UCS3000 that were shipped and excluding R346, they are loaded and upgraded. HOWEVER we have not been able to test every combination of every option for all core faces. There is a chance that you may encounter a save file that will not load correctly. If you do:

- consider entering the parameters into UCS and creating a completely new save file.

- Send the saved core file that wont upgrade to support@aemcores.com.au

and we will use it to fix any issue problem with UCS and email you back a corrected saved core file.

> UCS3000R346 - was the very first UCS3000 ever shipped. The save core files are not compatible with later versions of UCS - the save file format was completely changed. If you are using R346 you will have to recreate your save files. You should also delete the saved core files that are migrated by the installation. These files will cause UCS to lock up.

5.5 Installing UCS

New UCM owners will find that UCS has been pre-installed on the supplied computer.

Upgrading UCS

On your computer double click the installer executable file.
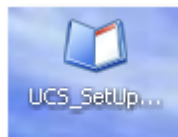
A window like the following will appear
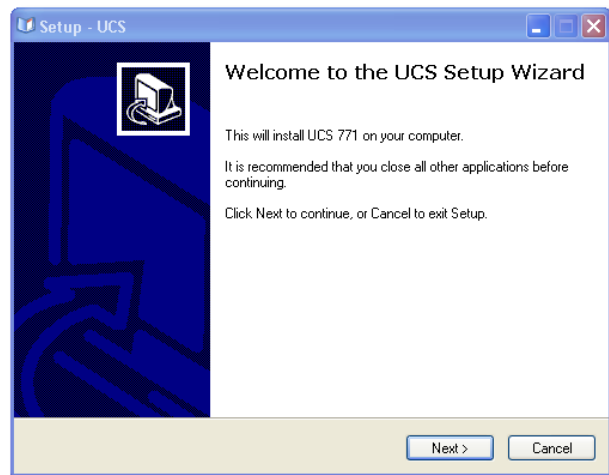
This is the License Agreement Screen.

Read the contents of the license and if you do not agree to the terms, cancel the installation. If you do agree to the license terms, indicate your acceptance by clicking on "I accept the agreement".

Click next
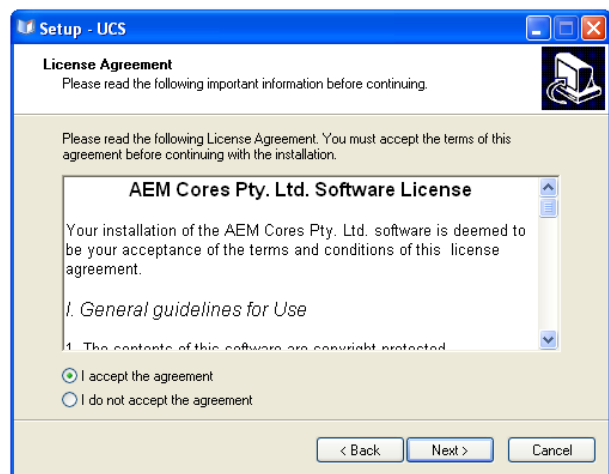
Pre installation setup instructions are displayed.

Make sure the USB11A adaptor (or USB-RS232 adaptor) and the UCMKey are both disconnected from the computer. These devices will be inserted when the installation is complete to trigger Windows to install drivers for each of them.

Here you may install UCS to a directory of your choosing. The default directory of c:\UCS is our preference and the only one we have tested and will support.

NOTE UCS does not support installation on network shares, or running multiple copies of UCS from a single network folder. Each machine running UCS requires its own local copy of the software.

You are able to change the start menu folder, but AEM Cores recommends that you don't.

Click next
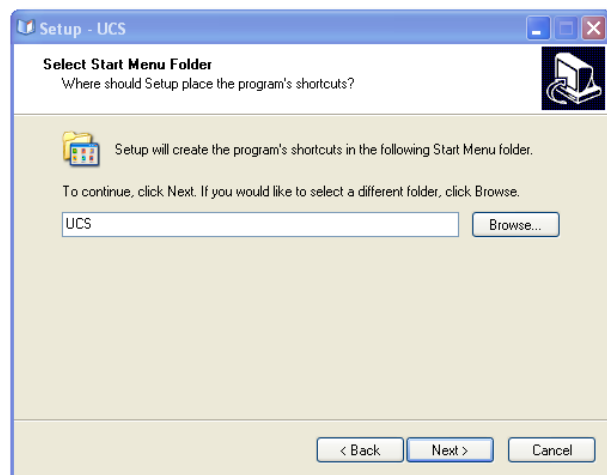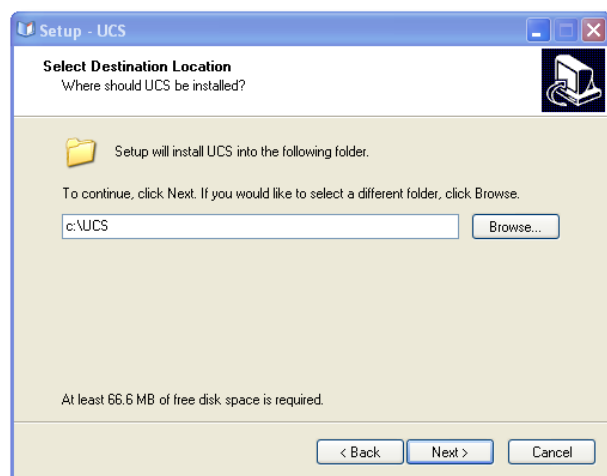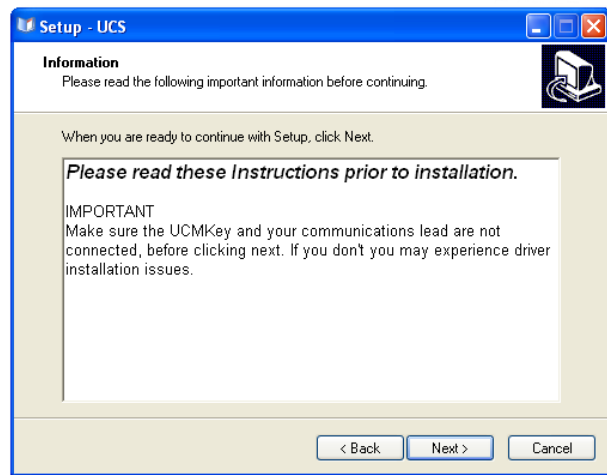
Creating a desktop shortcut

The default action is to create a desktop shortcut and we recommend that you do.

With the box ticked - a shortcut to UCS will be placed on your Desktop. We recommend that you do this. Click next here.
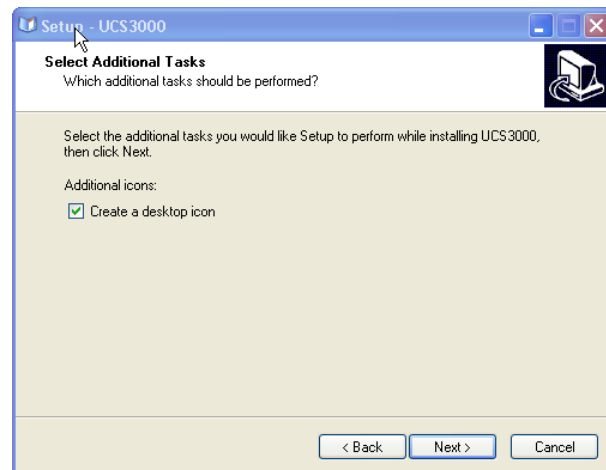
This page summarises your installation preferences.

Once you click install installation will proceed.
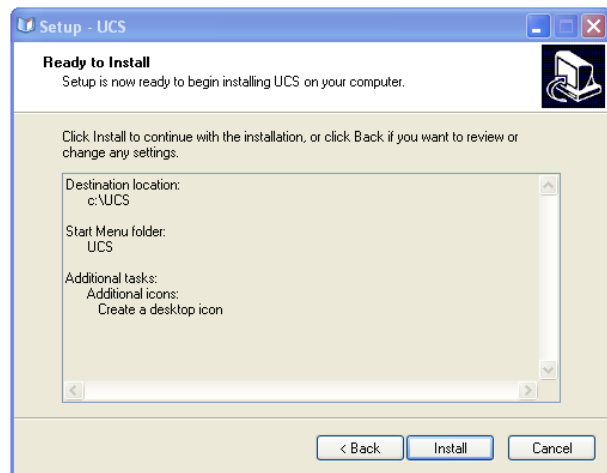
Installation proceeds

Whilst the installation is in progress you will see the bar graph move to the right, and file names will flicker past.
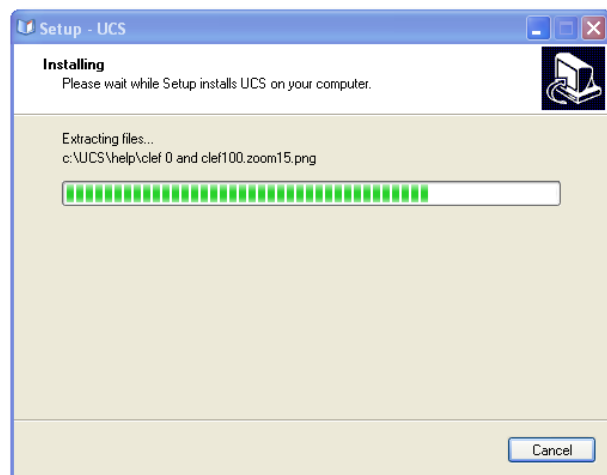
Post Install Instructions

These instructions are intended for first time users as a guide testing that UCS and the Unicore Machine are working together correctly.

This is **a list of things to do to immediately after exiting** the installation program. These last actions are important to enable UCS to work with your UCM.

Connect the communications adaptor USB11A (or USB-RS232) - this will start the driver installation process.

Connect the UCMKey. This too will start a driver installation process.

This is the final installation screen. In it there is a checkbox which allows you to view this manual electronically on your computer.

Clearing the box will not launch the manual.

The installation process is completed. Click finish!

If a pdf reader is not pre-installed on your computer and you leave the View DesigningAndMakingCoresWithUCS.pdf check box ticked, the installer will output an error message when it attempts to launch the manual in the pdf reader.

This error only means that a pdf reader is not installed. It will not effect the operation of UCS in any way.
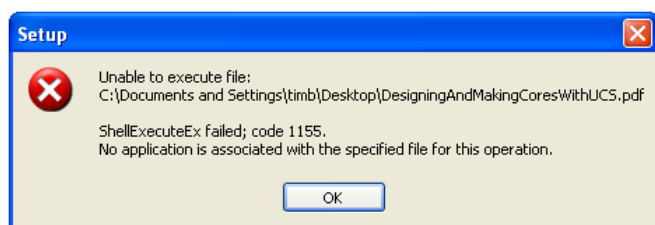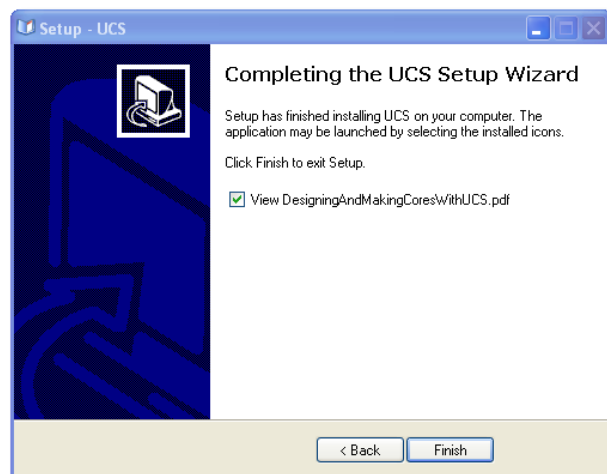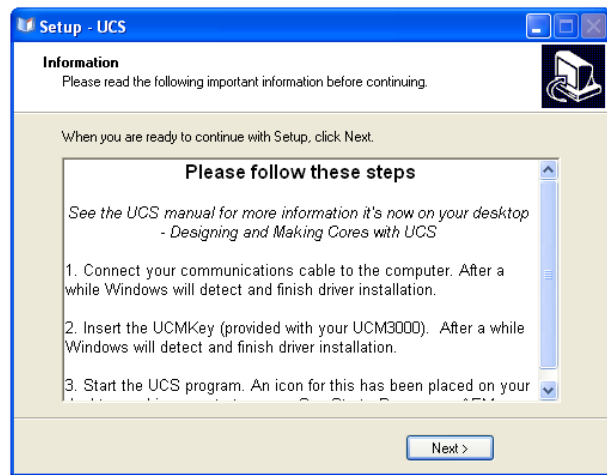
5.6 Files and Folders

When UCS is installed on your computer is creates a number of folders and files. The following sections tell you what they are used for.

As a general rule: Don't delete any files or edit/change any files with any other application. UCS expect all files and folders to be where they are installed.

5.6.1 Folders

Here is the layout of the UCS directory. The icon to launch UCS is circled in red. The UCS installation program creates menu entries in your Start Menu 49 and on your desktop.

© 2010 AEM Cores P/L
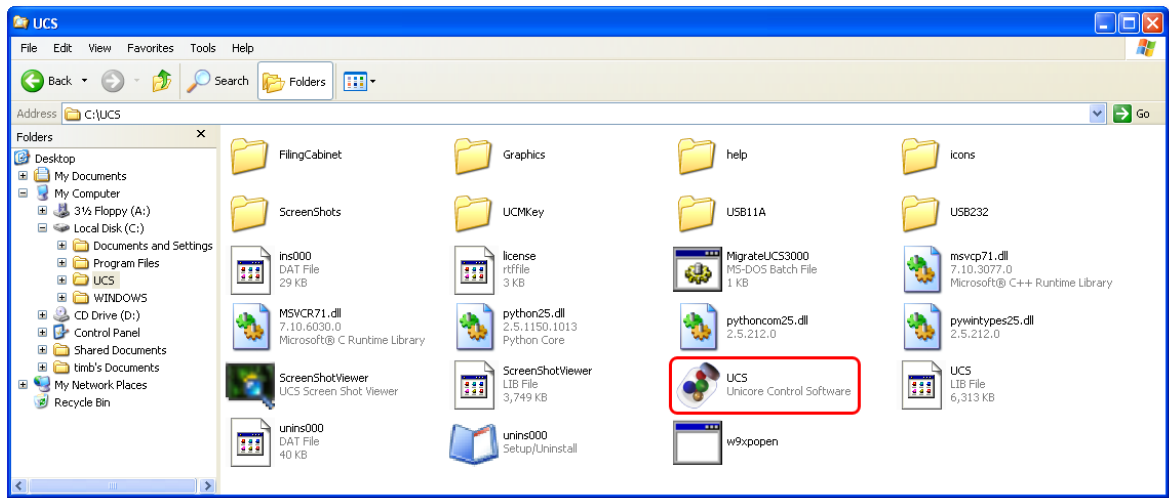
Folder Name	Use	Upgrade *
FilingCabinet	This is where UCS places your saved core designs.	Yes
Graphics	Images are retrieved from here when UCS runs.	No - erased
help	A html version of this Manual is here. It is used by UCS to provide the on-line help.	No - erased
icons	Icons used by UCS are stored here.	No - erased
ScreenShots	Any screen shots you take will be found in this folder.	Yes
USB11A	Driver software for the SEW USB11A interface adaptor	No - erased
USB232	Driver software for ATEN USB to RS232 converter.	No - erased
UCMKey	Driver software for the UCMKey.\n\nThis directory also contains the UCMKey verification utility and the Email UCMKey updater.	No - erased

* Files migrated on upgrade

5.6.2 Files

UCS uses a number of different file types. Their icons and any issues are listed here.

> All files in the UCS directory and below
> should not be altered or examined with other software tools.

Core definition files

These files contain a saved core design.
Double clicking them will load UCS but will not open the core design.
These files can be viewed using a simple text viewer, however any minor change in the file's content will render it unusable.

Save Core definition

DO NOT edit these files with any other software

Electronic version of this manual.

This icon will be determined by the PDF reader software you have installed.

Double clicking on this icon will load the electronic version of this manual into your PDF viewing software.

5.7   UCM Key

The UCMKey is a control device which acts like a key. It connects to your UCS computer via a standard USB port.

Each UCM is issued with a matching UCMKey. Your UCM will not manufacture cores without the UCMKey inserted into the computer.

There are 2 kinds of UCMKeys:

UCMKey

1. A customer key - used with each UCM.

2. An AEM Cores Staff Key - only carried by AEM Staff.

The UCMKey is used to control access to the UCM, and control the ability to upgrade the software in your UCM..

Do Not Loose It!

Your UCM will not be able to produce cores without the matching serial numbered UCMKey

Contact AEM Cores Support for a replacement key.

The UCMKey is NOT a USB thumb drive or USB disk drive.

No UCMKey inserted

When no UCMKey is detected, UCS will display the following empty key hole icons. UCS alternates between these indications to let you know it is looking for a UCMKey.

No UCMKey
Inserted
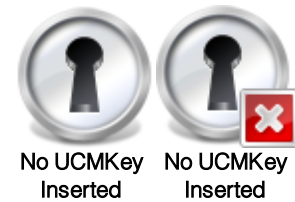
No UCMKey
Inserted

The Customer UCMKey

Each UCM comes with it's own key which must be inserted into the computer running UCS controlling the UCM. The UCMKey contains the serial number of your UCM and UCS will not communicate with the UCM without it.

Customer Key
Icon

> Removing the UCMKey from the computer controlling the UCM you can prevent unauthorised operators from making cores on that machine.

If a UCM is producing a core and the UCMKey is removed, the UCM will continue making the current core and then cease operation. UCS will no longer communicate with your UCM.

The AEM Cores Staff Key

AEM Cores Staff carry a UCMKey which will operate any UCM no matter what serial number.

Staff Key
Inserted

This key has a servicing capability called Birthing. Birthing is a new way of initially configuring the software in your UCM and is normally done at the AEM Cores Factory. However, in the case of machines that were released with R540 and older software installed, an AEM Agent is able to perform machine birthing in the field. See Birthing 195

A Staff key is able to Birth 4 machines or upgrade the software in 4 machines (or a combination of these activities) before it expires.

Because of the extra ability of the AEM Cores Staff UCMKey these keys expire after only 1 month from the date of issue. They can be recharged by emailing AEM Cores support department. This can be done quickly and simply via a return email.

If an AEM Staff member is travelling abroad to perform a UCM installation, it would be wise to update your UCMKey before leaving home. See Updating Your UCMKey 36

When closing UCS with a AEM Cores Staff UCMKey inserted staff members are reminded to secure their special UCMKey.
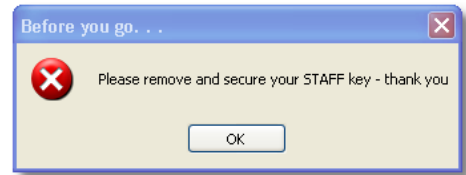
Reminder to Secure Staff UCMKeys

The Blank Key

Agents are provided with one or more blank keys, which will not operate a UCM. However UCS will detect these blank keys and display this icon.

Blank Key

To make a blank key operate a UCM,

1. Note the Serial number of the UCM the key will be used with.

2. Run UCS with the blank UCMKey inserted.

3. Hover the mouse on the blank key icon and UCS will indicate the serial number of the blank key. Record this.

4. Send an email to AEM Cores support with both serial numbers included. An authorisation file will be sent by return email. See Updating Your UCMKey 36

5.7.1   Installing UCM Key

The following are the dialogs with Windows whilst the UCMKey (USB dongle) is installed.

This is automatic and only needs to be clicked through.

Windows sees that the UCMKey has been inserted

The driver for the UCMKey was automatically loaded onto your computer by the UCS installation program.

Install the software automatically.
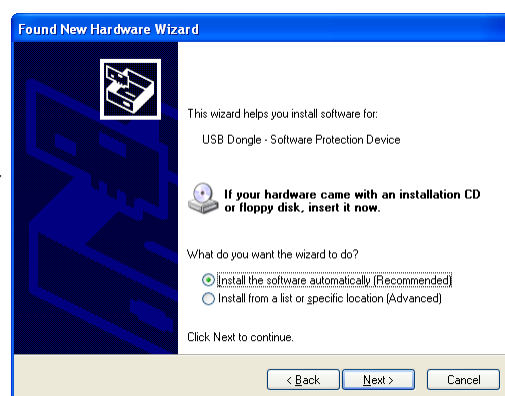
Windows finishes doing the driver installation.
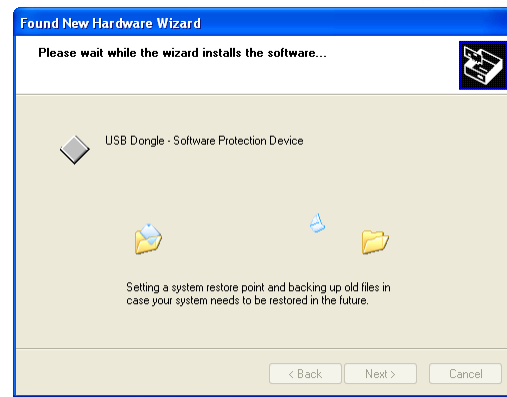
Windows has finished installing the driver.

UCMKey is now working.

5.7.2 Testing UCMKey

A small UCMKey testing utility is installed in the c:\UCS\UCMKey directory of your UCS installation. It's called VerifyKey.

With your UCMKey inserted, double click VerifyKey.

You may run VerifyKey and then insert the UCMKey if you wish.

Now single click the Verify Key menu item.

A dialog box will pop up telling you if the UCMKey is present and working.
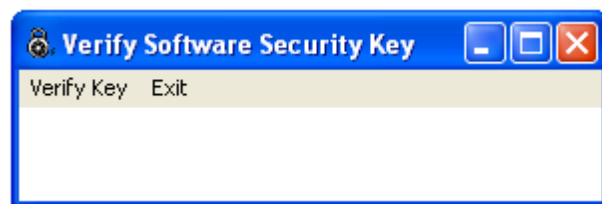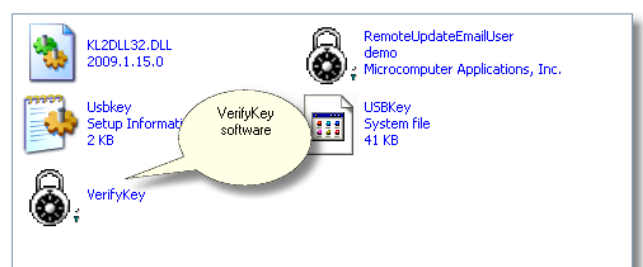
Verify UCMKey

The UCMKey is installed and working. Note this does not check counters nor expiry dates. This must be done with UCS.

Note that your UCMKey's serial number is reported. This serial number is unlikely to match your UCM serial number in any way.

The UCMKey was not detected.

If you see this. Check the UCMKey is inserted all the way into the USB connector on your computer. Try using a different connector, preferably one on the rear of the computer.

See Repairing UCMKey Installation

Repairing UCMKey Installation

If your UCMKey fails the VerifyKey test try the following suggestions.

Remove the UCMKey from the computer. .

Reboot the computer and retest.

Manually install the UCMKey driver by right clicking on the Usbkey Setup Information file
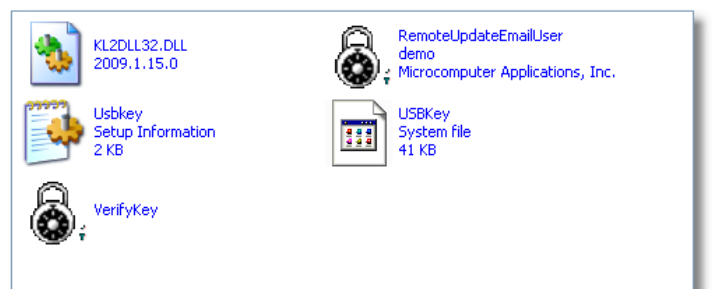
and then selecting Install from the menu that appears. Note your menu will be longer than shown here.

This will take you through the Installing UCMKey 33 sequence.
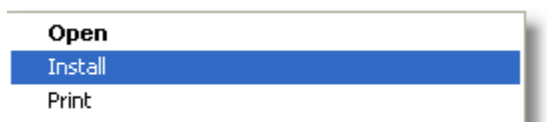
5.7.3   UCMKey Time Limitations

Your UCMKey restricts software upgrades to your UCM for a certain time limit.

Why?

A customer UCMKey is able to perform 3 UCM upgrades (which are done automatically by UCS). This upgrade feature is limited to a 12 month period. This is to prevent stolen or missed placed keys being used to perform unauthorised UCM3000 upgrades.

> **A UCMKey and UCM with matching serial numbers will always manufacture cores.**
>
> **There is no time limit on this.**

If you need to perform a UCM upgrade after the 12 months expiry, simply contact AEM Cores support with an email address and we will reply with an email containing instructions to renew the 12 month time limit.

UCS will indicate that your UCMKey is time expired with the dialog shown to the right.

UCMKey has time expired

Your UCMKey has a time limit which has expired. UCS will not perform certain software functions until the UCMKey has been refreshed by AEM Cores Support.

This can be done over the internet.

What to Do?

1. Send an email to AEM Cores (support@aemcores.com.au) stating that your UCMKey is time expired. Be sure to include your UCM3000 serial number - we cannot help you if you don't tell us the serial number.
2. We will reply with an email containing instructions on how to update the UCMKey
3. UCS will now close. This version of UCS will continue to refuse to operate until the UCMKey is updated. A critical software update must be made that needs the UCMKey to be updated.

NOTE:
You may uninstall this version of UCS and return to the previously installed version for continued operation of your UCM3000

OK

UCMKey has Time Expired

After clicking OK UCS will shutdown. The new installed version of UCS must not be run without it's matching software version inside the UCM. There is a risk of harm to both the operator and the UCM.

You may remove the just installed version of UCS, and reinstall the previously installed version of UCS to continue operations whilst your UCMKey is recharged.

UCM in production

If you install a new version of UCS, and your UCMKey has time expired, you will also see this icon. UCS will also inform you that the key has expired.

5.7.4   Updating Your UCMKey

There may be an occasion where AEM will need to update your UCMKey (customer or staff).

In order to supply an update you will need to provide your UCMKey's serial number. You can determine your UCMKey serial number by following the procedure in .

Once you have received an email containing an update file, follow these steps to apply the update.

1. Insert the Agent key into a computer that has UCS installed.

2. Detach the file Authorize.dat from the email and save in C:\UCS\UCMKey

3. Run RemoteUpdateEmailUser

4. Click on the menu entry Update Security Key

5.8   Connecting Your Unicore Machine

UCS can communicate with your Unicore machine via any Com (RS-232) port you have on your computer. Most modern computers no longer have com ports, and so an adaptor is used, which provides a com port via a USB connection.

> If you are reading this section of the manual because you are experiencing communications issues, see the section Reporting Communications Faults 204

This gives 3 possible connection configurations:

USB11A - using the
SEW USB11A adaptor

USB232 - using the
ATEN (or equivalent
adaptor)

RS232 com port (as
used in the UCM2000)
not used in the UCM
and later.

What device was my UCM supplied with?

- All UCM's shipped prior to September 2009 are USB232 or Aten

device.

- From September 2009 all UCM's are shipped with the SEW USB11A.

> You cannot pick and choose your communication device, you must use the device supplied.

> Only connect one communications device to your computer.

Computers with no Com ports (UCM's not fitted with USB11A)

If you purchase a computer after January 1, 2007 it is likely that there will not be any com ports. They were phased out. In order to have a com port to communicate with your UCM you must use a USB to serial adaptor like the USB232 device shown above.

This adaptor will come with a driver disk which must be installed before running UCS. Once installed, and with the USB device plugged in, UCS should identify it as an available com port and permit you to select it.

5.8.1   USB11A Connection

All UCM's shipped from September 2009 use the SEW USB11A communications device.

This device connects to your computer using a standard **shielded** USB A-B cable.

5.8.1.1   Installing the USB11A

There is very little to do other than connect the USB11A.

UCS automatically installs the driver for you, and Windows will complete the installation on the first connection of the device. This is done almost silently, a DOS box will appear briefly whilst the driver is installed.
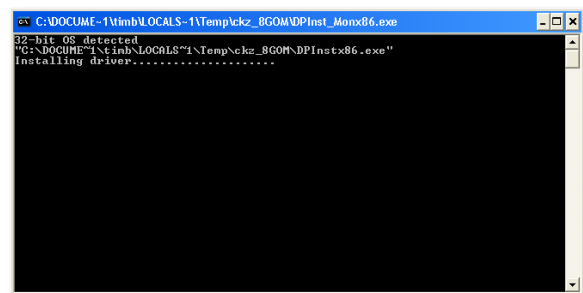
5.8.1.2 Manually Installing USB-RS232 adapter

This procedure manually starts the installation of the SEW USB11A driver. You should not need to do this.

> ⛔ Disconnect the USB11A device before proceeding.

Using Windows Explorer (NOT Internet Explorer) locate the files in c:\UCS\USB11A.

When you have located the folder USB11A

double click on it.
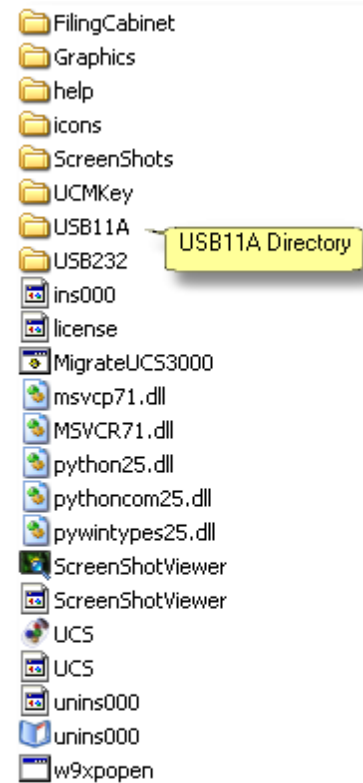
Double click on the file with the red circle icon.

Now, a DOS box will briefly appear, and then close. - That's it, the driver is installed!
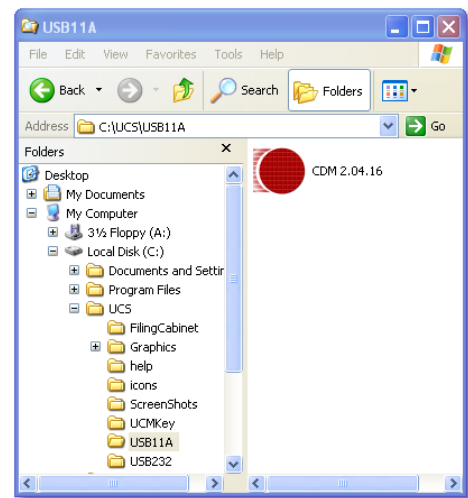
Now plug the USB11A device in.

Soon after connecting the USB11A device, Windows will tell you that it has found and installed the drivers.

5.8.2   USB-RS232 Connection

Many computers no longer come with a built in serial port and this adaptor creates a RS232 (serial) Port.

All UCM's shipped prior to September 2009 are supplied with a USB-RS232 adaptor.

USB-RS232 adaptor

In the kit of computer components supplied with your Unicore Machine you will find a USB-RS232 converter device. This device is used to perform serial communications with your Unicore machine. Normal communications ports will work but many modern computers no longer have these ports and we find that we get the best results using this USB device.

UCS detects powered up Unicore Machines that are connected no matter what communication port is being used.

Testing at AEM Cores has shown that more reliable results are obtained compared with the standard communications ports found built into older computers computers.

UCM's (prior to September 2009) and UCS use industry standard RS232 signals and cable wiring.
When the USB-RS232 adaptor is used, it adds an additional COM port to your computer.

UCS supports one Unicore Machine connection only.

5.8.2.1   Installing the USB-RS232

At the factory we install the driver for all usb ports on the supplied

computer.

Normally, there is no need to install any driver software.

The computer supplied with your Unicore Machine will have had driver software loaded in the factory. Your Unicore Machine and the computer went through their acceptance testing together - so you know it will all work when it is unpacked.

Your agent, or the AEM technician who commissioned your new Unicore Machine will have confirmed the installation of this driver software as part of the commissioning process

However, you may wish to install UCS on another computer in order to create core designs, and you may wish to communicate with your Unicore machine. Your AEM agent can do this for you.

If you are experiencing communications problems - you might wish to reinstall the driver, but do this only after you have tried troubleshooting [204] the connection.

5.8.2.2 Do I need to Install driver software?

Windows requires the driver installation to be done for each USB port that the USB-RS232 device is plugged into. If you don't connect the USB-RS232 to the same port as you installed the driver, Windows may request that a driver be installed.

When UCS software installs, it automatically installs the USB-RS232 driver for you. This means that the computer that came with your UNICORE machine has had this driver installed. During installation the installer places the driver files for this device in c:\UCS\USB-RS232.
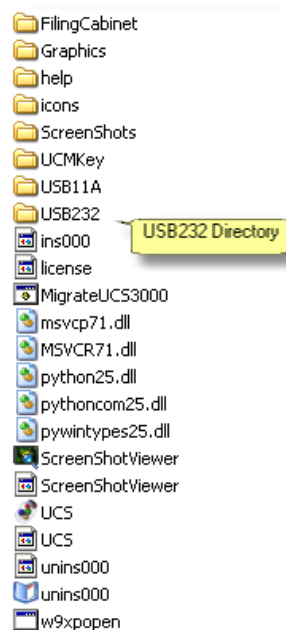
5.8.2.3   Manually Installing USB-RS232 adapter

This procedure manually starts the installation of the USB-RS232 driver. You should not need to do this.

> ⛔ Disconnect the USB-RS232 device before proceeding.

Using Windows Explorer locate the files in c:\UCS\USB-RS232.

RIGHT-click on the file SER2PL Setup Information, and select the option Install (second on the list)
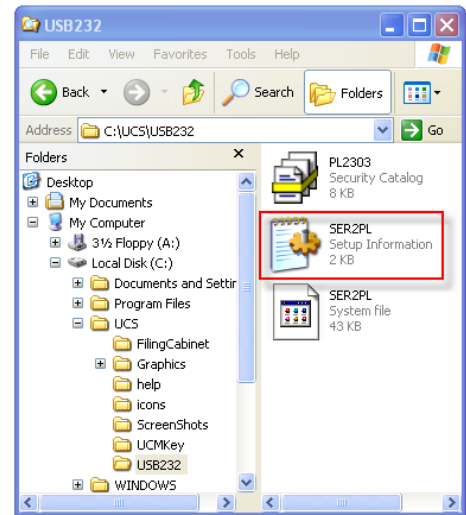
After a short delay the driver software will be installed. You will see nothing happen to tell you that this has been done.
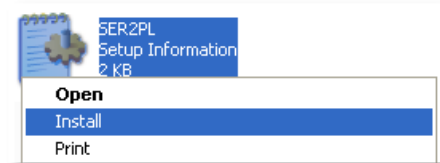
Now plug the USB-RS232 device in.

Windows will now follow the dialogs shown in Finishing USB-RS232 Driver Installation 42.

5.8.2.4   Finishing USB-RS232 Driver installation

After installing UCS from the installer program 21, or after manually installing the driver 40, Windows needs to complete the installation. This procedure assumes you have recently completed the installation of UCS or the manual installation of the driver.

To commence this final installation process connect the USB-RS232 device to your computer.

Insert the USB-RS232 device into a USB port on your computer, Windows will display this Wizard

Select the option No, not at this time, then next
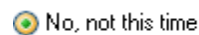
The drop down box initially contains the incorrect directory. That is D:\c:\ucs\usb232 is incorrect. The D:\ comes from the manufacturer of the ATEN device.

We need to change this to:

c:\ucs\usb232

Click on the text, make your way to the front and delete the D:\
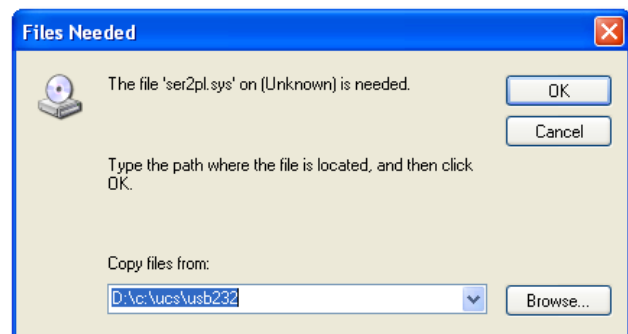
Now click OK

Windows needs to know where the driver is so either change the contents of the Copy files from box to c:\ucs\usb232 or click Browse to locate the file.

Here is the dialog sequence if you decide to use Browse:
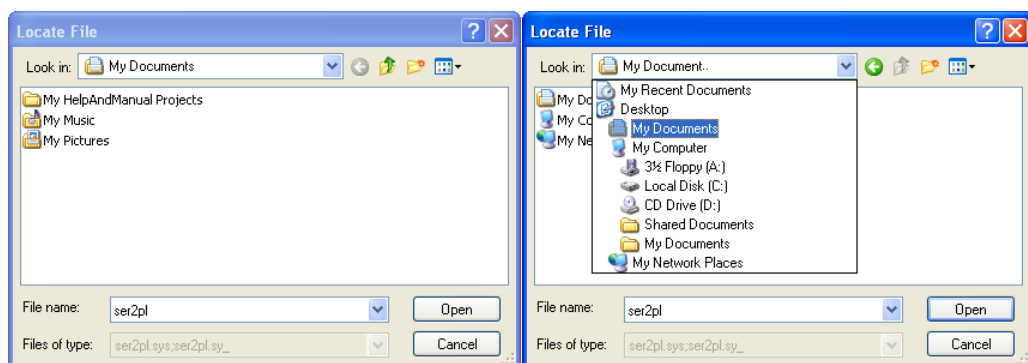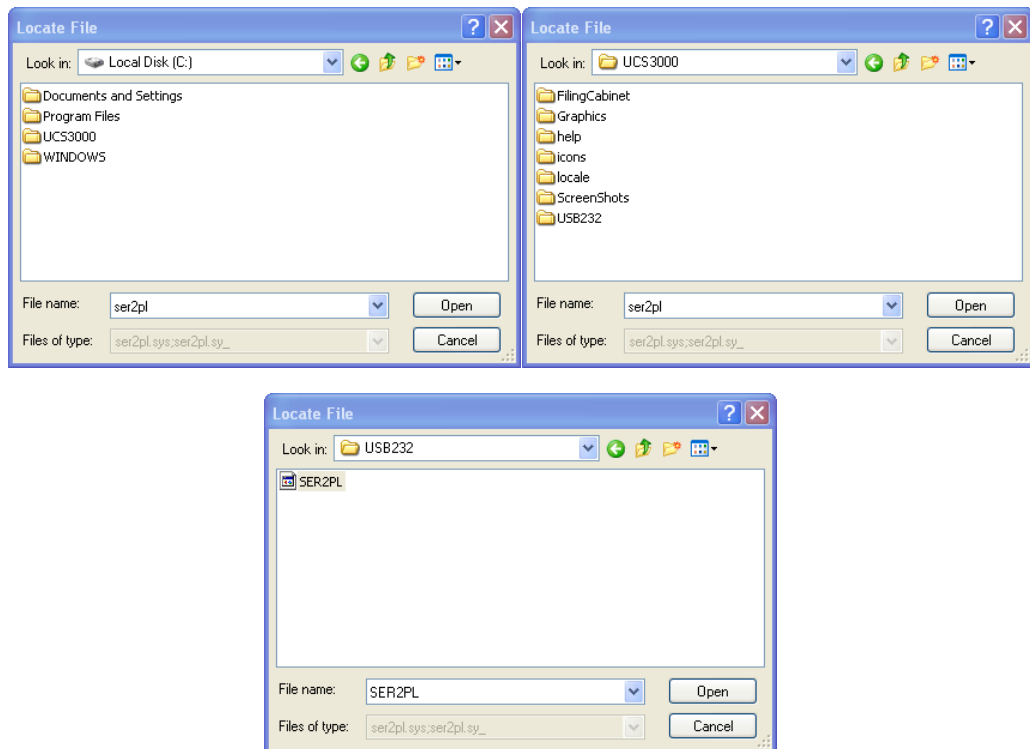
Once Windows has located the driver files, the installation proceeds
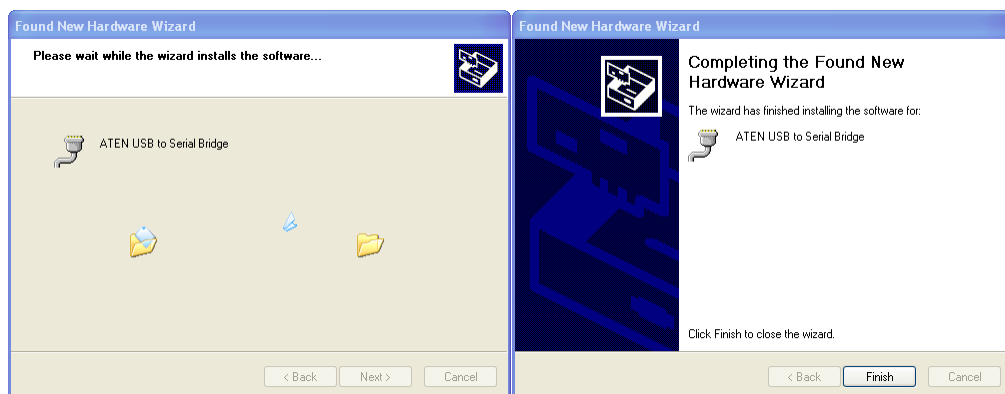
The installation has now finished and Windows is ready to use the device

AEM CORES PTY LTD

Designing and Making Cores with UCS

Part

VI

6   A First Look at UCS

This section will walk you through the displays and tell you where to find things. Then there will be a section of this manual dedicated to each screen to tell you what all the controls do. Be sure to spend some time familiarising yourself with the controls and core options. There's a lot of functionality here!

6.1   Overview

UCS has a number of major screens:
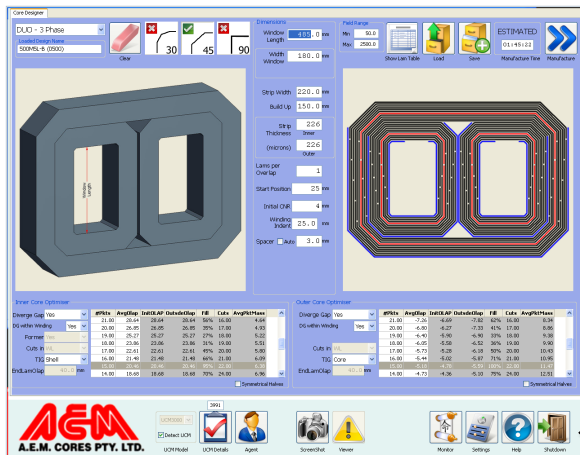
Core Designer

Used to create new core designs and save/load them.
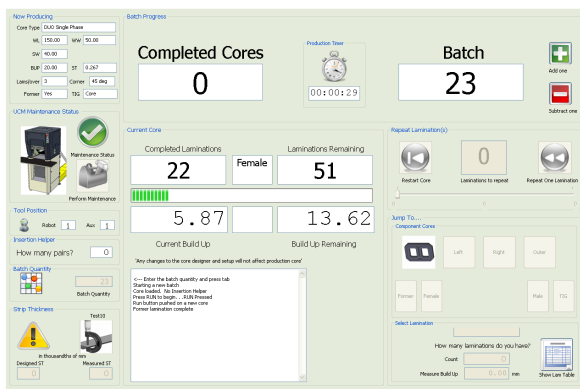
Production

Used to supervise the core manufacturing process on your UNICORE machine
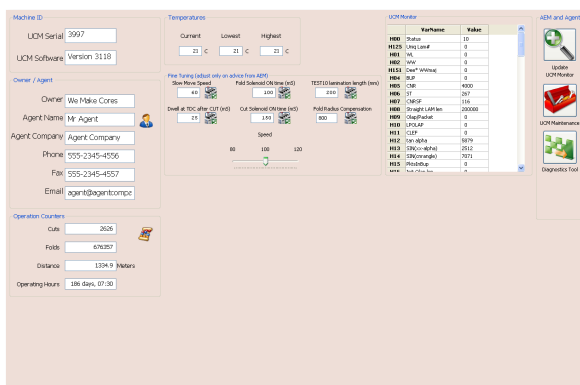
UCMDetails

Allows the setting of UNICORE machine parameters and monitoring of the machine

Maintenance

Monitors connected UCM's and lets you know when preventative maintenance activity is required.

Settings

Customise default core parameters and UCS settings.

Diagnostics

Perform Maintenance UCM movements and lets you test your UCM.

The Core Designer and Production screens are the most commonly used screens when designing and building UNICOREs. The UCM related screens are used to manage and maintain a connected UNICORE machine.

Typical operation

UCS normally starts up in the Core designer where an operator may design a core. Once the design is complete, the operator may select to manufacture the design by going to the production screen to make the core.

The Unicore machine related screens are typically only used when the UCM requires maintenance activities.

6.2   Start Menu Entries

The UCS installation program creates a new entry in your start menu called UCS.

Inside this are the entries shown to the right.
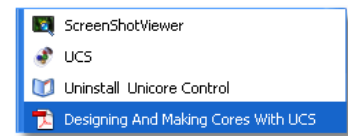
6.3   Desktop Shortcuts

The UCS places the following icons on your desktop:

Icon	Purpose
	Double clicking this icon will launch UCS. Only a single copy of UCS may be run on a computer.
	This icon will be determined by the PDF reader software you have installed. Double clicking on this icon will load the electronic version of this manual into your PDF viewing software.

6.4   Startup

On first startup UCS looks like this
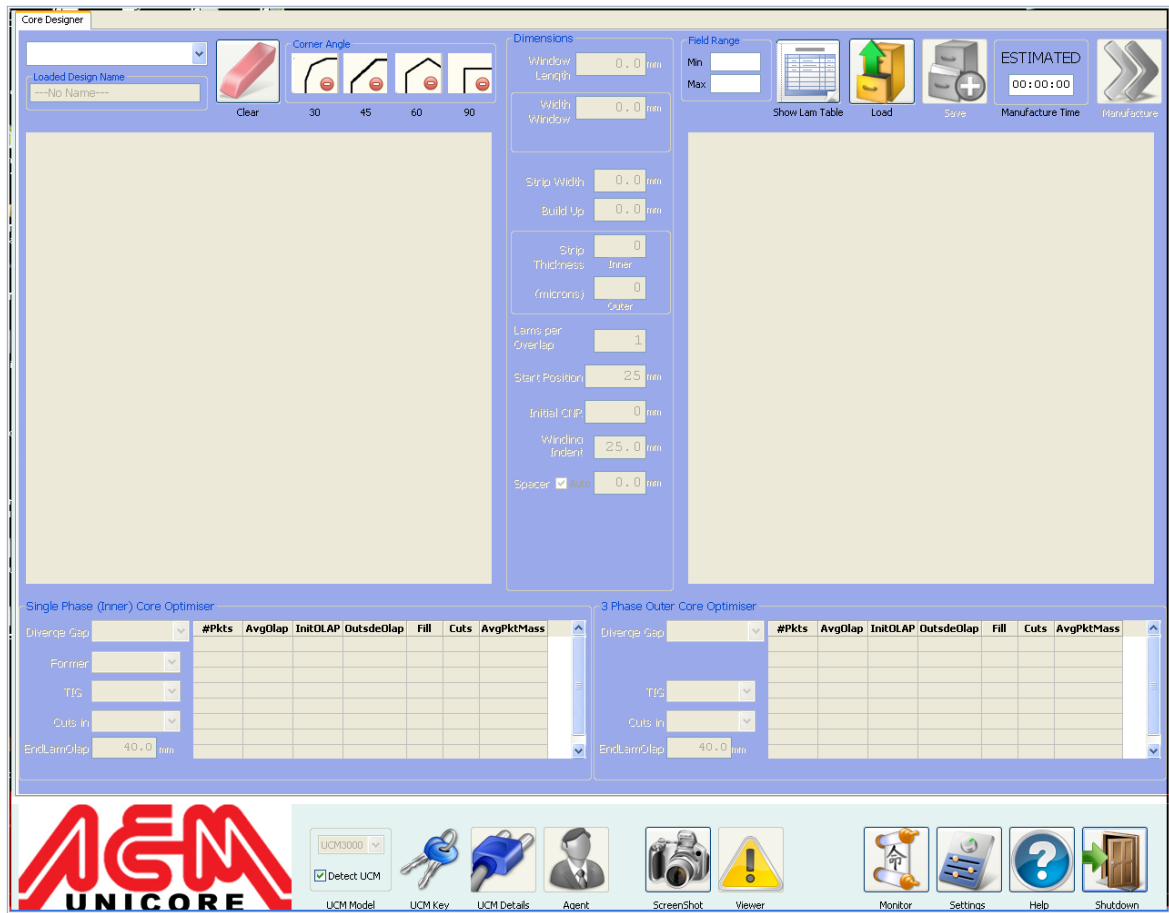
UCS after being launched

There are two halves to the screen - the upper notebook, and the lower menu panel. The screen split is the white line that appears just above the AEM logo.

The lower menu panel is coloured light blue, the remainder of the screen is the notebook, where you will design and make cores.

6.5   What version am I running?

Hover the mouse over this logo

To determine what version UCS software you are running, simply place the mouse over the AEM logo in the bottom left hand corner of the screen. It is not shown in this picture.

Text will appear identifying your version - for example: UCS $Revision: 771 $

The number indicates the exact software build you are running.

When UCS is running you will see the application button In the Windows Task bar which also
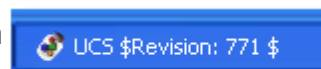
contains the name UCS and the Revision
number.

6.6 Screen Layout

Here is an overview of the UCS screen.
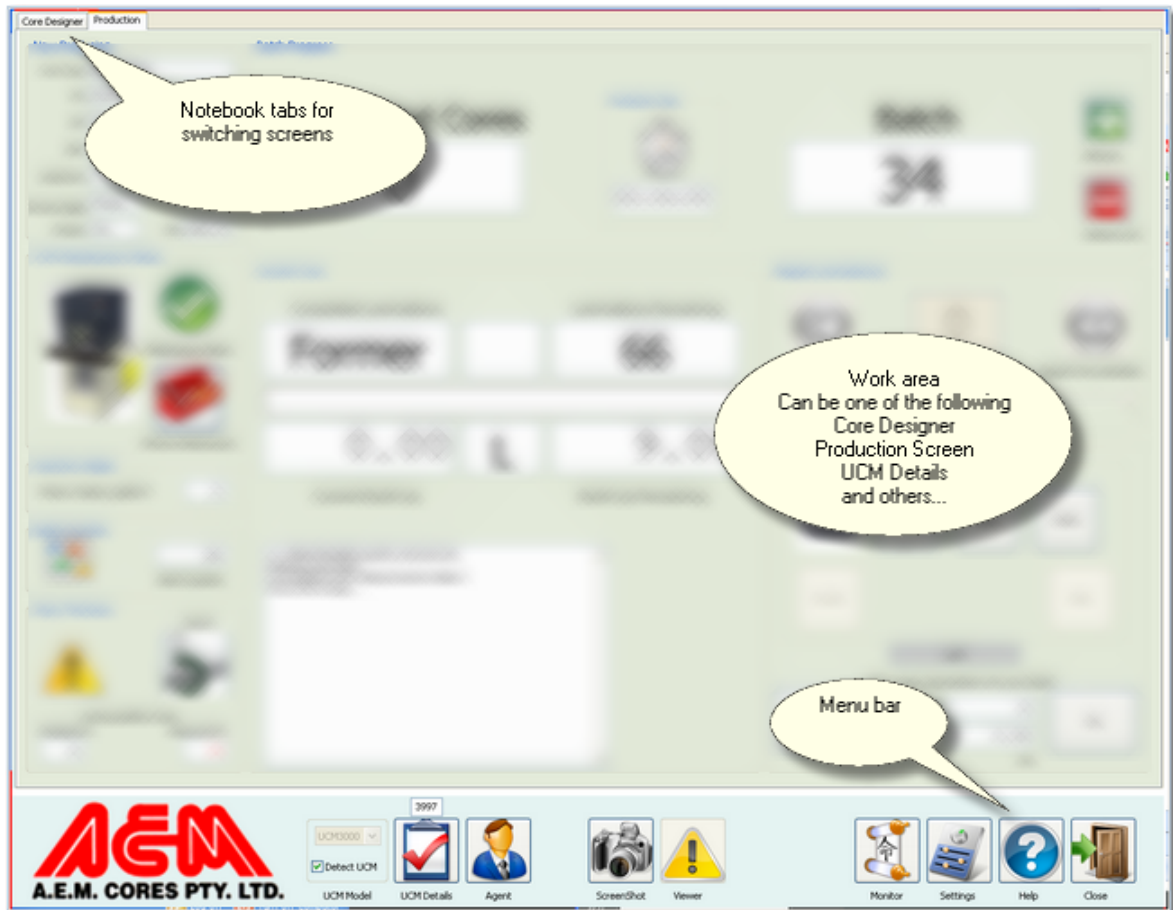
Screen Layout

The menu bar remains in view at all times.

The main bulk of the screen (the blurry area) is known as the notebook area, In this area several screens or pages of information may displayed.

6.7 Notebook Tabs

Along the top left hand corner of the notebook area there are notebook tabs. In this screen shot you can see a tab for
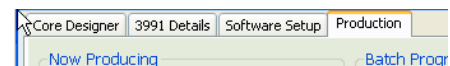
- Core Designer screen

- UCM 3991 UCM Details Screen (accessed by clicking)

- Setup Screen (accessed by clicking ![icon]( ))

- Production Screen, created from the Core Designer screen using ![icon]( )

In the above screenshot the Production page is selected, as it appears to be the tab on top.

Clicking on a screen's tab allows you to change from screen to screen. You can switch between screens at any time.

> Switching between the Core Designer screen and the Production screen does not affect the cores being manufactured in any way

> To close a tab click the ![icon]( ) icon. See [Close/Exit][60] for more information.
>
> If you close the Core Designer, then you will have to exit and restart UCS to access the Core Designer.

Hot Keys

UCS supports a small number of hot keys. These keys can be used to take you to a screen with one key stroke.

Key	Action
F1	Invokes context sensitive help
F2	selects Core Designer
F3	selects Production
F4	selects UCMDetails
F12	will exit UCS

> Note that these keys only work if the notebook tab exists when the key is pressed. For example if there is no production screen open and you use F3, nothing will happen.

6.8   Menu Panel

The menu panel is used to create new tabs or pages in your notebook, or to carry out some extra functionality.

The menu panel consists of a number of buttons which can be grey (UCM Details or Agent) meaning they are de-activated or coloured (Viewer, Settings) meaning they are available for your use.

6.8.1   UCM Simulator

When UCS cannot detect and connect to a UCM, this selection box determines what make and model UCM is used for core calculations. Each model UCM has different physical limitations, such as Fold to Cut [103] distances, this is why the model UCM matters when designing a core.

When a UCM is connected and detected, UCS uses the parameters for the connected model UCM. This may result in an automatic recalculation of a core design when a machine connects.

If there are custom settings for the connected UCM such as Strip Speed, [179] these settings will be used for calculations.

6.8.2   Detect UCM

UCS normally expects to have a UCM connected to it, however UCS can design cores without a UCM connected.

When operating UCS without a UCM connected, the automatic search and connect system interrupts the operator regularly to search for a machine which can be annoying while you are trying to design and save cores. You will see the mouse cursor regularly change to an hour glass and your typing will be interrupted momentarily. You will also see the icon on the UCM Details button change to reflect the state of the connection. A list of these icons is located in the section UCM Monitor [54].

To tell UCS to not check for Unicore machines simply click on the tick to clear the box.

This setting will be remembered from session to session of UCS.
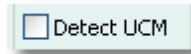
When Detect UCM is un ticked you cannot access either the "Production" or "Maintenance" screens. Any operation that would normally require a connected machine will not be available.

When the box is checked the UCS software will regularly look for a Unicore machine to connect to.

This setting will be remembered from session to session of UCS.

A correctly connected UNICORE machine will not be detected when the check box is clear.

6.8.3 UCMDetails

The UCMDetails icon has three functions.

1. Monitors the connection status of your UCM

2. When your UCM is connected it can be clicked on to access the UCM Details Screen 177 and from there access the Maintenance Screen 174 and the Diagnostics Screen 185.

3. When a UCM is connected, it indicates the UCM Serial number UCS is connected to.

UCM Connection Monitor

UCM Connection Monitoring

This table shows the different icons that may appear in reporting your UCM connection state.

Remember:

UCM status will only change if the Detect UCM check box is ticked.
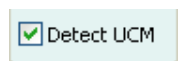
Icon	Connection State	UCM Details Page Available?
UCM not connected	This icon indicates that no Unicore machine is currently detected or connected and that UCS has not started looking yet. This icon should only occur briefly following starting of UCS and should soon change to Searching for UCM. Detect UCM 53 check box is ticked	No

Icon	Connection State	UCM Details Page Available?

Not searching for UCM. Detect UCM [53] check box is

Detect UCM

cleared.

You can't do anything by clicking on it. If you expect that your Unicore Machine is supposed to be connected then see the section on Troubleshooting Communications Issues [37]

Search

UCS is looking out of the com ports on your computer for a UCM.

You can stop UCS from searching by clearing the Detect UCM

Detect UCM

[53] checkbox.

No

No UCM

This icon appears when there is no UCM detected.

You will see the icon change to the one above whilst a search for a UCM is carried out.

No

UCM Seen

UCS has talked to your UCM.

No

UCM Connected

This icon shows that your Unicore machine is connected and communicating.

Clicking on this icon will take you to the UCM Details Screen [177]

Yes

UCM in production

This icon shows the the UCM is currently making a core.

If you install a new version of UCS, and your UCMKey has time expired, you will also see this icon. See UCMKey Time Limitations [35]

Yes

Connection problem

This icon indicates that a problem has been detected with the UCM communications.This icon only appears after UCS has talked to a UCM and communications have ceased unexpectedly or communications errors (noise and interference - welders, earthing) are occurring.

No

Icon	Connection State	UCM Details Page Available?

While this icon is displayed corrective action is possible. For example if a lead has been disconnected accidentally then it can be reconnected.

Once this icon changes back to the UCM not connected icon -

- an open Production screen will be automatically closed - the UCM will continue till the end of the current component core and then cease production.

- an open UCM Details screen will be closed

- the UCM detection process will be restarted

Stop Connecting	This icon is displayed when the Detect UCM|53| check box is cleared. It is a visual indicator that connections are not being attempted.	No
Wrong UCMKey	This icon indicates that a UCM has been detected but the inserted UCM Key is for another UCM. i.e the serial number of the UCM and the serial number in the UCM Key do not match.	No
Kick Start	This icon appears under special circumstances. Unless you are watching for it - you may not see it. It occurs when UCS can see a UCM but the software in the UCM is not running. This icon indicates that the UCM has been told to start running it's internal software. It is normal to see this icon only during software upgrades. If you see this icon during general operation, you should investigate power supply quality and check that you are not welding close to the UCM. Make sure your electrical earthing system is working properly.	No

6.8.4   UCMKey

Each UCM comes with a special digital key, called a UCMKey|31|. This is used to protect our software, and doubles up as an UCM inhibit key. With the UCM Key removed, UCS will not communicate with the UCM, more than to discover what UCM (if any) is connected.

If no UCM Key is inserted into your machine, you will see these two Key Hole icons slowly flash. This is designed to draw your attention to the fact that the UCM Key is missing

The UCMKey needs to be inserted into the USB port before UCS will communicate with a UCM.

When the correct key for the UCM is inserted in the computer the icon will change to a blue set of keys. This is known as the customer key.

AEM Cores Staff keys are indicated by an orange key.

6.8.5   Agent

The Agent icon only operates once your Unicore machine is connected and communicating. This is because the agent information is associated with the actual machine.

When you see the grey Agent icon it means that the Unicore Machine is not connected and thus no Agent information is available.

The Agent screen shows contact details for the Agent who sold you the machine. No more looking for phone or email details in the office - it is right here on the machine.

It is a simple window which can be closed using the normal X in the top right hand corner.

6.8.6   ScreenShot

The screen shot feature lets you record exactly what you are seeing on the screen. Screen shot is always available. It is provided to help you record the information your seeing on the screen, and as an aid to reporting software bugs that you may encounter.

Clicking on this icon immediately captures the contents of the UCS display. A shortcut key of F11 works too.

When you click on the screen shot button the icon will briefly change to this screen shot in progress icon.

See also Screenshot[199]

6.8.7 Screen Shot Viewer

Screenshot viewer is a separate application that can be used to view your screen shots. It can be called up from within UCS and will not interfere with what ever you are doing within UCS.

Screen shot viewer can also be launched on it's own - without UCS running. Look for it in your start menu in the UCS group.

Clicking here will start the screen shot viewer application. Switch between the viewer and UCS using Alt-Tab

If you should see this warning symbol in place of the viewer icon above it means that UCS cannot locate the Viewer application. The Viewer application is installed by the install program and as such should always be there.

If you see this icon, please notify AEM Cores.

6.8.8 Message Monitor

Internally UCS uses a messaging system to trigger activities between the different screens.

For example the module that talks with the UCM sends messages about connection states for any other module that is interested.
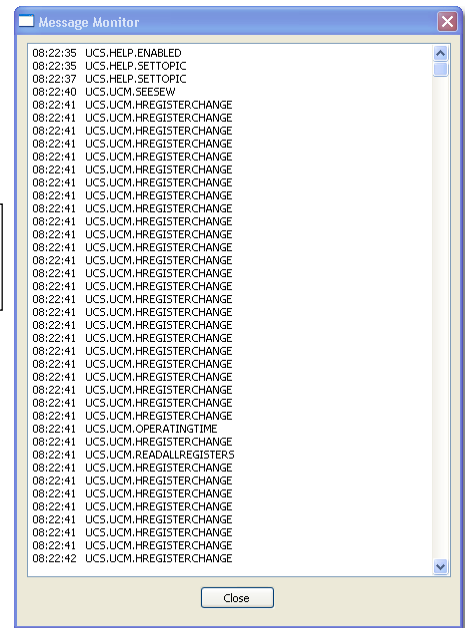
The message monitor button pops up a window which displays the messages travelling around the system.

<table>
<tr><td>ℹ️</td><td>This is normally of no interest to operators.</td></tr>
</table>

However, should problems occur we may ask you to display the message monitor and let us see what messages are being passed.

It is normal to see the same message repeated many times.

Message Monitor
```
08:22:35  UCS.HELP.ENABLED
08:22:35  UCS.HELP.SETTOPIC
08:22:37  UCS.HELP.SETTOPIC
08:22:40  UCS.UCM.SEESEW
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.OPERATINGTIME
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.READALLREGISTERS
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:41  UCS.UCM.HREGISTERCHANGE
08:22:42  UCS.UCM.HREGISTERCHANGE
```
[Close]

Moving and Closing

You can move the Message Monitor window around the screen and it will 'float' on top of UCS no matter what notebook tab you switch to.

To move the window, left-click the blue top border and drag the window to a new position. You cannot resize this window.

To close the Message Monitor window click the close button.

6.8.9 Settings

This icon opens the settings page and is available any time. See Setup Screen 59

6.8.10 Help

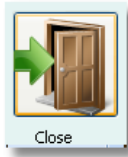The help icon activates the help system. It can be used at anytime.

The help system contains the same information as the printed manual.

Online you will see that many of the related topics are linked so that you may jump around the information as you require.

6.8.11 Close/Exit

This button performs 2 functions, closing notebook pages and exiting UCS.
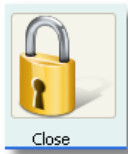
Normally it closes the currently selected notebook page.

To exit UCS you must click on the Close/Exit icon once for each open notebook tab. On the last tab the label under the icon will indicate Shutdown

> The special key combination ALT-F12 will close all notebook tabs and exit immediately.

Current page is locked and cannot be closed.

This happens during production of cores to show that the production screen cannot be closed during manufacture.
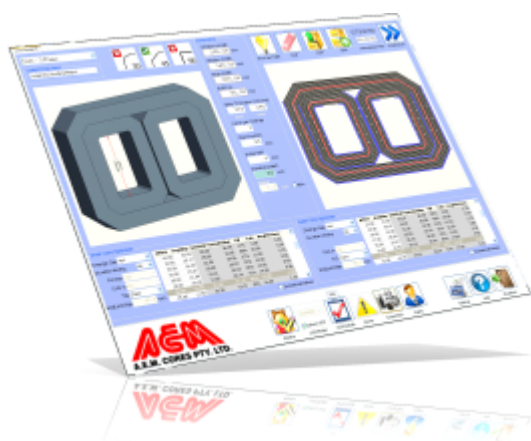
> You can release the production lock by placing the UCM in hold.

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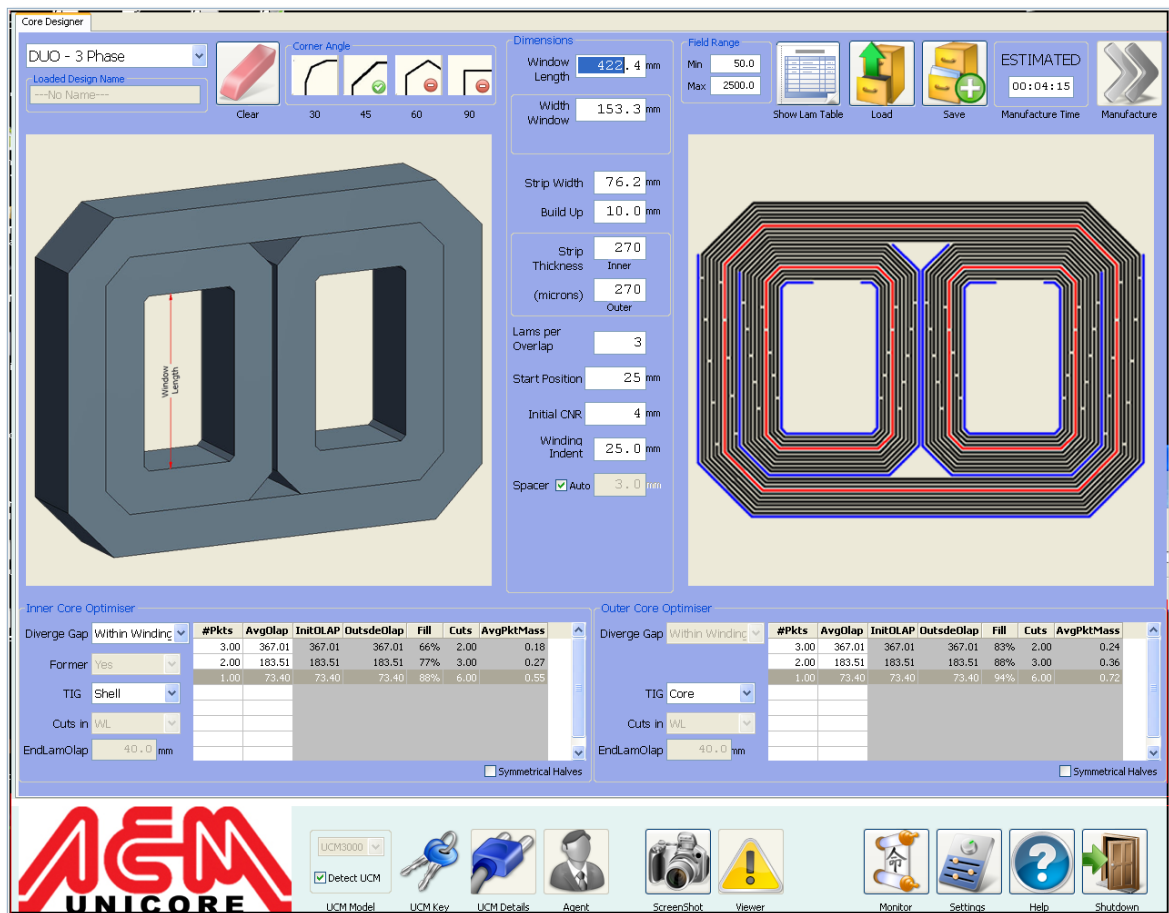**UNICORE**

Designing and Making Cores with UCS

Part

VII

7   Core Designer Screen

This section will introduce you to the Designer and then give an example of using the Core Designer to design a core.

UCS Core Designer with a 3 phase design loaded

This topic explains the many controls and areas of the designer screen. Later sections will explain each control in detail.

Closing The Core Designer Screen

If you click on the icon in the menu bar the Core Designer will close. If the Core designer is the only <u>tab</u>⁵¹ open in the <u>notebook</u>⁵¹ then UCS will close completely. You will not be asked if you wish to save your design.

7.1   Normal Workflow

When using the core designer there is a natural work flow. You don't have to follow this work flow, but it is recommended as parameters later in the workflow have their allowable ranges calculated from the values entered in the earlier parameters.

First: Decide if you are going to design a new core or load a previously saved design. I you are going to load an existing design use the Load button.

For the purposes of discussion we will assume you are to design a new core.

This diagram shows the general work flow using a red arrow.
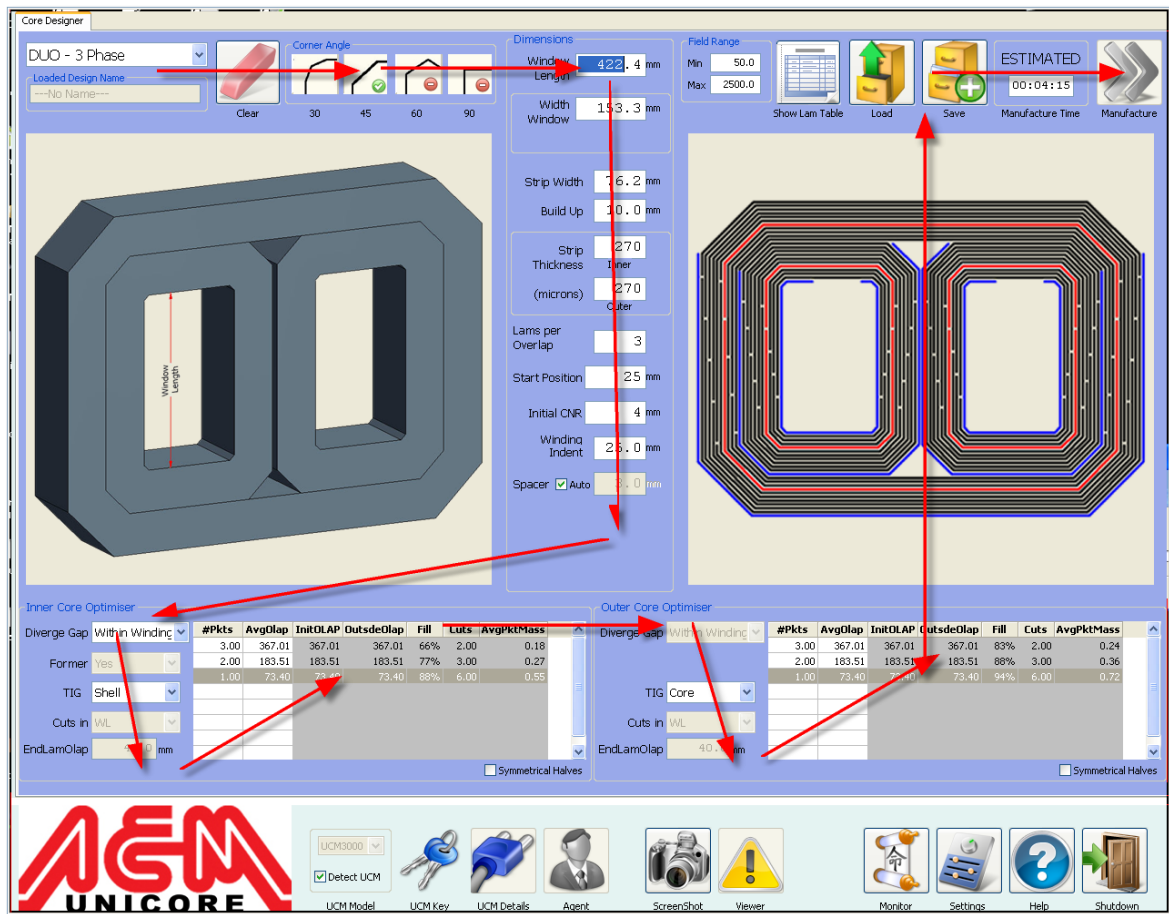
Work Flow

New Design

- Start with the core face selector and choose the type of core you wish to design.
  UCS will then fine tune its display for your chosen core type.
  You will notice that several parameters are automatically filled in with default values.
  Some parameters are disabled - these are not suited to your selected core.
  Some parameters may change completely, or new ones will appear.

An example of this is Core Gap, which will display two new fields not used by any other core, the Gap distance and the Gap offset fields.
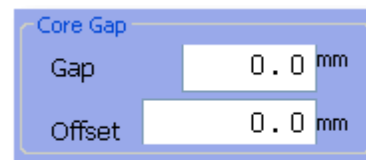
- Now select your corner geometry

- Now work down the middle of the screen starting with Window Length and Window Width.

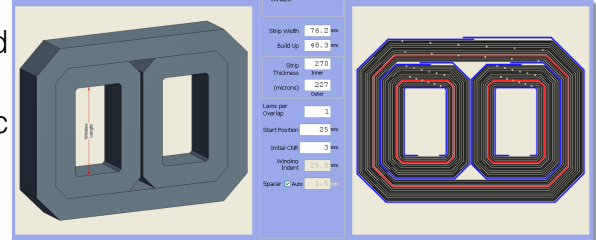- As you move from field to field note the parameters bounds being displayed in the Field range display. These bounds are calculated for fields as you enter data.

- At the same time as you move from field to field you will notice the two main illustrations change to give diagramatic representations of the parameters you are entering.

- At some stage as you fill in parameters in the middle you will see that the core optimisers 97 will populate. (Note the outer optimiser will only populate with solutions when designing 3 phase cores.)

This means that enough design parameters are now entered that the core optimiser has begun to optimise your design. If this area is not filled in - your design will not be made available for manufacture. The optimiser continuously calculates the optimum design as you enter any input from this point onwards. Note also that the manufacture button will illuminate at the same time - this means that the design is complete enough to manufacture, however you may wish to further fine tune your design.

- For all cores single and three phase work your way down the left hand side of the left hand optimiser (the Single Phase Optimiser) selecting the options you require. You will notice that some options change the values in the optimiser tables, this is normal.

- If you are making a three phase design, you should now work through the options on the left hand side of the right hand optimiser or Three Phase Outer Optimiser.

- When you have finished making your entries and selections, click the manufacture button to proceed to the production page.
  See [Manufacturing Button](71) for information about why this button may not illuminate.

7.2 Core Face Selector

The core selector lets you chose the type of core you wish to manufacture.

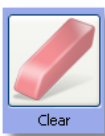Until a core face has been selected the core designer will not accept any input

When selected this drop down box gives a list of the various types of cores that can be produced.

You may change core types at any time, but if you do, many settings will be returned to the default settings. You should review all of your settings. This feature can be handy for designing a core with one face and then comparing alternate designs of the same physical dimensions.

Note if you attempt to select a separator line ---- no core will be chosen.

```
DUO - Single Phase
DUO - 3 Phase
----------------------
DDGAP - Single Phase
DDGAP - 3 Phase
EOLAP - Single Phase
EOLAP - 3 Phase
INCDGAP - Single Phase
----------------------
Step Butt - Single Phase
Butt2 - Single Phase
Butt3 - 3 Phase
----------------------
UnCut - Single Phase
Triangle - Single Phase
Core Gap
DEE - Single Phase
DEE-BUTT - Single Phase
Straight Lam
```
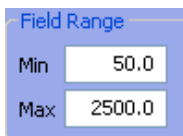
7.3 Clear Designer Form

The Clear function allows an operator to clear the entered information out of the Core Designer page. This is used to reset the entire page not individual sections.

7.4 Field Range

This box shows the range of values that UCS will permit you to enter into a numeric field. As you move around the Core Designer this values will change to indicate the minimum and maximum allowable values for the field you are currently entering data in.

Field Range
Min 50.0
Max 2500.0

As you enter each parameter of your core design, UCS re-calculates and will change underlying settings. In particular minimum and maximum values for many of the input fields will change.

This might cause some frustration to users as some values will not be permitted when at other times they are in various input fields, Be sure to carefully study the

core you are designing in the both the Core Faces|107| section and the individual Core Parameters|75| sections.

7.5   Lamination Table Display

Lamination Table Pop Up The lamination table display button pops-up a window showing the current lamination table and some of the calculated design parameters. Normally it is not used in day to day operation, but it can be useful for studying the set of laminations that will be produced for your core design.

The Lamination Table Screen displays the lamination table solution for the core you have defined in the Core Designer. You should not need to refer to it during the normal production of cores. However, it is a valuable diagnostic tool.

Moving and Closing

You can move the Lamination Table window around the screen and it will 'float' on top of UCS no matter what notebook tab you switch to.

To move the window left-click the blue top border and drag the window to a new position. You cannot resize this window.

To close the Lamination Table window click the close button.

***Gender Change *** highlights the change from female to male half in DUO cores.

Lam #	Lam Olap	Lam Pkt	Pkt #	Gen	BuildUp
001		Former			0.270
002	001	001	001	0	0.540
003	002	001	001	0	0.810
004	003	001	001	0	1.080
005	001	002	001	0	1.350
006	002	002	001	0	1.620
007	003	002	001	0	1.890
008	001	003	001	0	2.160
009	002	003	001	0	2.430
010	003	003	001	0	2.700
011	001	004	001	0	2.970
012	002	004	001	0	3.240
013	003	004	001	0	3.510
014	001	005	001	0	3.780
015	002	005	001	0	4.050
016	003	005	001	0	4.320
017	001	006	001	0	4.590
*** Gender Change ***					
018	001	001	001	1	0.270
019	002	001	001	1	0.540
020	003	001	001	1	0.810
021	001	002	001	1	1.080
022	002	002	001	1	1.350
023	003	002	001	1	1.620
024	001	003	001	1	1.890
025	002	003	001	1	2.160
026	003	003	001	1	2.430

Close

The Lam table for the DUO family can be misleading. It shows what the operator would measure as they made the halves not the theoretical build up.

That is, whilst making the male half - the former doesn't get represented in a measured build up The TIG lamination doesn't show up in the female measured build up either.

7.6   Saving and Loading Cores

UCS allows you to save your core designs for later recall.

The core files default to a location called the Filing Cabinet. The FilingCabinet (note no space) folder is located inside the directory where UCS is installed.

Like any other Windows application you may use the File save or load dialog box to save or load files from anywhere.

You may create folders within the Filing Cabinet to organise your saved cores anyway you like.

Core files are assigned this icon. This image shows a core definition file called Order254678 in Windows Explorer.

AEM recommends that you keep your core design files in the Filing Cabinet 29 directory. This will make them easier to find and will ensure that they are protected during future upgrades of UCS. They are also easy to backup from that location.

See also Files and Folders 29

7.6.1   Load Design

Selecting the Load button will allow the operator to load a previously saved core design.

This feature saves time by allowing an operator to quickly and easily start a recurring job without having to enter in the specific core dimensions.
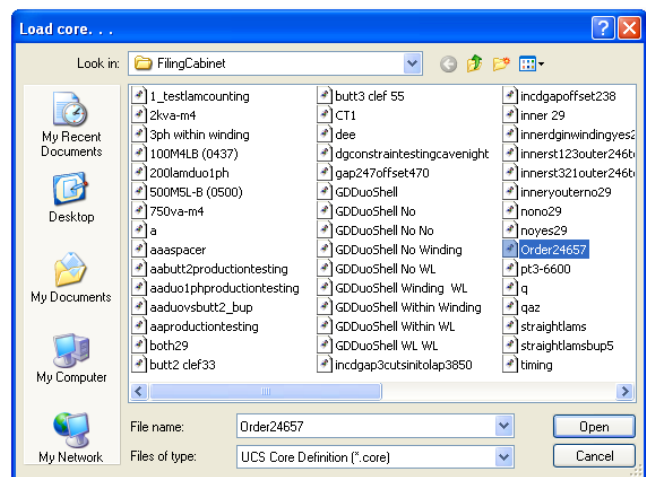
It also permits production managers to enter the design of several cores and save them, ready for future operating shifts.

When UCS starts the Loaded Design Name box appears empty
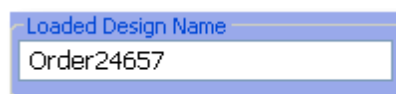
Loaded Design Name
---No Name---

If you click on A Windows file dialog will appear. It will open inside the Filing Cabinet directory.

Select the core design you wish to load and click open.

When you load a previously saved core design, the Loaded design name appears in the box.

If you edit the core in the core designer the loaded design name will not change, and there is no indication that a save is required. This is because AEM Cores expects an engineer to design the cores, and then designs will be reused, and not change. It's best to save changed designs under a new name, then should a lamination become damaged for the old design, you will have the core design ready to make replacement laminations.

7.6.2 Save

The Save feature allows for an operator to save the current core design for later use.

This enables the operator to keep a file of recurring jobs and save any unfinished jobs for a later date.

The saved cores are located in a directory called Filing Cabinet in the directory where UCS is installed.

If you click on A Windows file dialog will appear. It will open inside the Filing Cabinet directory.

In the File name drop down list, type a new name for this core, or select an existing design name to overwrite.
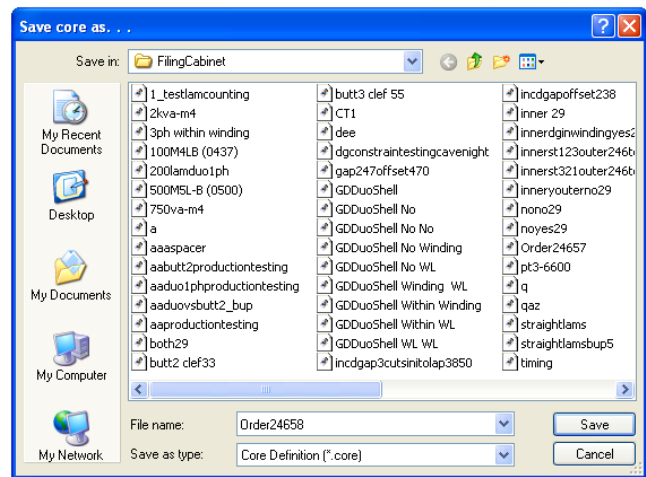
When you save a core design, the Loaded design name appears in the box.

7.7 Core Time Estimate

The core time estimator, **ESTIMATES** the amount of time it will take for your UCM to manufacture the core currently shown in the designer screen.

NOTE This time is an **estimate** and your UCM will generally be within 10% of this time manufacturing the core.

The actual time to manufacture a core will depend on

- wether the operator enters hold for any reason

- the operator repeats any lamination

- If insertion helper strips are selected

- air pressure supplied to the machine is low or not correctly regulated

- actual line voltage supplied to the machine

- ambient temperatures

- Mechanical condition of the machine

- Changes in strip density

- Changes in strip width

You can use this estimated time, as a starting point for calculating the cost of

making a batch of cores.

| | Tolerance.+/- 10% when UCM run at 100% feed rate See Strip Speed 179 |

| | If a core design is created with no UCM connected the estimated time will be calculated using factory default settings for a UCM of the model selected in the UCM simulation choice. See UCM Simulator 15 |

| | If there are custom settings for the connected UCM (such as Strip Speed) 179 these settings will be used for the time calculations.

Be aware that the estimates are specific to the model UCM selected or connected. |

7.8   Manufacturing Button

Manufacture (UCM ready)

The Manufacture Button is only used when an operator has completed entering all the information needed into the Core Designer page, the core designer has accepted your design, calculated the lamination deck, and is ready to progress to the Production page.

Manufacture (unavailable)

Selecting the blue Manufacture button will take the operator to the Production page 139. This button becomes blue once enough information on your design has been entered to arrive at a core. You may need to adjust some other design parameters before you manufacture.

When grey you cannot proceed to the production page. Manufacturing cannot take place as the current Core design is either incomplete or invalid.

There are a number of conditions which will prevent the illumination of this button:

- Your core design is incomplete - some input boxes are not filled in.

- Your parameters are out of bounds (not physically possible). Look for cells with a different coloured background.

- There is no attached UNICORE machine to manufacture the core on.

- You have a UNICORE machine attached but it is turned off.

- A problem with communications between UCS and the UNICORE machine.

- Your UCMKey is not inserted into the computer.

- The Detect UCM check box is cleared, so no UCM is being detected if though it is connected correctly and turned on.

7.9   Core Images
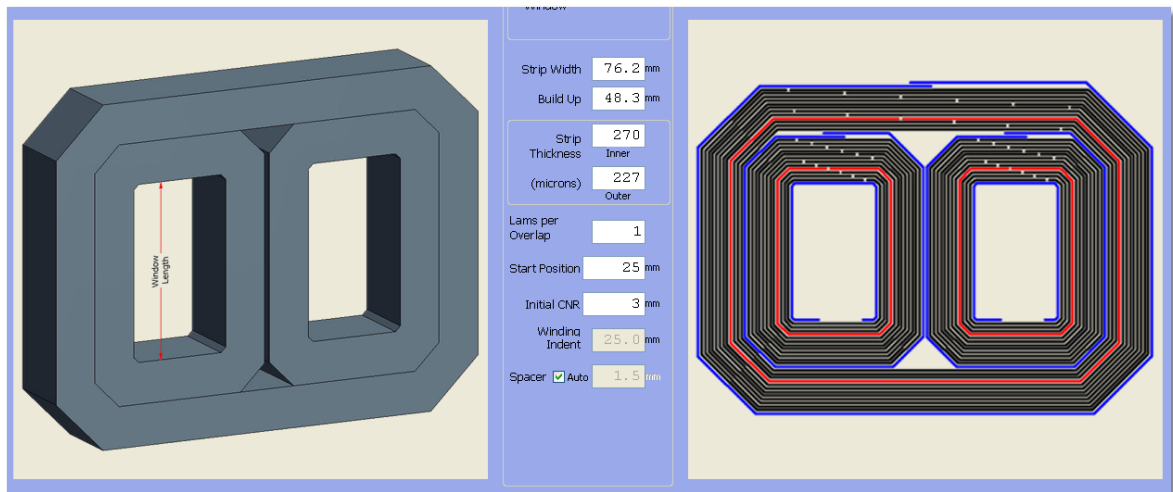
The middle slice of the Core Designer Screen shown the 3D core dimension image and the lamination layout image

There are two large images used as a visual aid whilst entering parameters.

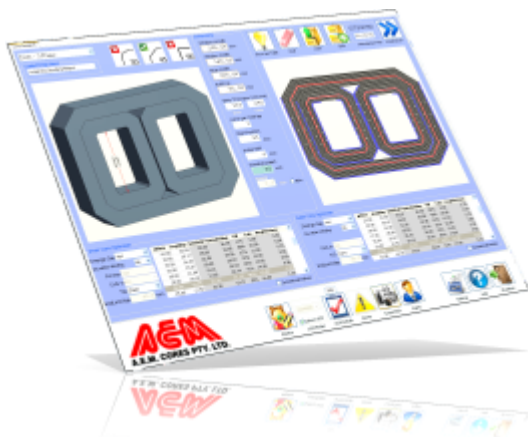The left hand image is a three dimensional view used to indicate the dimension being entered on the core.

The right hand image shows a two dimensional view of the laminations.

As the operator moves from input field to input field the images change to illustrate the parameter.

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Designing and Making Cores with UCS

Part

VIII

8   Core Parameters

Before investigating each parameter in depth, here's a short introduction to the way the input fields operate.

Upper and Lower Limits

UCS's Core Designer reconfigures the input fields to suit the core face the operator selects. Further, UCS implements input parameter boundaries dynamically, that is they change as each user input entered requires them to change.

UCS imposes upper and lower limits on all input fields. This is to ensure that the Core Designer cannot design cores that the UCM cannot manufacture.

These upper and lower limits are called out in each field using a display like this:

4.0mm

Lower Limit

999.0mm
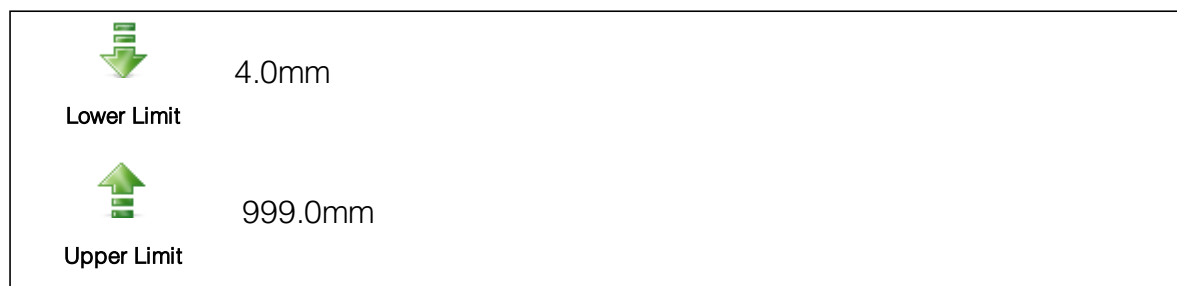
Upper Limit

When you enter a field UCS displays the upper and lower limits for the field in the Field Range display
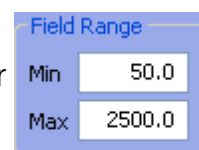
Each time you enter a parameter, UCS recalculates the core and it's lamination table, UCS also evaluates any change in the Min/Max range for all fields. On larger cores you may not notice this, but as cores get smaller and dimensions begin to approach the physical limitations of the UCM, You may notice:

- some parameters Min/Max change frequently
- some parameters may assume a certain limiting value,
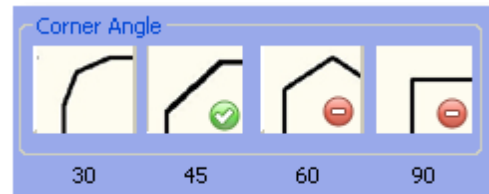- others may no longer be available for user input, or may become available for input.

The following sections detail each of the input fields and their use.

8.1   Corner Angle

The corner angle selector is used to specify what geometry you would like on the corner folds. UCM's support 4 corner angles:

- 30

- 45

- 60

- 90

Corner Angle Selector

Depending on the type of core, various core angles can be set. Some core types don't permit the selection of some core angles.

You will be shown what selections you are permitted to make via a small icon in the bottom right hand corner of each corner selection button.

No icon indicates this corner is available for selection.

A small green tick indicates the currently selected corner angle

A red - indicates that this angle cannot be selected for the selected core face.

This corner angle selector shows that,

- 30 degrees is available for selection

- 45 degrees is currently selected

- 60 degrees is not available for selection

- 90 degrees is not available for selection
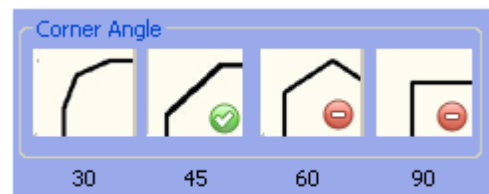
Corner angle selector

On a UNICORE, corners are formed by first making a fold then leaving some space, then making a second fold. Thirty degree corners have a further space and fold. The difference between corner angles is the distance between the folds and the number of folds in the corner.

Each lamination in the build up, has a different distance between the folds to enable wrapping of the outer lamination around the inner lamination.
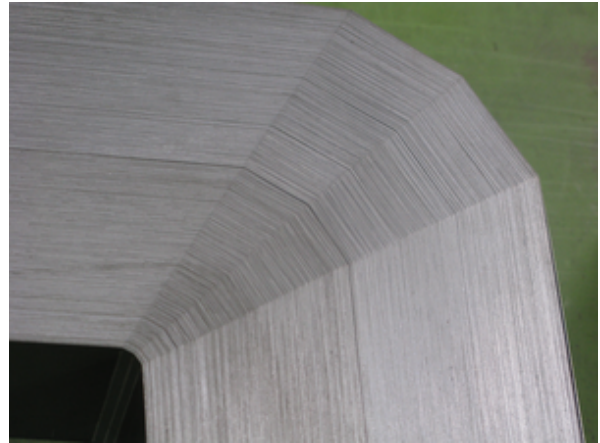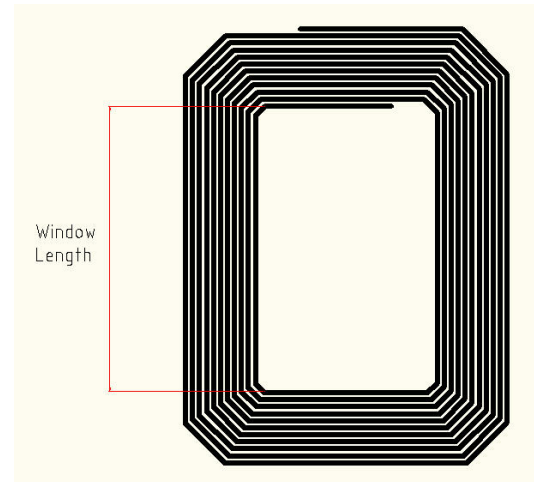

30 Degree Corner

8.2   Window Length

Window length is defined as the long length of the core Window including 2 core corners. It is entered in millimetres and has the following limitations.

50.0mm

Lower Limit

2500.0mm

Upper Limit

Window Length Includes the Corners

If you need one of the Window's dimensions to be smaller than 50.0, Window Width's lower limit is 20.0mm.

 Cuts in the core face are normally placed in the Window Length leg. However on most faces they can be moved to the Window Width leg using the setting Cuts in WL/WW 103

Enter the Window Length here in millimetres.
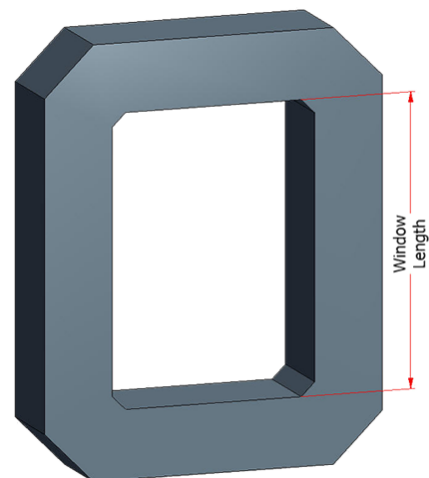
Window Length

For 3 phase cores this is the Window Length of the inner cores. The outer core Window Length is automatically calculated for you.
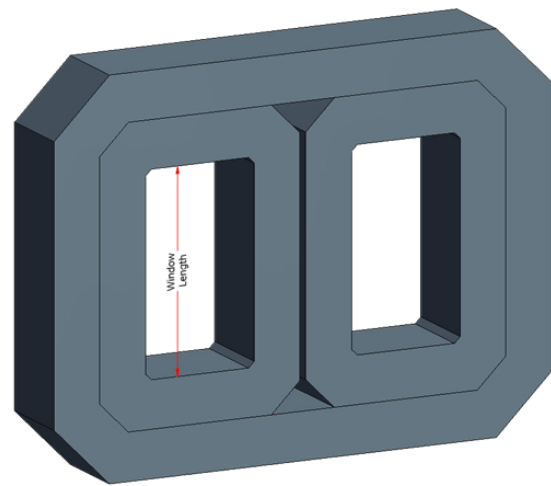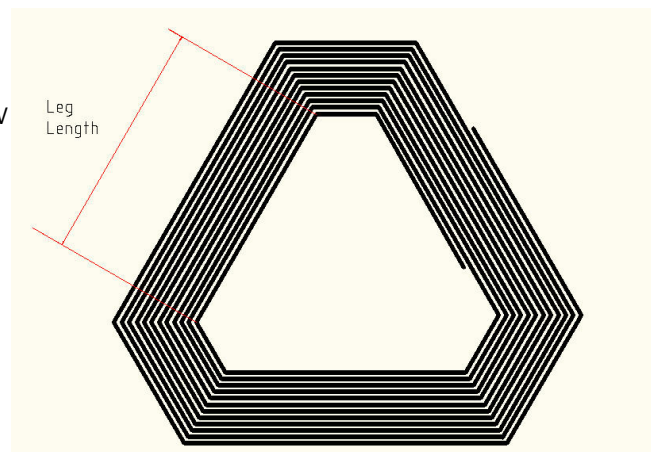

3 Phase Window Length

When making triangle cores the Window Length input field is renamed to Leg Length. Unlike all other cores, the Triangle core is defined with leg length between the inner folds, not the traditional Window Length which includes the folds.

Leg Length

Leg Length - corners NOT included

See Triangle Cores 126

Window Length Threshold

Short Window Lengths (typically less than 160mm) are difficult to manufacture as the folded strip fouls on the Unicore Machine body during manufacture

> This setting can be altered by using the Smallest Window Length Threshold 172 setting the in Settings Page 59.
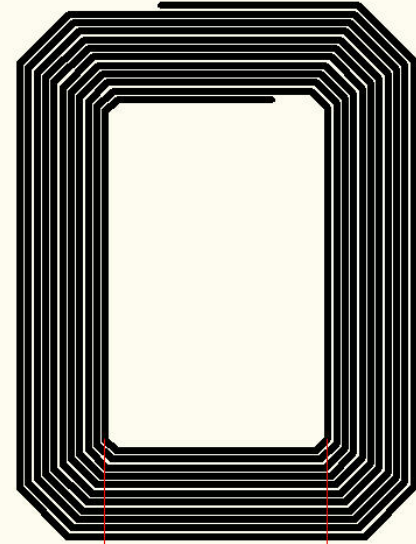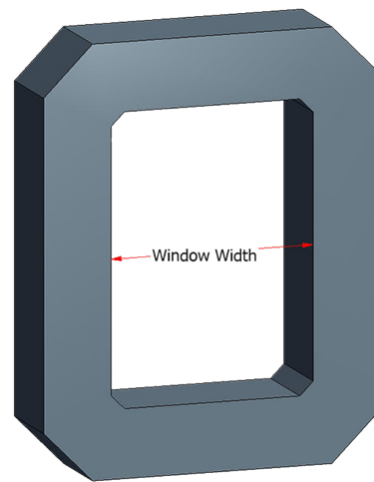
8.3   Window Width

Window Width is defined as the short length of the core Window including 2 core corners. It is entered in millimetres and has the following limitations

20.0mm

Lower Limit

2500.0mm

Upper Limit

Short Window Widths (typically less than 160mm) are difficult to manufacture as the folded strip fouls on the Unicore Machine body during manufacture

Cuts in the core face are normally placed in the Window Length leg. However on most faces they can be moved to the Window Width leg using the setting Cuts in WL/WW[103]
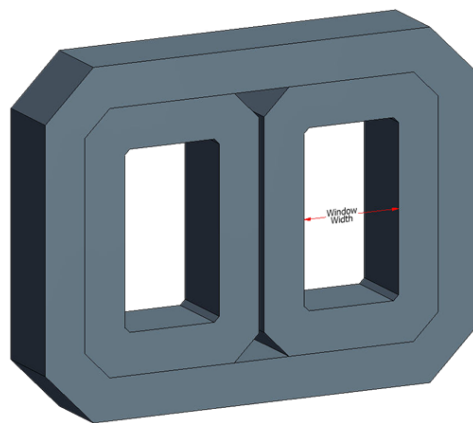
Window Width includes 2 corners

Width Window   140.0 mm

Enter the Window Width here in millimetres.

Window Width

For 3 phase cores this is the Window Width of one of the inner cores.

The Window Width for the outer core is automatically calculated for you, taking note of the spacer width 93 and the corner angle 76 you have selected.
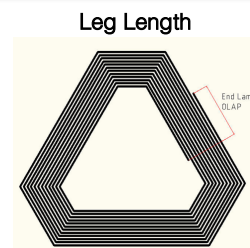

When making Triangle cores 126 the Window Width input field is no longer available.
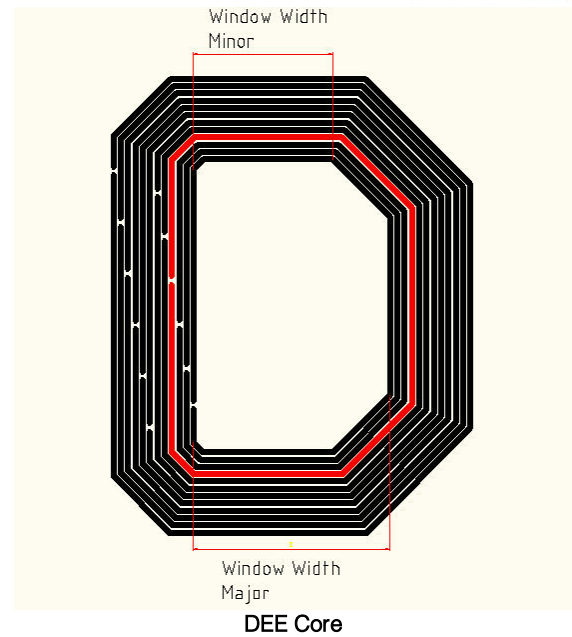
See Triangle Core 126

Leg Length

Triangle Core

When making DEE 130 cores, 2 Window Width input fields are available.

The first input field is for the minor (smaller) Window width and the second field is for the major (or larger) Window width.

Window Width Major and Minor

|	
Lower Limit	Window Width Major must be 5.0mm larger than Window Width.
Upper Limit	50% of (Window Length - Window Width - 5.0mm) mm

DEE Core

When making <u>DEE-BUTT</u>[132] cores 2 Window Width input fields are available.

The first input field is for the minor (smaller) Window width and the second field is for the major or larger Window width.

Window Width Major and Minor

Lower Limit	Window Width Major must be larger than 2 * <u>Fold Cut</u>[103]
Upper Limit	50% of (Window Length - Window Width - 5.0mm) mm
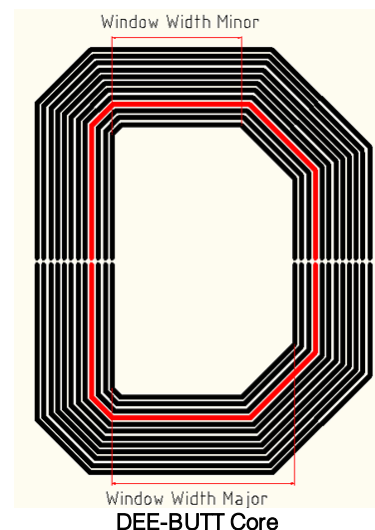
Q: Why do I enter the short Window Width before the long Window Width?

A: The short Window Width is the length where the cuts will be located. See also <u>Cuts In WL/WW</u>[103]

See <u>DEE Core</u>[130] <u>DEE-BUTT Core</u>[132]

DEE-BUTT Core

8.4   Strip Width

Strip Width is the width of the strip used in millimetres. The value you enter is used in calculating the best solution for your core.

Strip Width   150.0 mm

⬇ **Lower Limit**	10.0mm
⬆ **Upper Limit**	Physical limit of UCM mouth
	UCM3000 300.0mm
	UCM4000 300.0mm

ⓘ When making two cores at the same time, enter the widest strip width for best results.

Strip Width

It is also used to calculate the average mass 97 of a packet of laminations for the core, helping you to pick the best designs from the operator handling point of view.
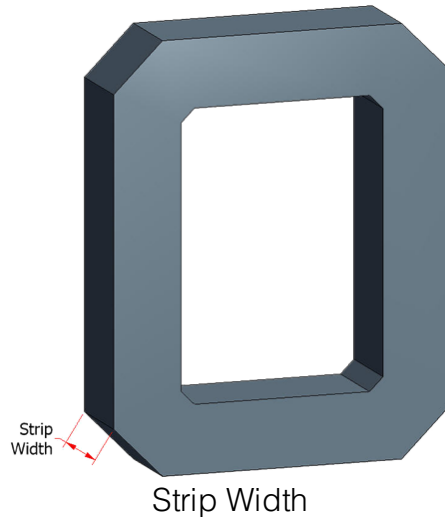
#Pkts	AvgOlap	InitOLAP	OutsdeOlap	Fill	Cuts	AvgPktMass
89.00	143.55	115.16	171.95	100%	2.00	0.24
60.00	71.78	57.58	85.97	33%	3.00	0.35
45.00	47.85	38.39				0.47
36.00	35.89	28.79				0.59
30.00	28.71	23.03				0.71
26.00	23.93	19.19			.00	0.82
23.00	20.51	16.45	24.56	25%	8.00	0.94
20.00	17.94	14.39	21.49	77%	9.00	1.06

Strip width is used to calculate average packet mass per overlap

Average Packet Mass

8.5   Build Up

Build up is the measurement of the height of the lamination stack.

Lamination stack height is terminology better suited to the old stacked cores method of core construction and doesn't really reflect what is happening in UNICORE. So we use the new term Build Up.

| Build Up | 96.0 mm |
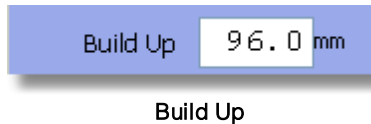
Build Up

The Build up you enter is divided by the entered Strip thickness to calculate the number of laminations in the core. This is why the value you enter for strip thickness is critical to core quality.

See Strip Thickness 85 and The Importance of Strip Thickness 87

4.0mm

Lower Limit

999.0mm

Upper Limit

Build Up

Build up for a 3 phase core is the measurement across the inner and outer cores - or the total lamination stack.

Three phase build up is evenly distributed between the inner and outer core buildups.

ie Buildup = Inner Build Up + Outer Build Up

and Inner Build Up = Outer Build Up

3 Phase Build Up
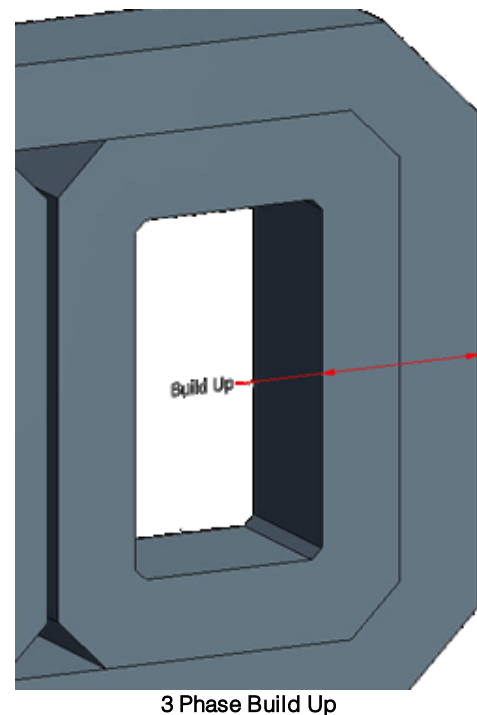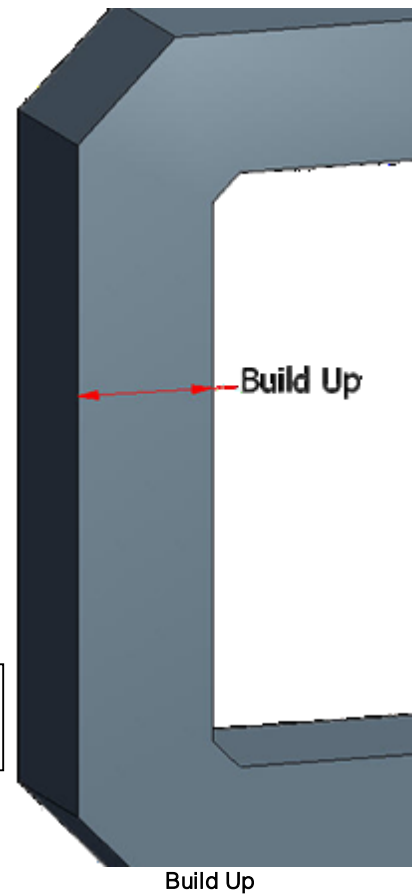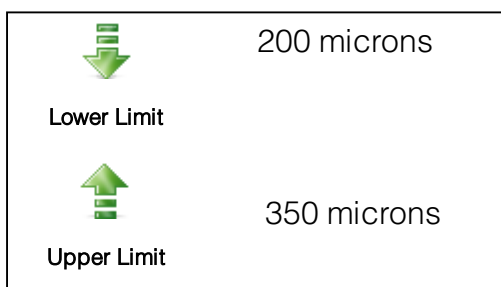
8.6   Strip Thickness

This measurement is simply the thickness of the strip you are using to manufacture your cores. This is measure in micro-meters (um).

Strip thickness can vary from batch to batch and in some cases roll to roll. There can be a number of causes of strip thickness variations:

- Manufacturing process

- Burr

- Dirt

- Coil set

- Surface treatments

Strip thickness is measured and input in microns.

200 microns

Lower Limit

350 microns

Upper Limit

Measuring Strip Thickness.

Measuring Strip Thickness

At any time when the Unicore Machine is not making core, simply pressing the RUN button will cause the machine to make 10 short pieces of strip which can then be measured with a micrometre.

The actual strip thickness is then given by taking the measurement and dividing by 10.

NOTE AEM Cores would prefer that this value were 80microns. However, we have revised this down to 45 microns following a request from a customer and reports that 45 micron strip passes through the UCM with no problems.

Lower Limit

We ask operators to pay particular attention to measuring strip thickness and entering it into the Unicore Control Software (UCS) Core Designer page

because an error in the measurement of strip thickness, leads to errors in our measurement calculations.

Inner and Outer Strip Thickness

For three phase cores, you may wish to use a different strip thickness for the outer core, so when a three phase face is selected the Strip thickness input box changes to accept a second strip thickness

UCS assumes that you will use the same strip thickness for both the inner and outer cores.

Unicore Control Software (UCS) Core designer will automatically fill in the outer strip thickness field with the value used for the inner strip. An operator may however over-ride this default choice and use a thicker or thinner strip thickness

> If you choose to use different strip thickness for the inner and outer cores in your three phase design make sure you make allowances for this in your production system.
>
> Either you will need to
>
> - load different strip when changing from inner to outer and outer to inner - the operator will be prompted by the production page.
>
> - Make all the inner's and then make all the outer's using the Production screens Jump To 152 feature

> The best practice method of measuring strip thickness is to load the strip that will be used to manufacture the cores, and perform a Test10 85 procedure.

8.6.1   The Importance of Strip Thickness

UCS relies heavily on an accurate determination of the Strip Thickness. This is because Unicores are formed by stacking formed strips leading to a build up of laminations. If your entered strip thickness contains even a small error, this stacking will lead to a build up of errors.

A feed error of only a few microns per lamination will quickly add up to an accumulated error of a few millimetres over the entire cores' build up. The Unicore machine is capable of making very accurate, consistent cores, however the onus is still on the human operator to enter the data correctly.
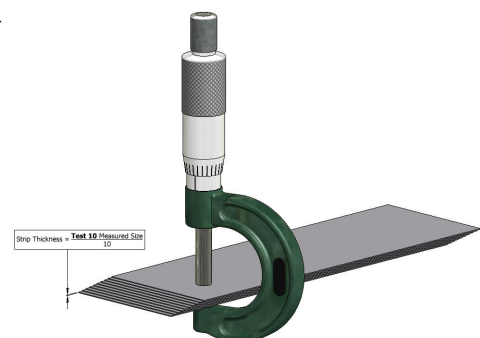
Measuring Strip Thickness

Why Measuring One Lamination Wont Work

Strictly speaking we are not necessarily interested in the Strip Thickness at all, rather the stacking ability of the laminations, since we are using a "stack" of folded laminations to make up a complete Unicore. Hence the procedure to measure Strip Thickness includes a Stacking Factor component as well as the pure Strip Thickness. Stacking Factor is not an entry in the Core Designer, but it is affected by various anomalies such as:

- edge burr,

- coil set,

- wavy coil

- surface treatment such as laser or mechanical scribing.

The figure we enter in the Core Designer strip thickness input field takes account of all of these factors.

The Strip Thickness can also vary quite considerably, even within the same coil of steel. Actual strip thickness is NEVER the same as "nominal" thickness. It is usually (but not always) several microns undersized. Due to the cold rolling process of GOSS we have found variations in Strip Thickness between the start and finish of a coil, and indeed to coils slit from the same parent coil. Never assume a Strip Thickness. Always measure a new coil, and always suspect a variance in Strip Thickness if the manufactured core appears too tight or loose.

All trigonometric calculations within UCS are based on an accurate determination of Strip Thickness. You will not produce good Unicores unless the procedure to measure Strip Thickness is adhered to and provides a consistent benchmark on which all other calculations can be based. A procedure needs to be established to ensure all operators measure Strip Thickness consistently.

8.7   Laminations Per Overlap

Abbreviated as LPOLAP.

Some Unicores offer the ability to significantly reduce core assembly time by creating sets or packets of laminations. The number of laminations in each packet is called the Laminations Per Overlap or LPOLAP.

Changing this setting can often change the solutions provided by the optimiser. As a general rule the larger LPOLAP the smaller number of solutions offered by the optimiser. This makes sense if you consider that the more laminations per overlap, the less overlaps will be present in a given build up, therefore the less possible optimiser solutions.

Why increase LPOLAP?

A core with 3 laminations per overlap assembles much faster than a core with only 1 lamination per OLAP, as it reduces the lamination handling by a factor of three. It is not three times faster, but is certainly double the speed.

However, there is a reduction in magnetic efficiency.
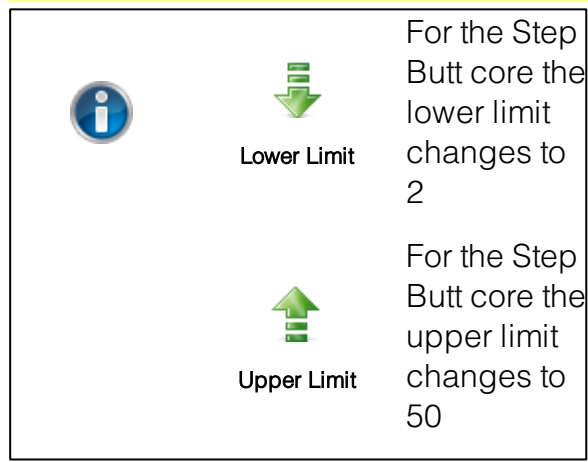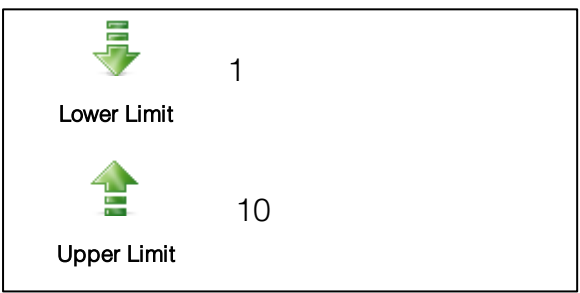
The image below shows a DUO 1 or 1 lamination per overlap. Note the pattern of white gaps shown in the laminations. These gaps are only one lamination 'wide'

For the Step Butt core the lower limit changes to 2

For the Step Butt core the upper limit changes to 50

The image below shows a DUO 3 having 3 laminations per overlap.

Note the pattern of white gaps shown in the laminations. These gaps are much wider than in the first drawing show that now the gaps are three laminations 'wide'.
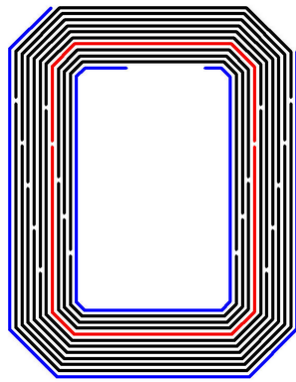
DUO 1 LPOLAP
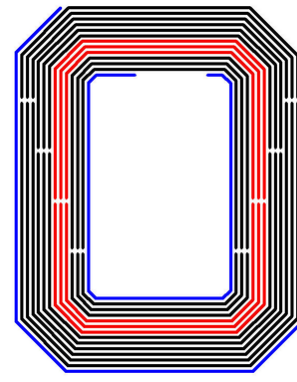
DUO 3 LPOLAP

8.8   Start Position

Start Position refers to the starting position of the cuts in a leg. It can alternatively be defined as the distance from the last fold to the last cut of the inner most lamination. On cores with distributed gaps the cuts start at Start Position and then move along the leg.

It is the complement to Indent Short Leg|173| on the inner most core lamination (ignoring Former Lamination)

Start Position

The default of 25mm is determined from a physical limitation of the UCM called Fold to Cut, the minimum distance between a fold and a cut.

The default Start Position|175| can be set in the Software Settings|165| page
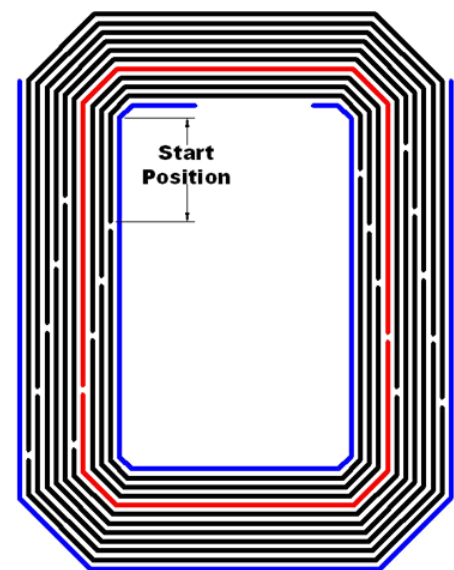
25.0mm

Lower Limit

99.0mm

Upper Limit

    Factory Default setting 25.0mm

    The default Start Position may be configured on the Settings Page|59|
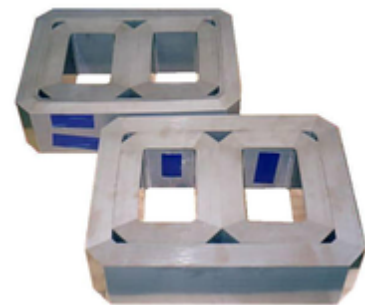
8.9   Initial CNR

Initial CNR stands for initial corner (length). It is defined as the distance between corner folds of the inner-most lamination.

Initial CNR may only be adjusted in whole millimetre steps.

Initial Corner (CNR)
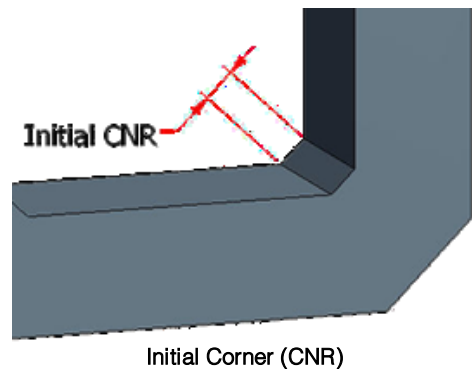
One use of this setting is to create bolt holes in cores.

Initial CNR used to create bolt holes

 This item may be configured on the Settings Page₅₉ — written as: This item may be configured on the Settings Page [59]

8.10   Winding Indent

Winding Indent is defined as the distance IN from either of the inner most folds of a DUO core, which enables the outermost laminations to keep their legs inside a Winding and not fall out during assembly.

Winding Indent is only used on DUO [108] cores when the Diverge Gap [99] choice is set to 'Within Winding',

When a DUO core type is selected, the Winding Indent field is populated with the default Winding Indent as set on the Settings Page

The default setting is the UCM's Fold to Cut distance.

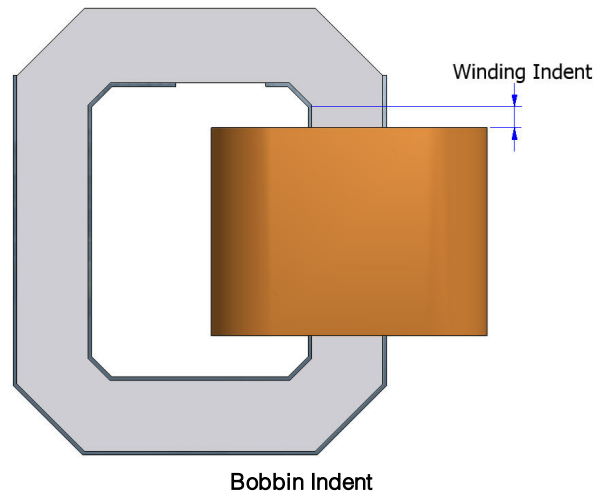|	
Lower Limit	0mm
Upper Limit	The upper limit of the Winding Indent is UCM FoldtoCut 103 distance. On cores with a Build Up of less than approximately 50mm the upper limit for Winding Indent will decrease below Fold to Cut or 25mm.

Winding Indent

Bobbin Indent

Within Winding/Within WL

The following diagram compares the two settings. **Within Winding** is on the left leg, whilst **Within WL** (Window Length) is shown on the right leg.

Within WINDING   Within WINDOW
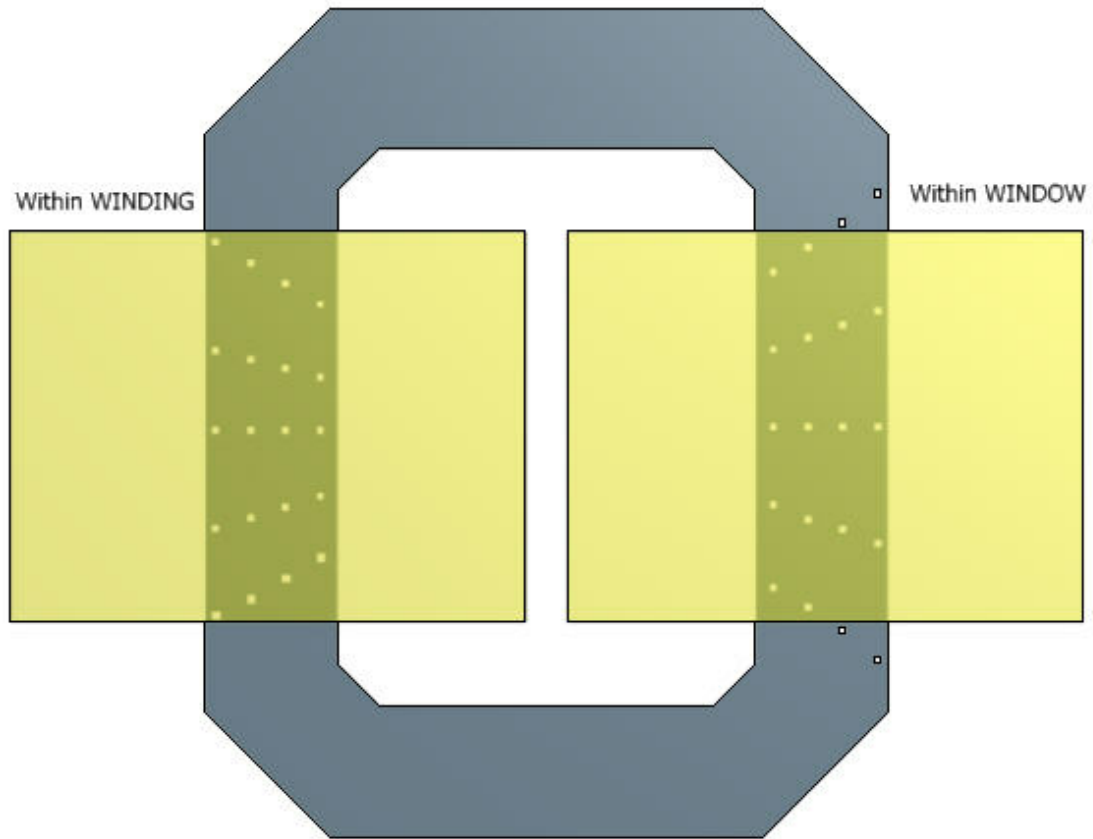
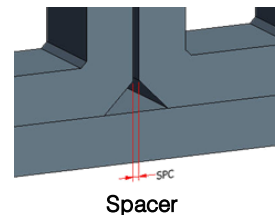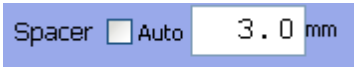(i) **DUO** This setting is used in conjunction with [Diverge Gap](99) setting.

(i) This setting is used in conjunction with [Fold Cut](103)

(⚙) This item may be configured on the [Settings Page: Constrain DG](170)
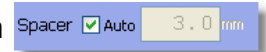
8.11 Spacer

Spacer is the material inserted between the inner cores in a three phase core.

Spacer ☐ Auto   3.0 mm

Spacer

UCS supports user entered spacer size or automatic selection from a Spacer selection table located on the [Settings Page](168)
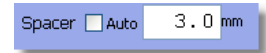
Using the table on the Settings Page¹⁶⁵ and the Window Length entered,

Automatic entry of spacer

To manually set the spacer value, uncheck the Auto box and enter the spacer width in the input field.

Manual entry of spacer

After entering a value, if you click the Auto checkbox, your value will be replaced by the value determined by the Spacer Table in Software Settings.

In Auto mode the Spacer Table on the Software Settings¹⁶⁸ page is referenced.

For an example WL of 220mm, UCS would select a 2.0mm spacer automatically.

For WL > 500.0mm a 4.0 mm spacer would automatically be selected.

These settings can be edited to reflect the spacing material your company normally uses,

Spacer Table	
WL vs Spacer	
WL	**Space**
80.0	1.0
100.0	1.5
180.0	2.0
250.0	3.0
500.0	4.0

Default Spacer Table entries

0.0mm	
Lower Limit	

50.0mm	
Upper Limit	

This item may be configured on the Settings Page¹⁶⁸
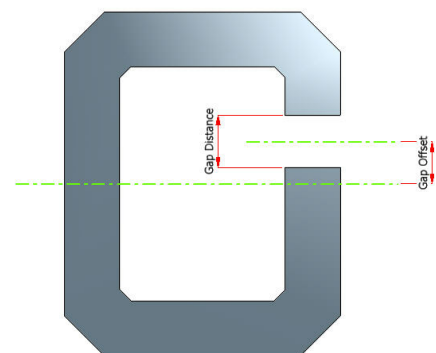
8.12   Gap Distance and Offset

These settings are used only in conjunction with the Core Gap face.

They are used to size and position the gap in the cut leg.

Core Gap
Gap   0.0 mm
Offset   0.0 mm

Gap Core showing Distance and Offset

The gap will occur normally in the Window Length, but using Cuts in WL/WW¹⁰³ can move the gap to the Window Width Leg.

Gap Distance

The Gap Distance is simply the width of the gap. You can have a gap of 0mm ie just a cut

Cut Leg length is the leg selected by the Cuts In drop down box.

<table>
<tr><td>Lower Limit</td><td>0.0mm</td></tr>
<tr><td>Upper Limit</td><td>Gap size limited by the Cut Leg Length less 2 corners less the Start Position|175|</td></tr>
</table>

Gap Offset

Gap position is specified as an offset from the centre of Window Length.

<table>
<tr><td>Lower Limit</td><td>0.0mm</td></tr>
<tr><td>Upper Limit</td><td>Limited to half of the Cut Leg Length less 2 Corners less the Start Position less the Gap Distance

The Gap offset upper bounds is adjusted for each change in Gap Distance.</td></tr>
</table>

8.13 CLEF

CLEF or Cut Leg Extension Factor is defined as a fixed addition added to long legs of cores.

CLEF   0

This extension is entered in microns, and is used to angle the face on BUTT and DEE-BUTT cores. It can be used to add a small amount of leg length (window length) to each leg on a Butt core.

The following photo shows the effect of CLEF. The core on the left has CLEF set to 100 microns and the core on the right has CLEF set to zero. Remember that the build up should be squeezed at between the 2 folds to get the air out of the laminations, this would result tighter lamination nesting and a flatter looking right hand face and would make the angled face of the left hand core look more pronounced. If you study the left hand core you can see the air gaps.
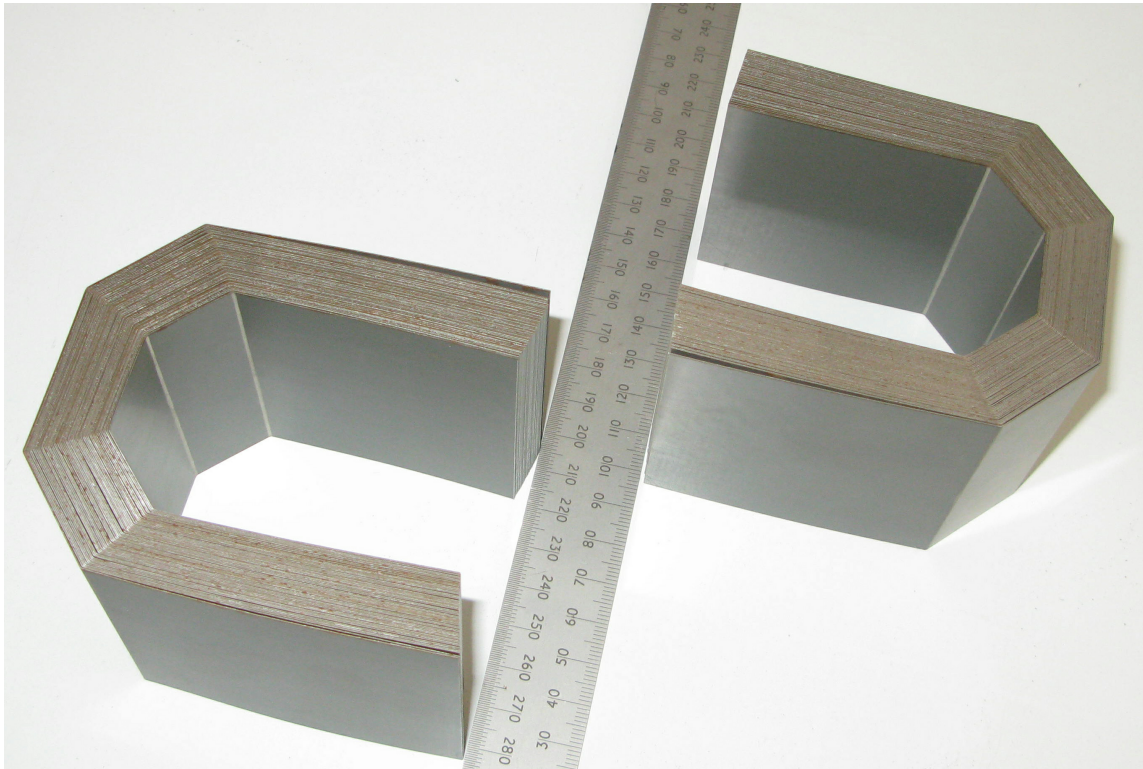
CLEF =100microns and CLEF = 0

0 microns (default)

Lower Limit

1000 microns

Upper Limit
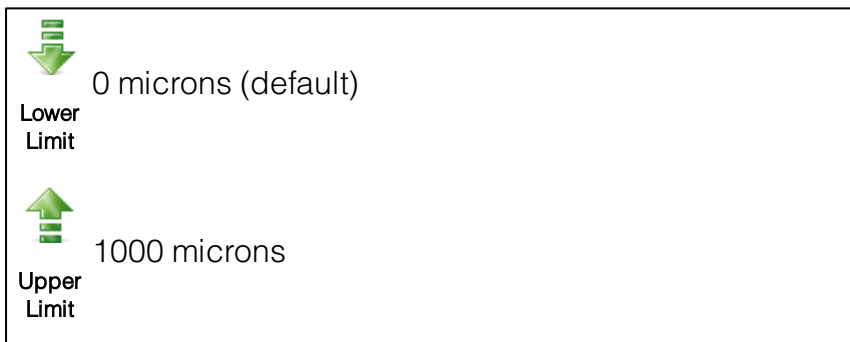
Needing to set CLEF to achieve a flat face on a gapped core can be a symptom of one or more of the following problems:

- strip burr

- strip thickness variations

- check folder bar for correct radius

- generally check UCM for cleanliness

CLEF of Cut Leg Extension Factor is only available for the Butt2 [119],
Butt3 [119], and DEE-BUTT [132] core faces.

8.14 Optimiser

The optimiser tables calculate a range of solutions for the number of packets and
cuts for your core design. There is an optimiser for Single Phase cores on the left of
the core designer screen and when working on three phase cores, the left
optimiser table becomes the optimiser table for inner cores and the right hand
optimiser displays solutions for the outer of the three phase core.

Table is not editable for all cores except the INCDAP [117].

#Pkts	AvgOlap	InitOLAP	OutsdeOlap	Fill	Cuts	AvgPktMass
89.00	143.55	115.16	171.95	100%	2.00	0.24
60.00	71.78	57.58	85.97	33%	3.00	0.35
45.00	47.85	38.39	57.32	50%	4.00	0.47
36.00	35.89	28.79	42.99	60%	5.00	0.59
30.00	28.71	23.03	34.39	66%	6.00	0.71
26.00	23.93	19.19	28.66	42%	7.00	0.82
23.00	20.51	16.45	24.56	25%	8.00	0.94
20.00	17.94	14.39	21.49	77%	9.00	1.06

Optimiser table

| Column	Description
#Pkts	Number of Packets The number of resulting lamination packets.
AvgOlap	Average Overlap This figure is the average overlap for each packet. The higher the number the better the magnetic quality of your cores. Calculated using InitOLAP + ((OutsdeOlap - InitOLAP) / 2)
InitOLAP	Initial Overlap - This the first packet overlap measurement.
OutSideOlap	Outside Overlap - This is the last packet overlap measurement.
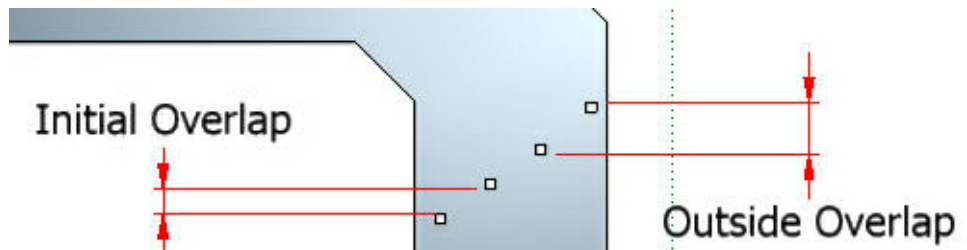
Column	Description
Fill	Fill of the Outside Packet
	A packet is considered full when it contains a full set of laminations. That is if each packet should have 9 laminations, then it is 100% full when it has 9 laminations and only 30% full when it has 3 laminations.
Cuts	The number of Cuts or laminations per packet.
AvgPktMass	Average Packet Mass
	Average packet mass is important to know when considering operator handling issues.

This item may be configured on the Settings Page [59]

8.15 Indent Short Leg

Indent Short Leg is defined as the distance from the first cut to the first fold.
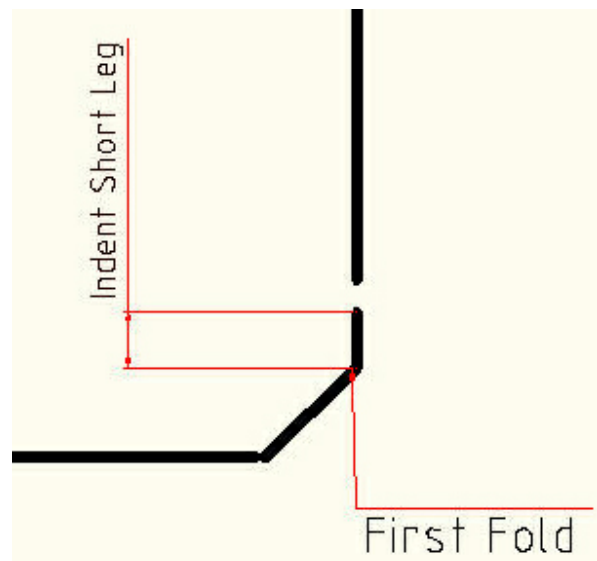
Factory Default setting 8.0mm

This item may be configured on the Settings Page [59]

8.16 Diverge Gap

Diverge gap refers to the spreading of the cuts in a packet along the leg length.

Cores can have the diverge gap feature turned on or off.

For all cut cores excluding the DUO, the Diverge Gap setting can only be turned on or off. When off is selected, the gap will not diverge and when on is selected the gap will diverge across the leg length excluding the corner area.
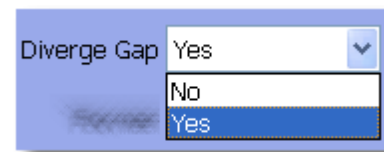
DUO

The DUO core always has a diverging gap - that is it cannot be turned off. There isn't a 'No' setting.

DUO assumes Diverge Gap is set to yes and further refines the diverging to occur either within the Winding area (Within Winding) which starts at Winding Indent on the leg or along the entire leg length excluding the corner area (Within WL), the same as the 'Yes' option for other cores.
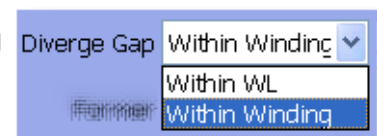
DUO Diverge Gap Choices

The Winding Indent is configurable using the Winding Indent[171] input field. See Winding Indent[171]

The default Winding Indent is configurable on the Settings Page

Single vs Three Phase DUO's and Diverge gap.

The single and three phase DUO supports having a different Diverge Gap setting on the inner and outer cores, but only one Winding Indent setting, which is applied to both inners and outers.

Three phase outers are constrained to the dimensions of the inner, this is to keep the cuts on the outer within the winding.

See[59] also Winding Indent[91]

This item may be configured on the Settings Page[59]

8.17 Former

Former laminations are used to aid the assembly of the lamination stack and to prevent items being inserted into the core window from fouling on the gap or cut face.

A former lamination shields the inner cut laminations from catching on items passing through the core and helps to align the 2 halves of a first few laminations.

Therefore you will find formers are generally only offered on core faces with laminations that have a cut in them.

Formers are most useful with DUO cores, and cannot be turned off when designing DUO's.

In the diagram on right, the former lamination is the blue line inside the core. You can see how this lamination would help with the initial assembly of the core.

Former lamination in blue
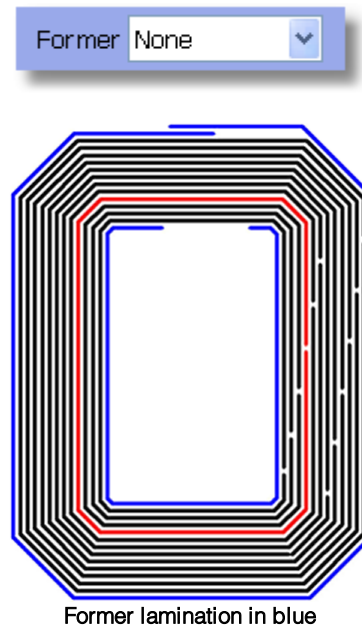
When Window Width < (Fold Cut + 2 Corners) the former will be automatically turned off. This is because the resulting former lamination would be too small physically for the UCM to manufacture.

DUO cores with small Window Widths will warn the operator with a pop up message and then allow Former setting to be Yes or None. If WW is increased, then the former selection box will be disabled and Formers will be set back to Yes.

Lower Limit

Caution - Small Window Width affects former

Your small size for WW, will effect the quality of the former lamination. You may choose to turn formers off.

OK
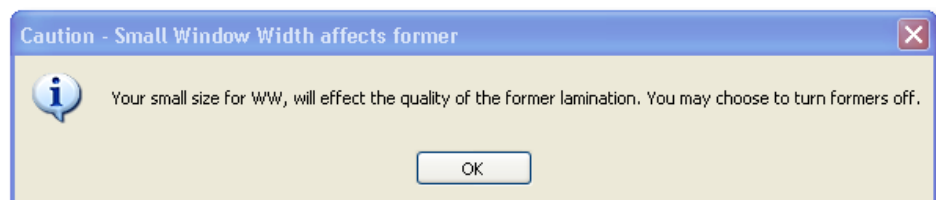
8.18 TIG Lamination

A TIG lamination is used as the final lamination in the build up [84] to form a mechanical strap around the entire core without the need for any further

mechanical strapping, eliminating the physical size of a strap and buckle. This TIG lamination gets it's name from the TIG welding process. The TIG lamination is used to place a wrapper around the cut on the out-most lamination of a core.

> **Separate Mechanical strapping is eliminated!**

A TIG lamination is offered on a range of cores, when it is not available the input field is greyed out. Depending on the type of core you have selected a default TIG lamination will be set.
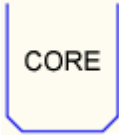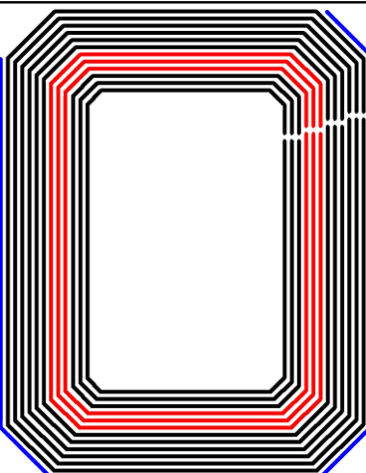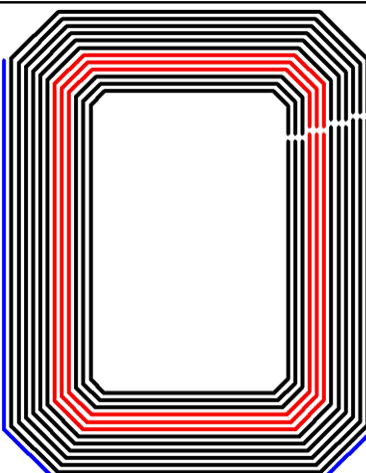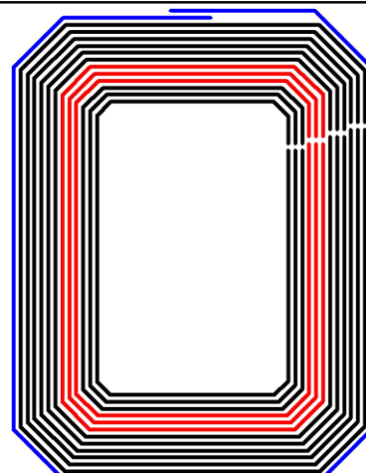
Unicore Control Software (UCS) offers 3 different styles of TIG lamination, the Core, Shell and OLAP (overlap).

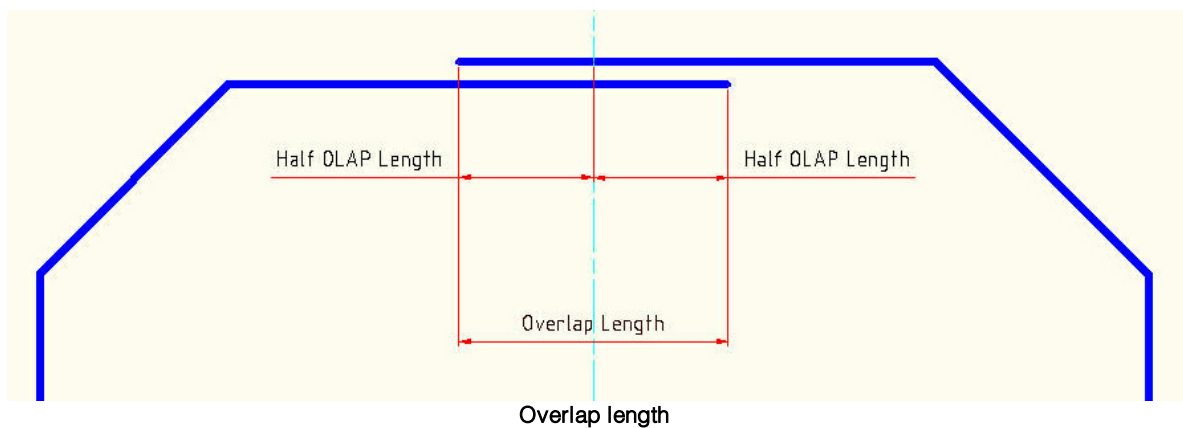UCS also permits deselecting the TIG lamination.

TIG Lamination Types

In the following diagrams the TIG lamination is the blue line on the outside of the core build up. The inner blue line is the former lamination.

Shell TIG	Core TIG	OLAP or Wrap Around TIG
A Shell TIG is used when one side of the core is inside a bobbin and the weld has to be moved outside the bobbin for physical access.	A Core TIG is used when there is easy access to both sides of a core.	The OLAP TIG provides and overlapping lamination so that mechanical closure of the core can be achieved by a single weld instead of the two welds required by the Shell and Core TIGs. The length of the OLAP can be set using Overlap Length[103]
 Shell TIG	 Core TIG	 OLAP or Wrap Around TIG

8.18.1 TIG Overlap Length

When selecting the OLAP TIG, the Overlap length may be entered into the field OLAP length.

Lower Limit   0.0mm

Upper Limit   Entered Window Width less the 2 corners less 2 time the Fold to Cut [103] distance.

Overlap length

The default Overlap length may be configured on the Settings Page [165]

Factory Settings:

40.0mm

8.19   Cuts In WL or WW

Lamination cuts can be placed in the Window Length or Window Width dimension

On three phase cores you may place the cuts on different dimensions for the inner and outer cores. Note both inner cores must have their cuts on the same dimension.

8.20   Fold To Cut Distance

Fold to Cut is a physical limitation of the UCM. This is the distance between the LAST fold and the LAST cut.

Fold to Cut is not a user alterable parameter and must be taken into consideration in many calculations, mostly when small cores are being made.

Factory Default setting 25.0mm

This cannot be set or changed.

8.21   Symmetrical Halves

Symmetrical halves option is unique to the DUO core.

When symmetrical halves are selected, each male and female half of a DUO core will contain a male and a female leg.

This leg configuration is offered in single phase only as the 2DDGAP core.

When making a DUO however, the core designer offers the 2DDGAP face as an option to either inner and or the outer core.

8.22   INCDGAP Centre Offset

This field is unique to the INCDGAP [117] core. This core doesnt use the optimiser and requires the operator to enter the the lamination overlap manually.

#909

8.23   Select Face

This is for one core only INCDGAP [117]. You are able to configure the face to be either DDGAP [112] style or EOLAP [115] style.

Designing and Making Cores with UCS
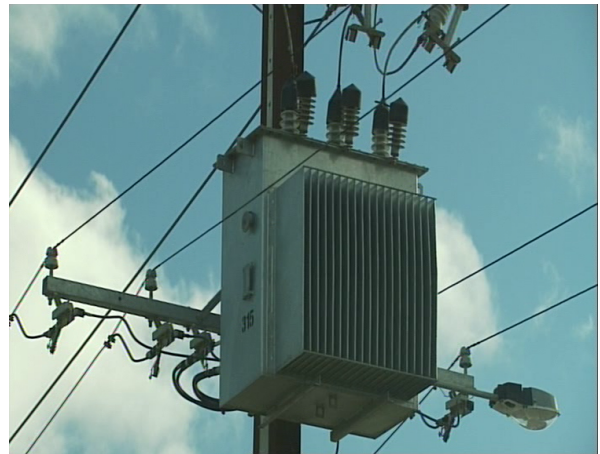
Part

IX

9   Core Faces

Which Core Face to Choose?

UCS is written for transformer core manufacturers who are expected to understand the magnetic, electrical and physical engineering issues involved in the choice of a core face. This section provides information of a general nature about core faces.

Benefits Of Unicore Technology

UNICORE transformer cores are formed from laminations manufactured by a numerically controlled machine under the guidance of a sophisticated software program that controls the core parameters and geometry.

As a result UNICORE's assemble tightly for the best possible magnetic properties.

UNICOREs are:

- Low Loss,

- Accurate

- Tooling Free

- Lower core mass

- Repairable, the cores can be disassembled and individual laminations manufactured to replace damaged laminations. See the disassembly videos on our website www.aemcores.com.au

- Offer strapless and buckless lamination retention through special TIG 100 laminations.

Annealing Information

An annealed core will always have lower losses than an un-annealed core. Annealing is desirable to achieve the highest efficiency and typically reduces losses by 5 to 30% depending on the core size. For distribution applications UNICOREs would normally be annealed.

9.1 DUO

The AEM Cores DUO UNICORE was specifically created to significantly speed up core assembly.

DUO cores are used for single and three phase distribution transformers.

DUO UNICOREs are made from two halves, a male and a female half, which will mate with minimum effort inside a bobbin.

DUO cores can be secured with a special TIG [100] lamination that comes in 3 styles.

DUO - core can replace conventional C and E and Cruciform cores.

3 Phase Duo Ready For Assembly

Applications

DUO-Cores with one lamination per overlap [89], are used for Power Distribution applications, this configuration yields the most efficient transformer design. The DUO core is available for single and three phase applications.

The DUO range can expand to 2, 3 or more laminations per overlap, but these are for General Purpose Transformers where the core loss is not as critical. This makes DUO cores highly suitable for Core type, single-leg and shell-type, single and three phase, general purpose transformers.
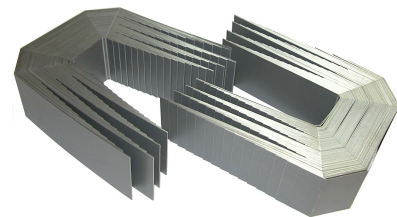
DUO male and female halves offset
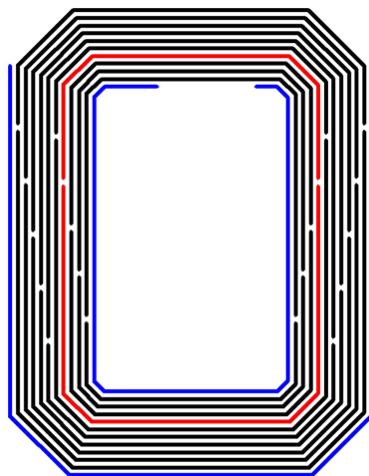
Single Phase DUO
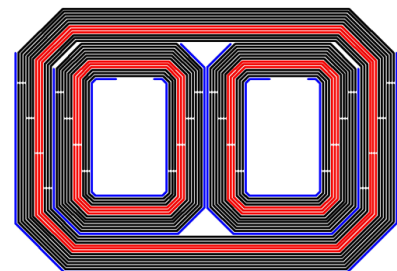
Three phase DUO

Pole Transformer

For best efficiency, power distribution applications require long overlaps with no gaps or mismatched laminations in the face. Core loss testing by AEM Cores has also determined that slight wedging (in the winding) also reduces the core loss across the face as the magnetic coupling between adjacent laminations improves. For Power Distribution applications, three phase units can be built up in a 4 loop 5 limb configuration using single phase cores(DUO Single Phase), or with an Evans style three leg straight off the machine (DUO - 3 Phase). The DUO - 3 Phase is simply two inner cores nesting inside an outer core.

Dramatically Reduced Assembly Time

DUO's 'split in half' design means that inserting laminations into bobbins is easier than any other core. To further reduce assembly time, the number of laminations per overlap may be increased from 1 up to 3. These are called DUO1, DUO2, DUO3. Increasing from 1 to 2 results in a 45% decrease in assembly time, and 2 to 3 results in a further 25% decrease. Note that losses and magnetising VA will increase as the number of lamination overlaps increase.

As a further aid to assembly, the UNICORE machine produces Insertion Helper Strips. Check out the AEM Cores website www.aemcores.com.au to see a video of a core being assembled using insertion helpers.

Special Settings

DUO assumes Diverge Gap 99 is set to yes and further refines the diverging to occur either within the Winding area (Within Winding)
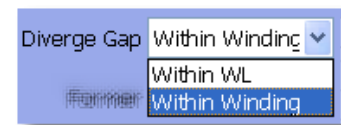

DUO Diverge Gap Choices

which starts at Winding Indent on the leg (or the bobbin) or along the entire leg length excluding the corner area (Within WL), the same as the 'Yes' option for other cores.

See Winding Indent 91

DUO cores with small Window Widths will warn the operator with a pop up message and then allow Former setting to be Yes or None. If WW is increased, then the former selection box will be disabled and Formers will be set back to Yes.
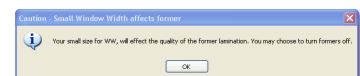
Within Winding/Within WL

The following diagram compares the two settings. Within Winding is on the left leg, whilst Within WL (Window Length) is shown on the right leg.
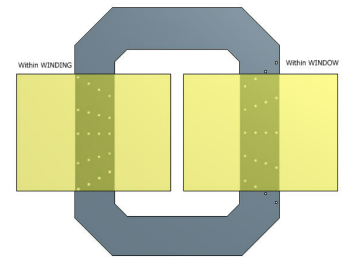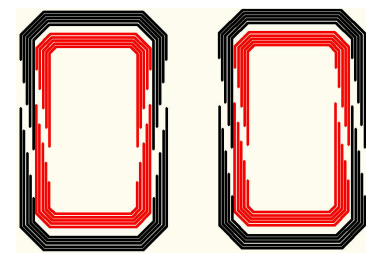
Symmetrical Halves - The 2DDGAP[134] core face.

This is only available on single phase DUO cores.

This option allows for easier core assembly in some rare scenarios.

When the Symmetrical Halves is checked

a 2DDGAP style of core is produced. Study the lamination diagrams on the right and note the different lamination layouts. This diagram is reproduced full size in the 2DDGAP[134] core face documentation.

DUO Core and 2DDGAP core
Note the differences in the male and female halves

Insertion Helpers[149] are a tool used during the assembly of DUO cores. This input field appears on the Production Screen[139] and not in the Core Designer.
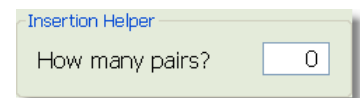
During core assembly an insertion helper is repeatedly passed through the Winding assembly to stop the cut laminations fouling, and to slide laminations past the previously inserted packets.

Insertion helpers are not part of the core designer but are selected at production time using the Insertion Helper input field.

Option	Choices			
Corners				
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None

Option	Choices			
TIG 3 Phase Inner	SHELL	OLAP		
3 Phase Outer	CORE	OLAP		
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Diverge Gap 3 Phase Inners	Within Winding	Within WL		
3 Phase Outers	Within Winding			
Symmetrical Halves	Off	On		
Optimiser Table	Select the number of cuts			

9.2   DDGAP Diverging Distributed Gap

Applications

The DG Unicore is used in Core type, single-leg, and Shell-type, single and three phase distribution transformers. They come in either DG (straight) or DDG (diverged) forms.

DGAP looking into Outer Packets

To select between DG and DDG forms use the Diverge Gap selection box.
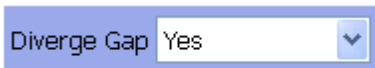
Yes selects the DDG form and is the default selection.

When making 3 phase cores it is possible to have inners and the outer of a different form (DG/DDG). Note both inners will be the same form.

The position and specification of each DG face can be easily and accurately specified to best suit your application.

DG: Straight Distributed Gap Core

#928

Single Phase

DDG: Diverging Distributed Gap
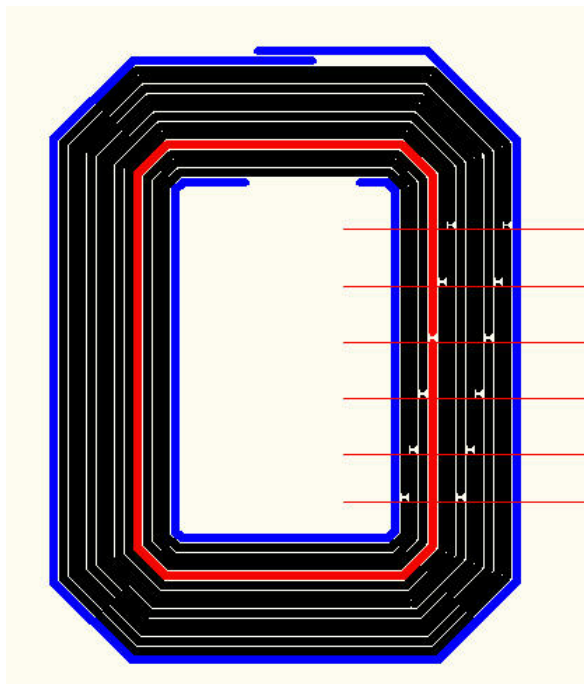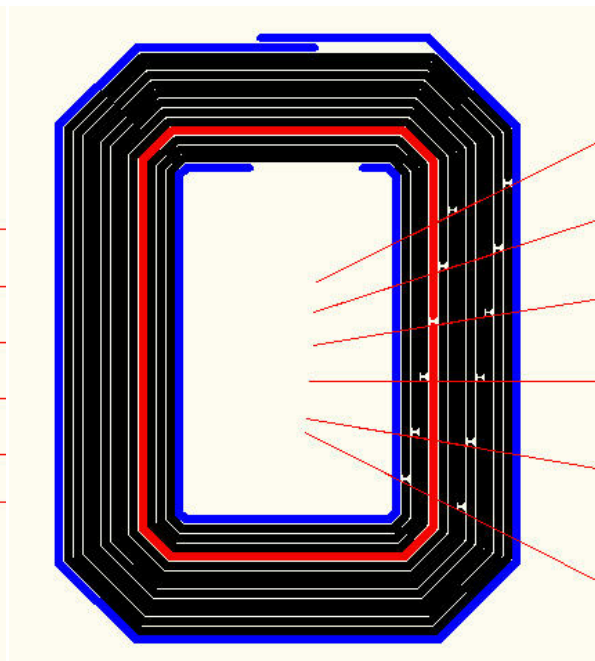
#928
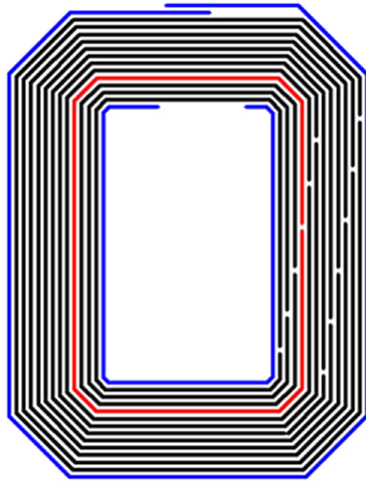
Three Phase

Single Phase DDGAP
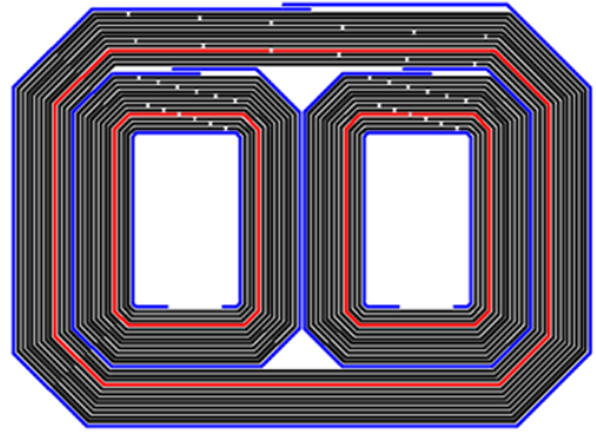
Three phase DDGAP
showing Cuts on WW

Option	Choices			
Corners	✓	✓	⊖	⊖
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
TIG 3 Phase Inner	SHELL	OLAP	None	
3 Phase Outer	CORE	OLAP	None	
Cuts In WL/WW separately for inner/outer	Window Length	Window Width		
Diverge Gap Single Phase	Within Winding	Within WL		
Diverge Gap 3 Phase Inners	Within Winding	Within WL		
3 Phase Outers	Within Winding			

Designing And Making Cores With UCS

Option	Choices			
Symmetrical Halves	Off	On		
Optimiser Table	Select the number of cuts			

9.3 EOLAP End Overlap

Applications

Core type, single-leg, and shell-type, single and three phase distribution transformers. A more efficient replacement for the DGAP face.

The EOLAP face offers a slightly more efficient magnetic design. This is achieved by the magnetic flux circuit only having to 'jump' 1 cut per circuit compared with 2 cuts in the DGAP face.
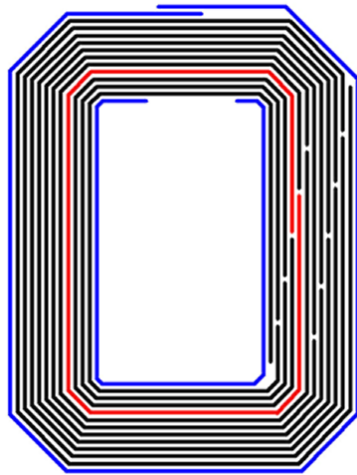
Single phase EOLAP
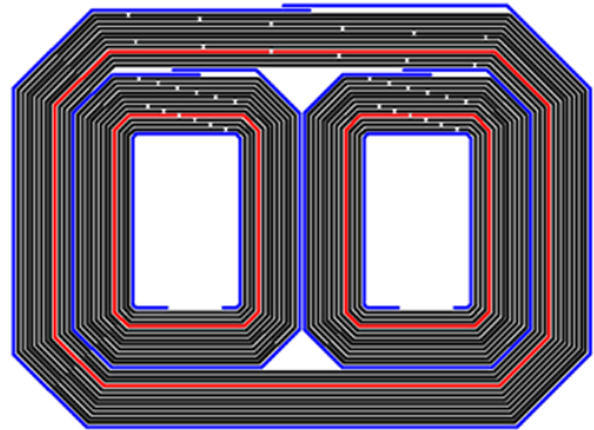
Three phase EOLAP

Option	Choices			
Corners	☑	☑	⊖	⊖
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
TIG 3 Phase Inner	SHELL	OLAP		
3 Phase Outer	CORE	OLAP		
Cuts In WL/WW separately for inner/outer	Window Length			
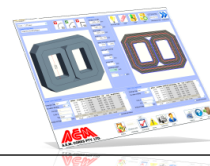
Option	Choices			
Diverge Gap Single Phase	Within Winding	Within WL		
Diverge Gap 3 Phase Inners	Within Winding	Within WL		
3 Phase Outers	Within Winding			
Symmetrical Halves	Off	On		
Optimiser Table	Select the number of cuts			

9.4   Inclinded DGAP

The INCDGAP stands for Inclined DDGAP derived from the direction of the sloping cut face.

Available in single phase only

Application

The INCDGAP core is selectable between an [DDGAP]112 and an EOLAP face. It will have the same magnetic characteristics of a DDGAP or EOLAP core except the face slopes towards the corner.
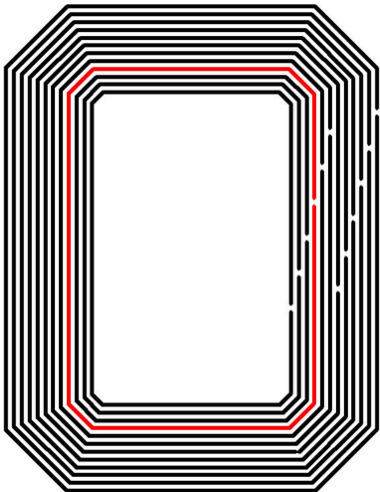
Single phase Inclined DGAP

Special Features

The divergence of cuts is not calculated by the Optimiser or the diverge selector, but the operator entering the lamination overlap.

You will notice that the Diverge option is set to Yes and greyed out also.

The offset of the cuts may be set and the optimiser solution can be edited.
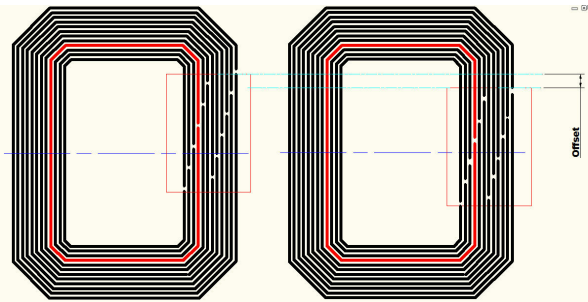
The INCDGAP core allows you to offset the cut face around the centre of the cut leg using the input field
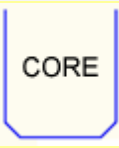

| INCDGAP Centre Offset |
| 0.0 mm |
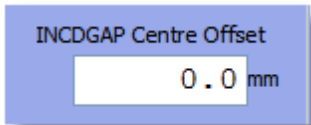
> You must enter all parameters down the centre of the Core Designer and be sure that you are happy with them. Then make changes to the number of packets in the optimiser table. If you return to other parameters in the Core Designer, you changes in the optimiser will be over-written. Be sure to make them last.

At this point a single solution is chosen and ready for hand editing

Option	Choices			
Corners				
Former	Yes			

Option	Choices			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Symmetrical Halves	Not available			
Optimiser Table	Select the number of cuts			

9.5   Butt

Core is in two halves, the face being flat, permitting a fixed gap to be set between the halves mechanically.

Applications

Used for chokes or reactors.

BUTT is a core suitable for chokes; its front surface is superposed thus enabling conventional C cores replacement.

Individual laminations are formed to create an even surface of the core face.

The corner angle 76 can be set to 30° or 45°. Corner radius can be set using InitialCNR 91.

These Unicores have a gap of programmable size in 2 legs (single phase) or 3 legs (three phase).
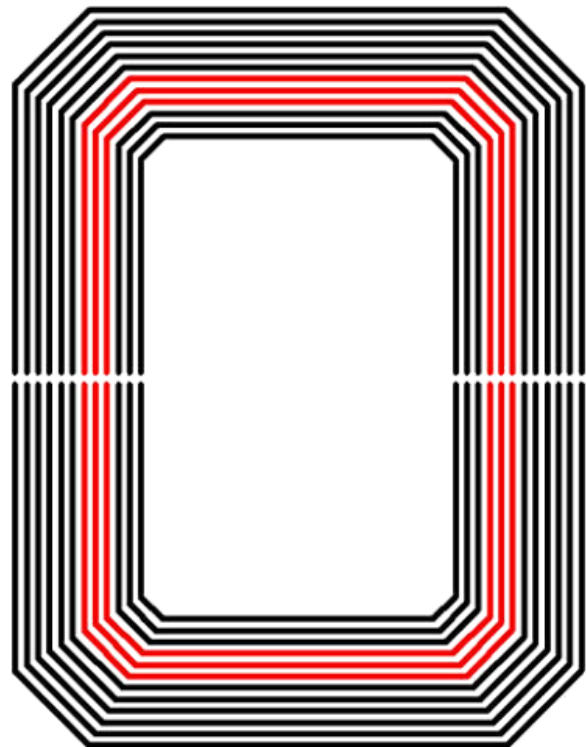
BUTT cores have a packet increment AND overlap increment of zero. Therefore they cannot have a diverging gap. The Diverge Gap option for these three cores is greyed out with No as the default.

The concept of "better magnetics" is reversed in these cores, we want a lossy face for a reactor choke rather than an efficient face as per DUO and DDGAP.

Special Settings

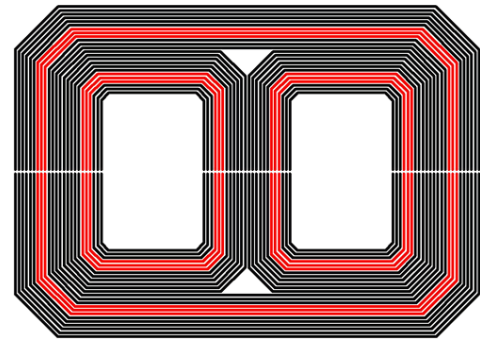CLEF is a special parameter for BUTT cores only see CLEF 95. It is used to slope the normally flat face.

CLEF   0

BUTT2 is single phase   BUTT3 is Three phase
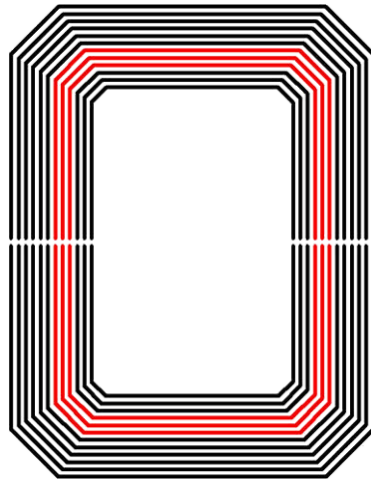
BUTT2 or single phase BUTT

Three phase BUTT or BUTT3

Option	Choices			
Corners	✓	✓	⊝	⊝
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
TIG 3 Phase Inner	SHELL	OLAP		
3 Phase Outer	CORE	OLAP		
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Diverge Gap 3 Phase Inners	Within Winding	Within WL		
3 Phase Outers	Within Winding			
Symmetrical	Off	On		

Option	Choices			
Halves				
Optimiser Table	Select the number of cuts			

9.6 Step Butt

Cuts in the packets form a step or stair case pattern.

Application

For shell type general purpose transformers only, up to approximately 1 KVA. Losses are much higher than DUO-Cores or Distributed Gap Unicores, but less than or comparable to a C core depending on size and application.

There is only one type of Step Butt Unicore, if assembled with alternate packets reversed to distribute the face, then core loss and noise will be reduced.

By default UCS offers a default [Laminations Per Overlap](89) setting of 12. This can be user set from 2 to 50 laminations.

Single Phase only.

To increase the distance from lam beginning to the first cut, increase the [Indent Short Leg](173) value in the [Setup Screen](165).
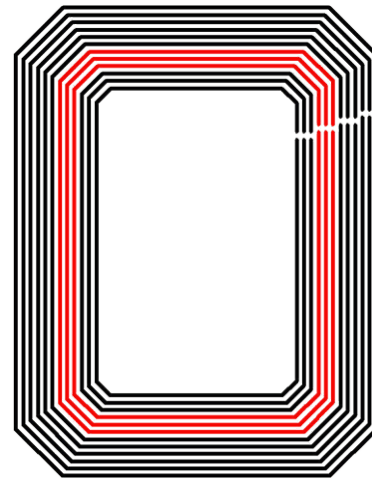
Single phase Step Butt

Special Features

Special two piece frames can be used which clamp the core and provide terminal plate mounting.
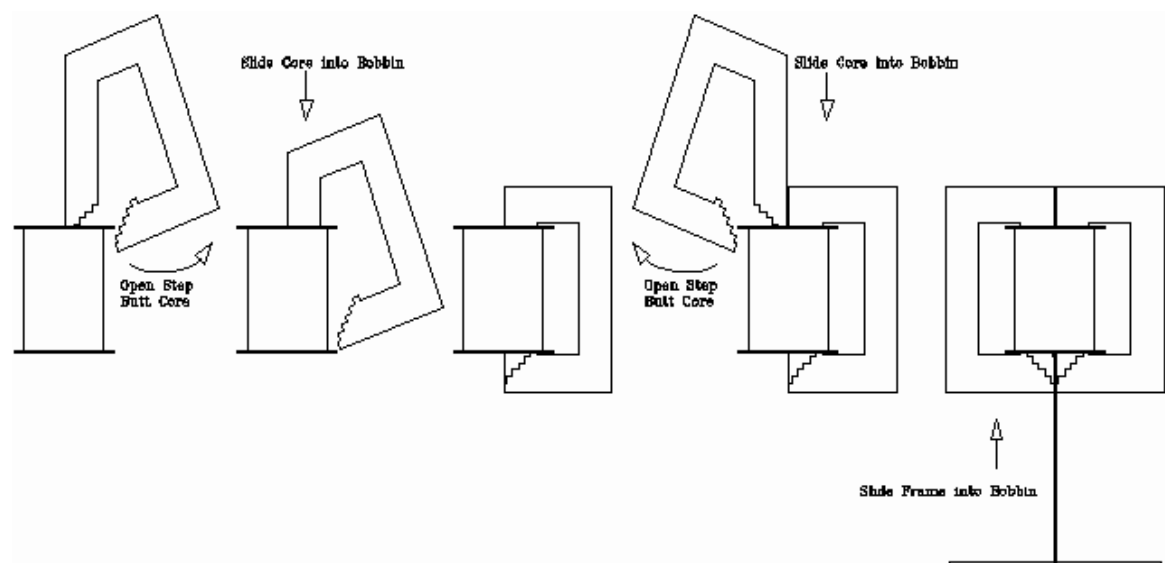
Step Butt Frame Assembly

Option	Choices			
Corners				
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Symmetrical Halves	Not Available			
Optimiser Table	Select the number of cuts			

9.7   UnCut

An Uncut core is made from continuous strip with no cuts in each lamination.

Application

Uncut cores are typically used to make cores for Rectangular Current and Voltage transformers. Uncut Unicores are always annealed as their typical applications demand the best performance.
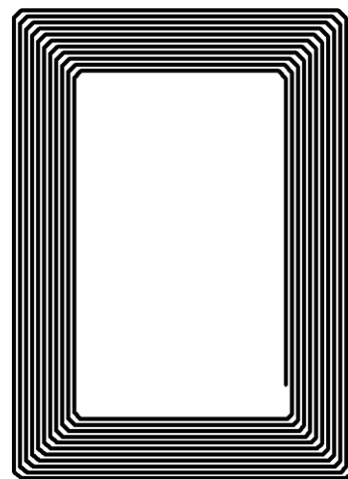
Winding Information

The use of uncut cores in VT/CT's is economically possible with the use of a Ruff Toroidal Winding Machine with Parallel Winding attachment. This can tape wind the legs and then layer wind the copper directly onto the uncut core. This removes the need for a former or split bobbin. More information on these and other Ruff products can be found on their website: www.ruff-worldwide.com.
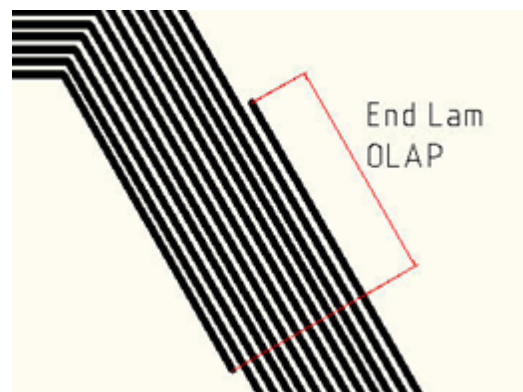
Single Phase only
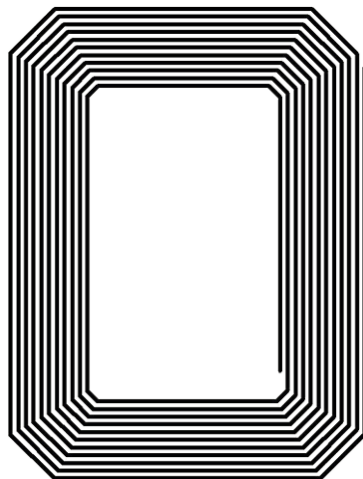
UNCUT with 45 degree corners   UNCUT with 90 degree corners

Overlap Length|172| defaults to 0 and is measured either side of the centre point of the leg length.

The value is set using

| Olap Length | 40.0 | mm |

EndLam Overlap centred in Leg Length

Option	Choices			
Corners				
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW separately for inner/outer	Not Available			
Diverge Gap Single Phase	Not Available			
Symmetrical Halves	Not Available			
Optimiser Table	Not Available			

9.8   Triangle Cores

The triangle core is a special shaped uncut core. Therefore it may be used in some uncut core applications and in combination with other components, some special cores are possible.

Note Unlike all other cores, the Triangle core is defined with leg length between the inner folds, not traditional Window Length which includes the folds.

Single Phase only

Triangle Core

> ℹ️ Be sure to adjust your UCM folder bar for 60 degree folds

In The Core Designer

When making triangle cores the Window Length input field is renamed to Leg Length.

Window Length[78] input field is renamed to Leg Length

Window Width[80] input field is no longer available all 3 legs are the same length.

Leg Length

Unlike all other cores, the Triangle core is defined with leg length between the inner folds, not the traditional Window Length which includes the folds.
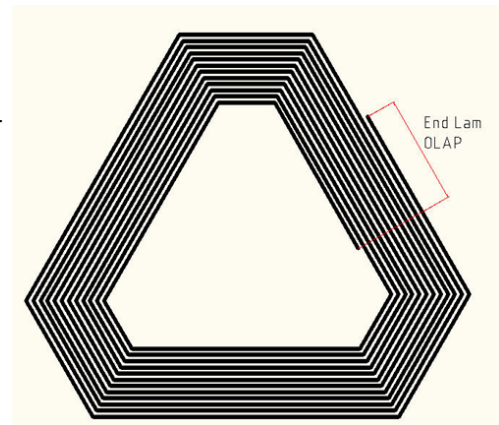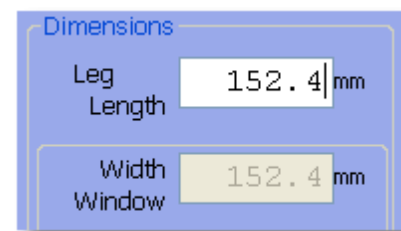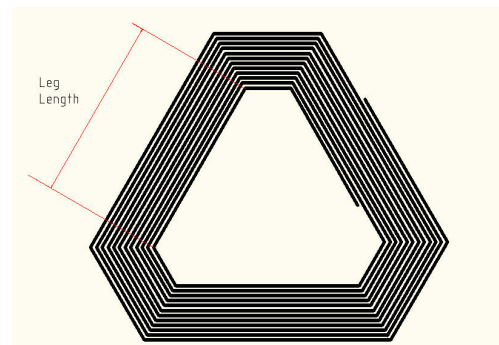

Leg Length - corners NOT included

Overlap Length[172] defaults to 0 and is measured either side of the centre point of the leg length.

The value is set using

EndLam Overlap centred in Leg Length

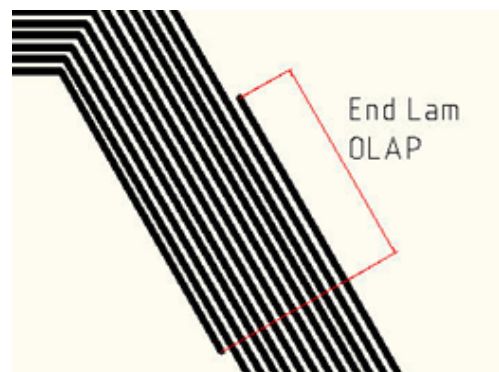| Option	Choices			
Corners				
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Not Available	Within WL		
Symmetrical Halves	Not Available	On		
Optimiser Table	Not Available			

9.9   Core Gap

The Core Gap UNICORE has ONE gap of programmable size in one leg only.

Application

Typically these cores are used in chokes or reactors.

The gap can be programmed for the long side (Window Length) or short side (Window Width) of the Unicore. It may have 45 or 90 degree corners. This is selected using the Cuts In drop down box.

Cuts in WL

CoreGAP has a packet increment AND overlap increment set to zero. Therefore it can't be a diverging gap. The Diverge Gap option for these cores is greyed out with No as the default.

Single Phase only.

The Gap in the CoreGap can have it's gap distance and offset on the cut leg customised, using the Core Gap special input fields which only appear for Core Gap

Core Gap
Gap   0.0 mm
Offset   0.0 mm

.
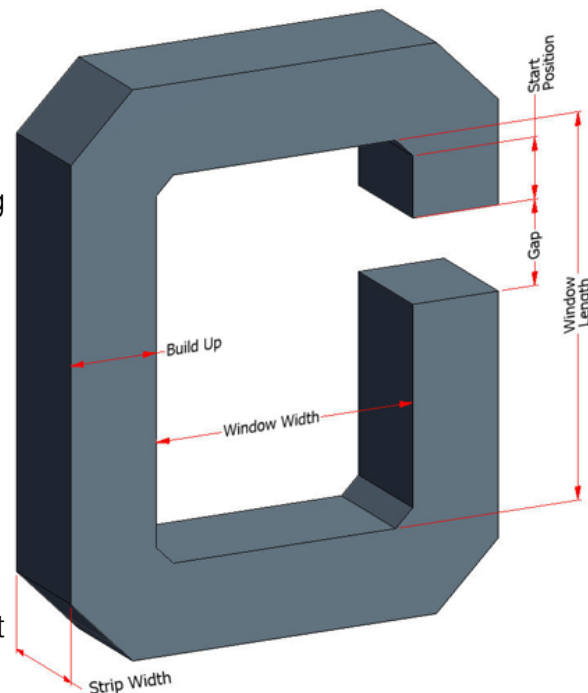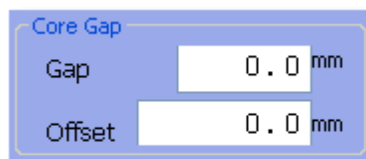
Single Phase Core Gap

Gap Distance

The Gap Distance is simply the width of the gap. You can have a gap of 0mm ie just a cut

Cut Leg length is the leg selected by the Cuts In drop down box.

⬇ **Lower Limit**	0.0mm
⬆ **Upper Limit**	Gap size limited by the Cut Leg Length less 2 corners less the Start Position [175]

Gap Offset

Gap position is specified as an offset from the centre of Window Length.

⬇ **Lower Limit**	0.0mm
⬆ **Upper Limit**	Limited to half of the Cut Leg Length less 2 Corners less the Start Position less the Gap Distance
	The Gap offset upper bounds is adjusted for each change in Gap Distance.

Option	Choices			
Corners	✅	✅	⛔	✅
Former	Yes			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Symmetrical Halves	Off	On		
Optimiser Table	Select the number of cuts			

9.10 DEE

Application

DEE cores are used to make high voltage transformer cores.

The DEE core is "D" shaped to optimise / make more consistent the high voltage short circuit path between the coil and the core for epoxy encapsulated dry type power distribution transformers. When you epoxy encapsulate you need to consider the void spaces between the coil and the core. It has to be fairly even (without large dimensional changes), hence it can't go from a 5 mm space to a 20mm space...the epoxy won't flow around the sharp edge caused.

Single Phase only.
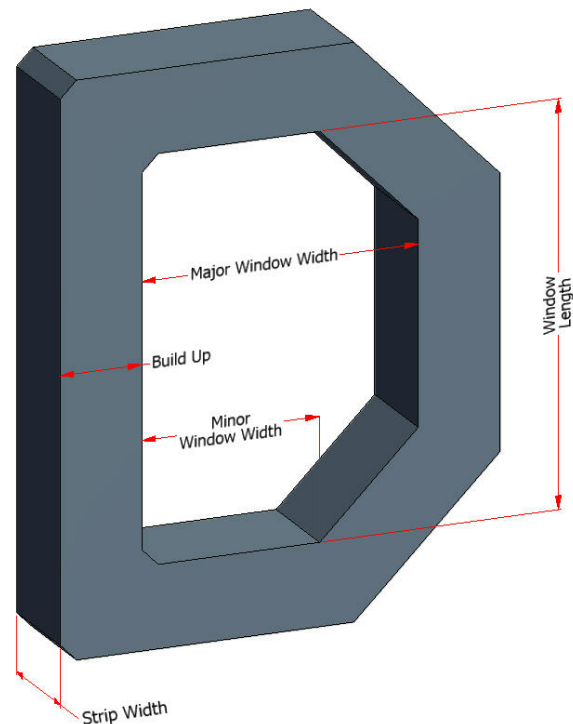
DEE Core Dimensions
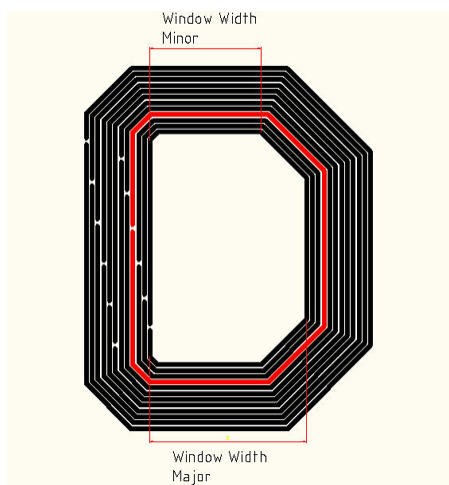
DeeCORE
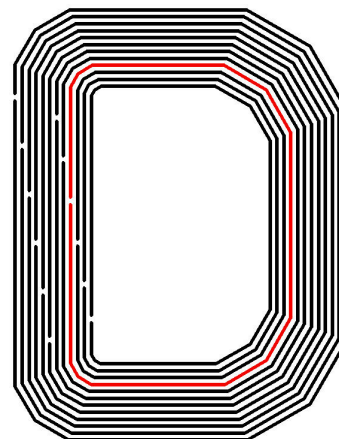
DEE with 30degree corners

Special Features

The DEE core requires 2 Window Widths to be input to define the 'D' shape. When DEE core is selected in the core designer, an extra Window Width field is enabled. This field is the second one pictured on the right. We refer to this as Window Width Major,for the longest Window Width and Window Width Minor for the smallest Window width.

Please consult the Window Width 80 topic for detailed information regarding the setting of Window Width and Window Width Major

Option	Choices			
Corners				
Former	NO			
TIG Single Phase	None			
Cuts In WL/WW separately for inner/outer	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Symmetrical Halves	Off	On		
Optimiser Table	Select the number of cuts			

9.11 DEE-BUTT

Dee cores are generally used to make high voltage transformer cores.

Application

The DEE-BUTT Core is "D" shaped to optimise / make more consistent the high voltage short circuit path between the coil and the core for epoxy encapsulated dry type power distribution transformers. When you epoxy encapsulate you need to consider the void spaces between the coil and the core. It has to be even (without large dimensional changes), hence it can't go from a 5 mm space to a 20mm space...the epoxy won't flow around the sharp edge caused.

DEE Core Dimensions
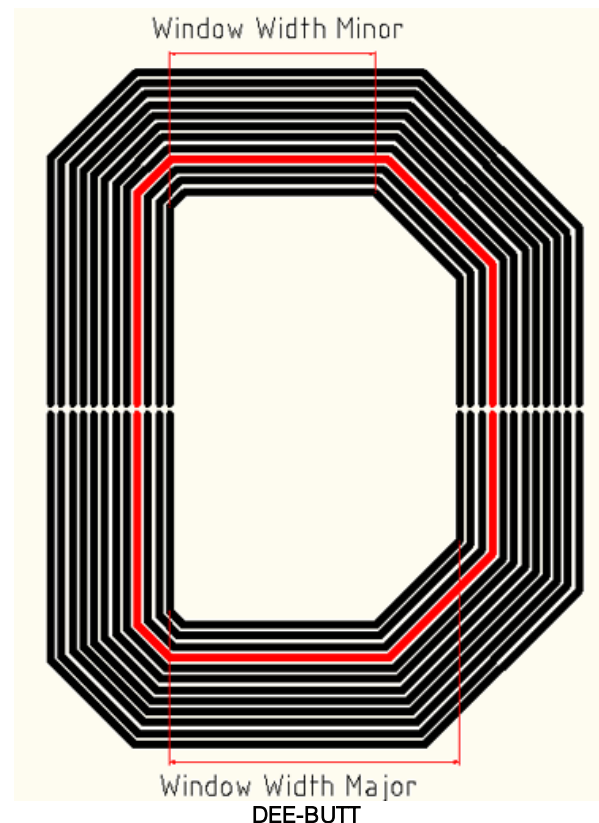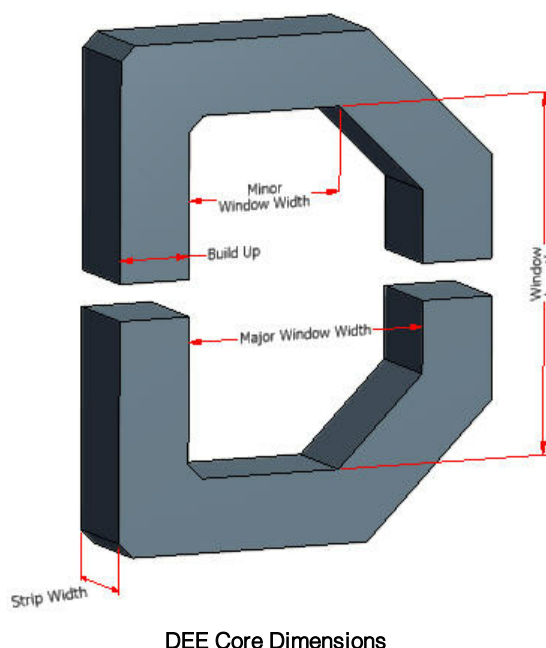
DEE-BUTT

Special Features

The DEE-BUTT core requires 2 Window Widths to be input to define the 'D' shape. When DEE-BUTT core is selected in the core designer, an extra Window Width field is enabled. This field is the second one pictured on the right. We refer to this as Window Width Major, for the longest Window Width and Window Width Minor for the smallest Window width.

Please consult the Window Width⌐80⌐ topic for detailed information regarding the setting of Window Width and Window Width Major

CLEF is a special parameter for BUTT cores only see CLEF 95. It is used to slope the normally flat face.

CLEF	0

Option	Choices			
Corners	✓	✓	⊖	⊖
Former	None			
TIG Single Phase	None			
Cuts In WL/WW separately for inner/outer	Not Available			
Diverge Gap Single Phase	Not Available			
Symmetrical Halves	Not Available			
Optimiser Table	Not Available			

9.12   2DDGAP

Application

The 2DDGAP is basically a DUO core (and hence used in similar applications) with symmetrical male / female legs. Therefore the halves are not unique and are interchangeable.The 2DDGAP is basically a DUO core with each half (male and female) having a male leg and a female leg.

The 2DDGAP offers some assembly advantages for customers depending on their current product range.

Single Phase only
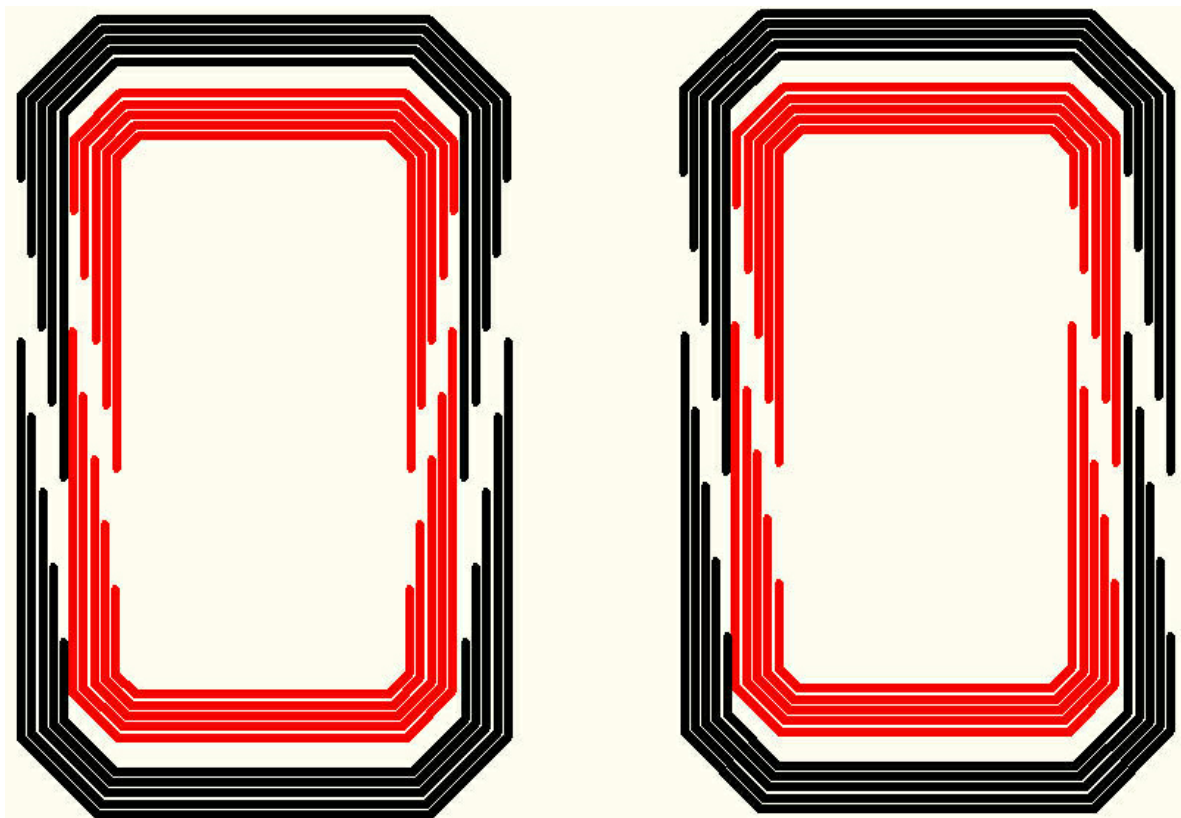
DUO Core and 2DDGAP core
Note the differences in the male and female halves

> The 2DDGAP core face is not selectable from the core face menu, it is implemented as Symmetrical halves on the Single Phase DUO core designer screen.

Option	Choices			
Corners	⬤✓	⬤✓	⬤⊖	⬤⊖
Former	Yes	No		

Option	Choices			
TIG Single Phase	SHELL	CORE	OLAP	None
Cuts In WL/WW	Window Length			
Diverge Gap Single Phase	Within Winding	Within WL		
Symmetrical Halves	Not Available			
Optimiser Table	Select the number of cuts			

9.13 Straight Laminations

Straight Laminations are simply that.

In the Core Designer straight laminations uses the simplest input screen with no options available.
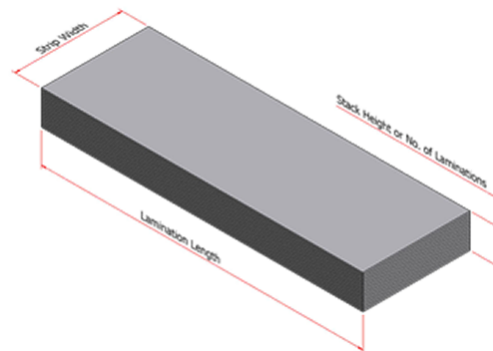
Straight Laminations

The field changes are:

Window Length becomes Lam(inaton) Length.

27.0mm

Lower Limit

2500.0mm

Upper Limit

Dimensions

Lam Length   0.0 mm

Width Window   0.0 mm

Strip Width   0.0 mm

Height   0.0 mm

Strip Thickness   0   Inner

Short Lamination lengths are difficult for an operator to catch and there is risk of injury to the hand. Ensure hand protection is worn, or remove the laminations by other mechanical means.

Build Up Field now becomes the Height of the lamination Stack

4.0mm

Lower Limit

999.0mm

Upper Limit

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UNICORE

Designing and Making Cores with UCS

Part

X

10   Production Screen

The Production Screen supervises core production on your UNICORE machine. It looks like this

You may only enter the Production screen from the Core Designer screen. This is only possible when the manufacture button has illuminated. This happens when all of these conditions are true:

- You have completed a core design, .

- A UCM has been detected

- The detected UCM is not currently making a core - UCM must be in hold or not in use.

- You can only ever have one production screen open.

You must close the production screen in order to take a new design from the Core Designer screen into production. You cannot arrive at the production screen, then return to the Core designer by using the <u>notebook tabs</u> and alter the design and have the manufactured cores change during a batch. Changes in the Core Designer are not transferred to an already open production page. This means that whilst a UCM is in production, another staff member may create a new core design and save the design for later use. This is very handy for creating core designs ready for later use by operators.

Closing the Production Screen

Closing the Production screen during the manufacture of a batch of cores or during the components of a three phase core will cause production to cease. The UCM only knows about the core (or component core) it is currently making. If the Production screen is closed during a core (by entering HOLD and clicking the close button) The UCM will be reset and the core will be incomplete.

If communications with your UCM are broken during the manufacture of a core (or component core) your UCM will continue to manufacture the current core (component core) until completion.

Under these circumstances UCS will automatically close the Production Screen and indicate that the UCM is busy
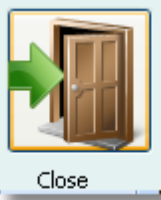
UCS will not re-enter the Production Screen until the UCM completes the core it is manufacturing.

The Production screen is locked when ever the UCM is making laminations.

When the Production Screen cannot be closed it becomes locked. This locked state is indicated on the Menu Bar 53 by a padlock icon in place of the normal exit icon

It becomes unlocked (shown by a icon on the Menu Bar 53) when:

- the Production screen is entered until the Run button is pressed

- Whenever the UCM is in hold.

- On completion of a Batch
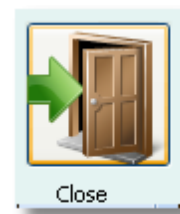
Remember: If core production is interrupted for what ever reason, you can always restart manufacture from any point in a core using the Jump To 152 feature.

10.1 Production Screen Workflow

The Production Screen only deals with making cores from a design made in the core designer.

The basic flow through the screen is:

Upon entry the Now Producing [143] area summarises the core design that will be made. Be sure to confirm that the basic core dimensions match the batch of cores you wish to manufacture.

The UCM Maintenance [143] area will indicate the state of the maintenance of the connected UCM. You should confirm a large green tick in this area indicating that the UCM is ready for production, with no maintenance items out of date.
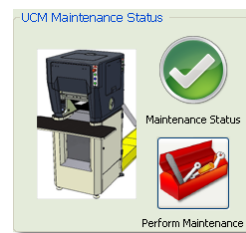
ID Robot Tool Positions for this core.

If your UCM has an ID Robot connected, the Robot and Aux tool positions to set for this core are indicated in this panel.

DUO cores offer the option of insertion helpers [149]. An operator uses these as an assembly tool. Enter the number of pairs you wish to make - usually only 1-3.

Now enter the batch quantity [149]. As soon as you hit enter or tab the core data is sent to the UCM. You will see a slight pause and then....

Text will begin to appear in the operator dialog [147] box. You will be prompted to press RUN when the UCM is ready to produce cores.

Once you have pressed RUN, the UCM will commence production and a small offcut will emerge, which can be discarded and then the laminations will be produced. Once lamination production commences, the current core progress indicator 146 will begin to count laminations.

At any time during core production you may press the UCM Hold button and the UCM will cease production. In Hold you will see the production page change, with active production fields going dark and both the Repeat Laminations 151 and Jump To 152 controls illuminated. Using these lamination selection options you can continue production from any point in the core.

Production Page in HOLD

10.2   Now Producing

Now Producing summarises the core that is being made. This is supplied so that the operator is aware of the major dimensions and significant features of the core being manufactured.

If the operator wants to know more detail about the design, he/she may switch back to the Core Designer screen using the notebook tabs 51 at the top of the screen.

> If you switch back to the Core Designer 63 screen and some one has been constructing or editing the design, the Core Designer will no longer reflect what the Production screen is manufacturing.

10.3   UCM Maintenance Panel

The second area on the left hand side of the production screen is the UCM maintenance status panel.

As you are about to commence core production, the UCM Maintenance Status panel lets you know whether your UCM is close to needing preventative maintenance.
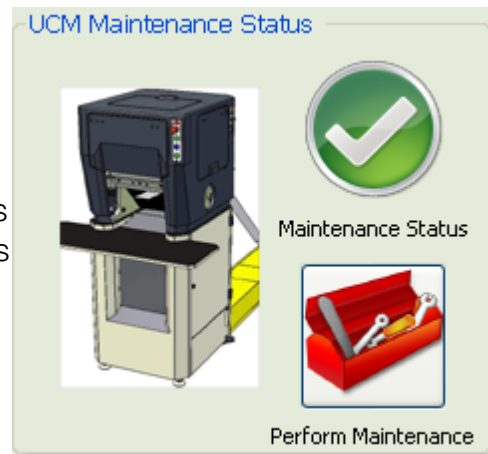
The indicators displayed are:

If the icon appears as a green check mark, then the machine is ready to manufacture.

If the machine appears as a yellow exclamation mark then maintenance is required soon. You may manufacture a batch of cores, but now is the time to organise maintenance for the machine.

The red cross means that a maintenance item is now overdue and the quality of your manufactured cores may no longer be at AEM Cores high standards.

Effect on UCM operation

None of these maintenance indicators will prevent the UCM from being operated. However, the condition is noted by UCS and you may breech the terms of your warrantee on your UCM by continuing to operate the machine in this condition.

Recording Maintenance Carried Out

If maintenance has been carried out, the Perform Maintenance button will open the [Unicore Maintenance Screen](#)189 and at the same time close the Production screen. This is based on the assumption that in order to perform maintenance the UCM will be powered off loosing any production settings sent by UCS.

In the Unicore Maintenance Screen you can find out what maintenance items are outstanding and record complete maintenance activities.

10.4 Batch Progress Indicators

This is the Batch progress indicator panel.

It shows the number of completed cores and the number in the batch of cores to be made.

When making three phase cores the number of completed cores refers to the number of three phase cores completed not the number of component cores completed.
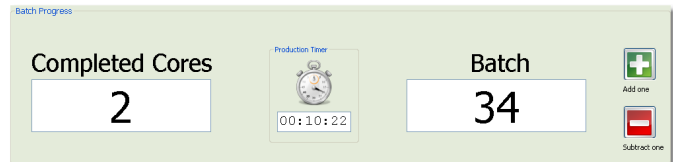
The number of cores in a batch is entered into the [Batch Quantity](#)149 field else where on this screen

 and

When in hold these two buttons permit increasing or decreasing the batch size by one core at a time.

In the centre of the display is the Production Timer. It's purpose is to indicate production time of the batch of cores in hours, minutes and seconds. This information can be used to estimate how long a machine will be in use, as an aid for production scheduling.

The Production Time allows an operator or supervisor to monitor and evaluate actual production time taken to complete a batch of cores.

UCS Core Designer also estimates how long a single core will take to manufacture. See [Core Time Estimate](#)70
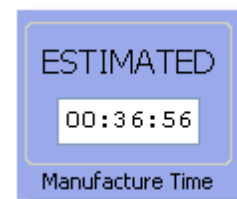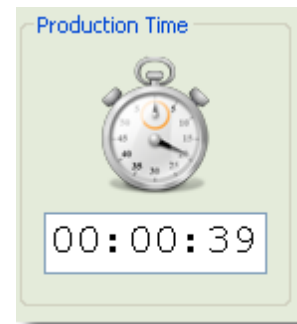
The time indicated on this stopwatch does not include time in HOLD. It

commences from the moment RUN is pressed on the UCM to make the first core, and accumulates elapsed time excluding hold time.

This information can also be used to determine how productive an operator and machine combination are, by comparing normal time from a wall clock or watch with the Production time. ie 3.45 hours of production in 4 elapsed hours, gives an indication of operation efficiency.

Note that hold time and production time are reported in the Operator Dialog 147 box each time HOLD is exited. This is intended to serve as am indicator to operators of how much hold time is being generated.

10.5 Current Core Progress

The Current Core panel reports the manufacturing progress of the current core. In three phase cores this is the current component core.

This display is in three strips from top to bottom

1. Lamination progress

2. Bar graph

3. Build up progress

Current Core

Completed Laminations		Laminations Remaining
3	Male	13

1.07	L	3.47
Current Build Up		Build Up Remaining
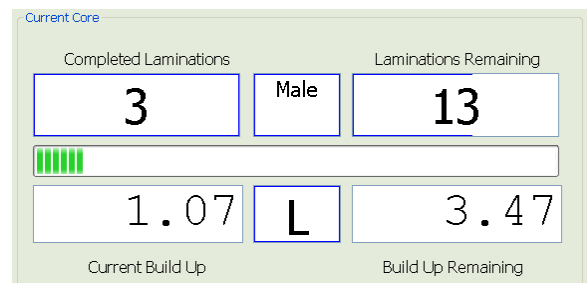
In the centre of the top line, for cores having Male and Female halves, the half currently in production is also indicated.

The centre box in the bottom line indicates which component core is being made, This field is only used for three phase cores. The indicators are

- L for the inner Left hand core

- R for the inner Right hand core

- O for the outer core

When Former or TIG laminations are made the top line will indicate Former in the completed lamination field and TIG in the Laminations Remaining field.

DUO	In the special case of a DUO core with male and female halves, prior to pressing RUN, UCS will commence by displaying the Laminations remaining for both the male and female combined or the total laminations in the DUO Core. As soon as RUN is pressed, UCS will display completed laminations and build up for the male or female core that is being made. Upon completion of the core UCS will return to displaying the total laminations for the complete DUO

10.6 Operator Dialog

The operator dialog box is where UCS will display informational messages about manufacturing progress and operator prompts.

You cannot enter text in this area.

Note that hold time and production time are reported in the <u>Operator Dialog</u> [147] box each time HOLD is exited. This is intended to serve as an indicator to operators of how much hold time is being accumulated.

<--- Enter the batch quantity and press tab
Starting a new batch
Core loaded in UCM No Insertion Helper
Press RUN to begin. . .RUN Pressed
Run button pushed on a new core
Former lamination complete
Entering HOLD

Press RUN to begin. . .RUN Pressed
Run button pushed on a new core
Former lamination complete
Entering HOLD
Hold Time accum: 29s
Prod Time accum: 21s
Exiting HOLD

Operator Messages

Operator messages create a time line of activity that helps determine where you are in the production process. It is intended to prompt an operator into action and inform them of changes. Should an issue arise this dialog is captured in screen shots which helps AEM staff understand where in the process you were when you encountered your issue.

Message	Interpretation
<--- Enter the batch quantity and press tab	This text is present when you first take a core to the production screen. It is a prompt pointing to the batch quantity field which requires input to start the production process.
Starting a new batch	Indicates that a new batch of cores is starting.
Press RUN to begin...	The core design has been successfully loaded into the UCM, when the operator presses the RUN button on the UCM, production will commence.
RUN Pressed	This is an informational message only acknowledging that the UCM has responded to the operator pressing RUN.
Run button pushed on a new core	This is an informational message acknowledging the commencement of a component core.
Entering HOLD	The operator has pressed in the UCM hold button. The production stop watch is paused. The Hold stop watch starts running, this is not displayed.
Exiting HOLD	The operator has released the UCM hold button. The production stop watch recommences counting time, the Hold stop watch stops running.

Message	Interpretation
Hold Time accum: 34s	Each time the operator exits Hold, UCS reports the amount of time spent in hold during the production of this batch of cores. The 34s shown indicates 34 seconds of hold time.
Prod Time accum: 549s	Each time the operator exits Hold, UCS reports the amount of time spent in production for this batch of cores. The 549s shown indicates 549 seconds of production time.
Batch finished Add extra cores using '+	Indicates that the batch quantity of cores has been manufactured. Clicking on the [+] button will add an extra core to the batch quantity. Note once the batch quantity has been increased, you can use the [–] button to remove added cores.
Home complete	Indicates that the UCM has completed a homing operation, producing a short length of scrap. This allows recalibration of the movement mechanism.
Insertion helper	Currently manufacturing an Insertion Helper (DUO only)
*** Strip thickness changed - load 350um strip ***	Three phase core designs can have different strip thicknesses for the inner and outer cores. See Strip Thickness 85. If a core design has different inner and outer strip thicknesses, UCS will prompt the operator to change thickness. AEM Cores expects that you would not normally do this, you would use the Jump To 152 controls to make all the inners and then all the outers, requiring only the one strip change. In this example shows a design using 350micron strip.

10.7 IDI Robot Tool Position

If you are using the IDI Robot to assemble your cores automatically, this window shows the Tool Positions you should configure on your robotic tenderer.

If you would like to know more about this robot option, please contact AEM Sales department.

Note, This window is only activated if your UCMKey has had the IDI Robot option enabled.

10.8   Insertion Helper Strips

Insertion Helpers are a tool used during the assembly of DUO, DDGAP, EOLAP and INCDGAP cores. During core assembly an insertion helper is repeatedly passed through the coil to aid the correct matching of the cut laminations.

Insertion Helpers can be a double or single strip. ie for single for the DGAP and double for the DUO core face.
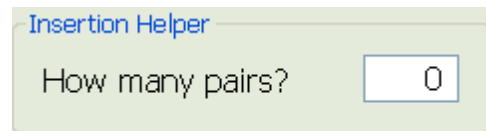
Lower Limit	0 helpers or pairs
Upper Limit	The smaller of the batch quantity and 99 helpers or pairs.

> The length of the insertion helper is determined by the Window Length [78] of the core being manufactured and cannot be changed.

Insertion helper strips are optional and do not have to be made. Unicore Control Software (UCS) also allows you to select the number of insertion helper strips. Normally a set of insertion helper strips would be made for each core assembly worker and on large batches of cores a spare set may also be made.

> You can see the insertion helper strips being used in the core assembly video at our website   www.aemcores.com.au

10.9   Batch Quantity

The number of cores to be made in a batch of cores is entered in the Batch Quantity field.

Lower Limit	The smallest Batch quantity is 1 core
Upper Limit	Batch quantities up to 9999 complete single or three phase cores (not component cores)
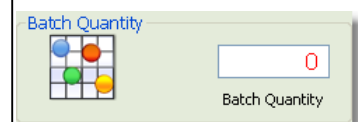
Once production has commenced you cannot change the batch quantity using the Batch Quantity field. However, extra cores can be added and deleted using these two buttons located to the right of the Batch field.

The Add One and Subtract One buttons will allow you to adjust the batch quantity one at a time.

At the end of a batch of cores, these buttons remain active allowing the batch quantity to be increased and thus more cores to be made. This feature is handy if there is an end of roll which has one more core left in it

See Batch Progress Indicators 145

10.10 Strip Thickness Tester

Strip thickness 85 is the single most important parameter in the construction of UNICORE.

See The Importance of Strip Thickness 87

Any error in the measurement and entry of the strip thickness will affect the quality of your cores.

The production screen offers a chance to confirm that the loaded strip is correct and within specification for the core design that is about to be manufactured.
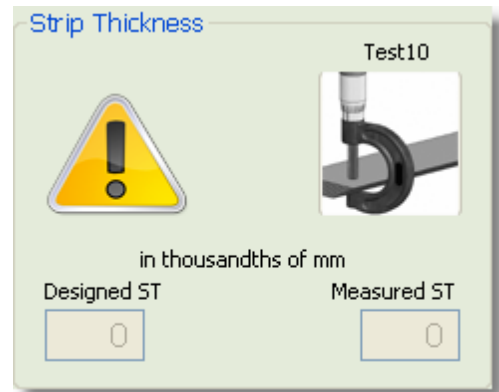
When in the production page you can use the Test10 button when the UCM is not producing laminations to commence a Test10 procedure. This is only possible between cores and when manufacturing three phase cores between component cores.
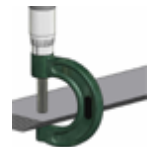
See your UCM Manual for further details.
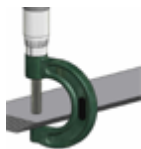
Before beginning production select Test Ten to check the strip thickness. Test Ten will prompt the machine to cut 10 laminations. These laminations are to be measured with a micrometer.

If you enter the measured Strip Thickness and it is more than 2 microns different to that specified in the Core Designer, the production page will close, recommending that you adjust the Strip Thickness in the Core Designer page

before commencing production. This is to keep the quality of the cores made to a high standard.

10.11 Repeat Laminations

The Repeat Laminations panel is a simple approach to repeating one or a few laminations in the core currently being produced. The Repeat Laminations controls cannot jump core boundaries where as the Jump To 152 panel can jump to any component core. Most importantly it only works with the current core or in the case of three phase cores, the current component core.
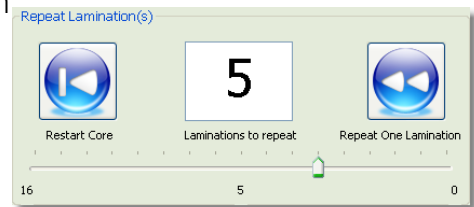
The Repeat Lamination control is only available when the UCM is in HOLD during the production of a core, not when waiting to start a core.

In the case of DUO Cores it only works for the current male or female half. You cannot use repeat lamination to move backwards through a core starting from a male half and crossing over the female half. If you need to move between halves use the Jump To 152 feature.

Repeat Laminations has two functions.

1. The first is that it allows an operator to repeat, however many specific laminations are required for a single core. This is very useful when a lamination is damaged through miss handling or a defect in the strip.

2. The second is that it allows an operator to repeat an entire core from the beginning of the core, not the batch. This can be useful when an operator loads the wrong strip and realises it in the first few laminations.

The operator may select the number of laminations to repeat by:

1. Repeatedly clicking on the Repeat One Lamination button

2. Entering the number of laminations in the Laminations to Repeat field

3. Using the mouse to adjust the slide control to the number of laminations desired. The slider will only allow selection from the last lamination through to the beginning of the core.

4. Clicking the Restart Core button to repeat all the laminations in a core.

Whichever control is used the other controls will change to reflect the operators selection. For example as Repeat One Lamination is clicked, the slider will move and the Laminations to repeat input field will be changed to reflect the correct number.

The Repeat Lamination control doesn't work unless the laminations to be repeated have been made. You can't jump to a core and [BUP]84 and then repeat from there.

10.12 Jump To

The Jump To feature allows production of laminations to occur at any point in the core. There is no requirement to have manufactured any laminations.

This feature is extremely useful for dealing with production interruptions such as power or air loss, factory down time or simply running out of strip. It is also used for making Cruciform cores, making the different width (strip width) sections.
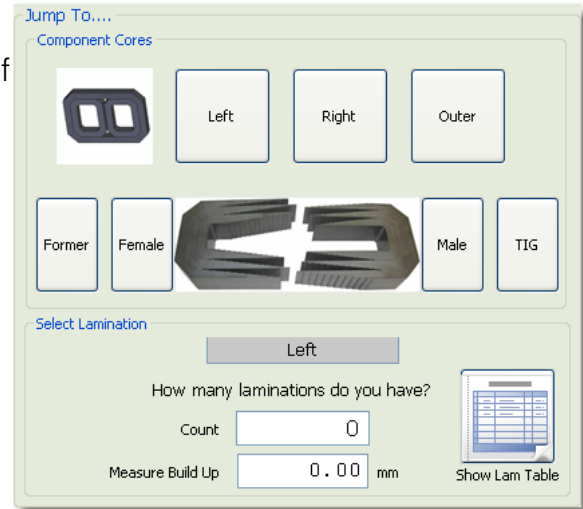
Jump-To Control Panel

This feature can also be used during core repair. If you have a core with a one or more damaged laminations (these can be distributed throughout the build up), you can disassemble the core, load the saved core design into the core designer, identify the damaged laminations and Jump To them and manufacture the laminations needed for the repair. This is one of the great features of UNICORE technology.

Jump To will allow an operator to skip ahead or revert back to previous laminations either by:

1. Entering in a specific lamination number or

2. By measuring the build of completed laminations and entering that number.

Jump To will also allow an operator to select various sections of a core to begin production on.

Example: An operator will be able to select the female portion of the right hand core of a 3 phase DUO core, lamination 14.

Using the Jump To Controls

The Jump To controls are available:

- when you first enter the production of a core or component core, following setting the batch number (you do not need to have commenced manufacture)

- any time when the UCM is in HOLD.

The jump to controls reconfigure depending on the core face selected and options you have selected in the Core Designer. Only the controls that are relevant to your design will be available. For example, in the single phase DDGAP with no former or TIG laminations, it is possible that the entire Jump To panel may only offer the ability to enter the number of laminations you have in hand, or the desired build up to commence manufacture from.

Note: When you make a Jump To selection part way through a core's manufacture, the next lamination produced will be the one selected in the Jump To controls. Depending on the time of lamination manufacture that the UCM entered hold, a homing off cut may be produced.

Component Core Selector

The control is active only when making three phase cores. A three phase core is made from 3 cores - or component cores. We call them Left, Right and Outer based on their positions in the final assembled core.

Clicking only a component core button will commence manufacture at the beginning (Former if selected) of the associated core.

Component Core Selector

The Core sub-component selector and the lamination selector both operate in the component core selected in this panel. If no selection is made, then the currently being manufactured component core is assumed.

You can only select one component core at a time.
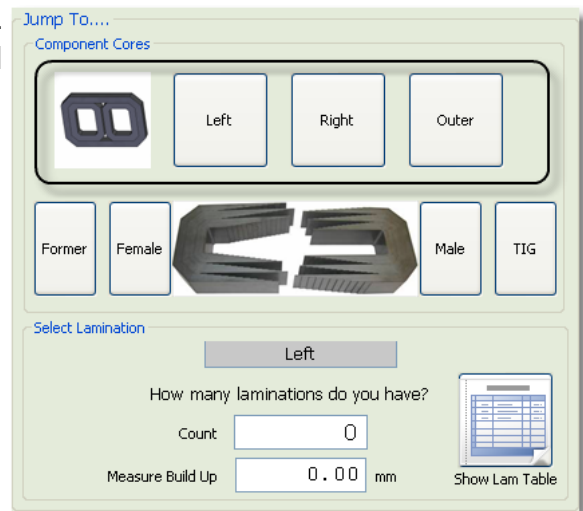
Core Sub-component Selector

This row of controls is active in single and three phase cores. A DUO component core consists of a former, a female half lamination stack, a male half lamination stack and a TIG lamination, these are referred to as core sub-components.

This panel of controls only illuminates when it makes sense to use them. For example making a DDGAP core will not illuminate male and female half selection buttons because there are no male and female halves. If your design in the core designer does not include a former or TIG lamination then these buttons will not illuminate. Under certain conditions determined by your core designs face and former/TIG selection, none of the sub-component selector may illuminate.

These controls operate by default on the currently being manufactured component core, unless a component core selection has been made.
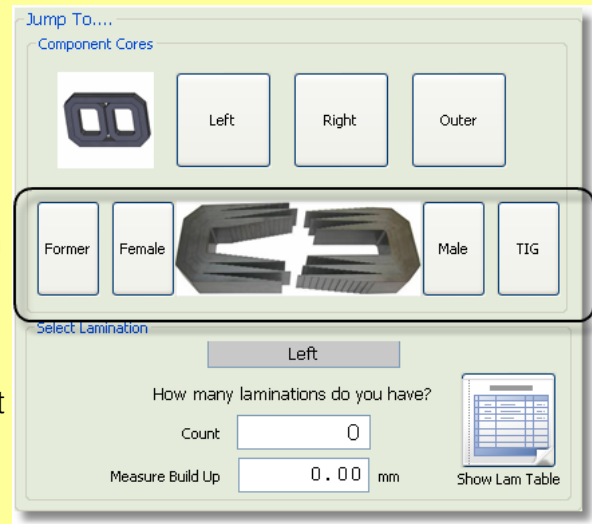
Core Sub-component Selector

If you have a former or TIG lamination in your design the Former and TIG buttons permit selecting these for manufacture. The Former and TIG buttons will not be available if your design doesn't include a Former or TIG lamination.

The female and male buttons are only available for DUO family cores (DUO, BUTT2 and BUTT3). When clicked the male and female buttons will commence production from the lamination immediately following the former lamination, or the first lamination if no former is selected.

You can only select one subcomponent at a time.

Lamination Selector

The lamination selector, chooses the lamination in the sub-component core in the component core.

For the three phase DUO core, this means that the lamination being selected will be located within the male or female half of the left, right or outer component cores.

When you wish to jump to a specific lamination, the lamination selector allows you to enter either

1. The number of good laminations you have in your hand in the Count field.

2. Or the build up you have already manufactured (the good laminations)
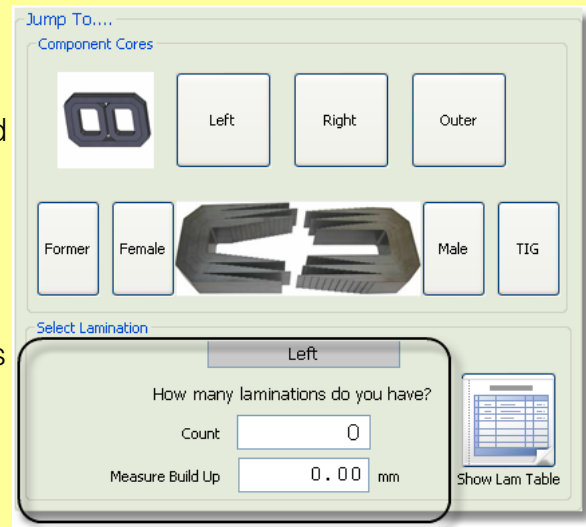
Lamination Selector

Which ever field you enter, UCS automatically fills in the other field for you.

In the case of DUO's, the lamination count is for the current male or female half only. The male lamination counts do not include the female laminations.

Use the Former and TIG buttons to get these special laminations made.

The Show Lam Table button will pop up a window for you to inspect the core's lamination table. The lamination table window can be positioned anywhere on the screen and will float above UCS, even whilst you switch screens. If you position the lamination table window on top of UCS, and then take a screen shot - the Lamination table window will be included in the screen shot. This can be very useful.

Show Lam Table

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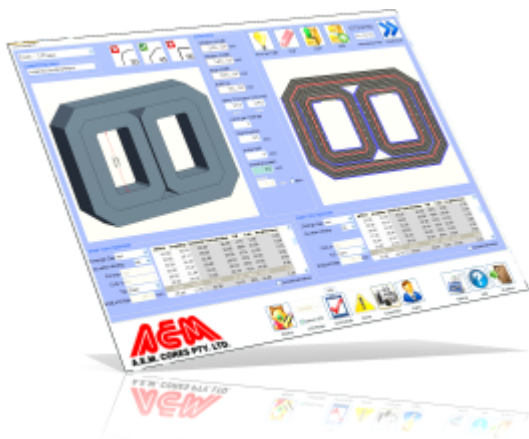
11   Unicore Interpretation

With the correct training an operator can very quickly learn to "interpret" a core from the Unicore machine. There are several indicators which can be used to determine the requirements for a perfect Unicore.

11.1   What Makes a Perfect Unicore?

- The dimensions of the core must be correct and within tolerance.

- Fold Angle must be correct.

- The faces should meet without overlap or gap (unless it is a gapped core, whereby the gap should be as specified).

- The legs should be straight or bowed out slightly, never inwards.

- The folds making up the corners must nest exactly within each other.

- There must not be any mismatched laminations.

- The cores must be of the correct "tightness".

- The strip must not be wavy, cambered or deformed.

- The legs of the core must not be twisted, the core must sit flat.

- The cut edge burr must be acceptable (varies depending on customers requirements).

Assuming that the operator has loaded the coil, measured the Strip Thickness, and entered the value into the UCS software. The other parameters required to make the Unicore, such as Window Length, Window Width, Build Up etc have also been entered.

After making the first lamination, the operator should now pause to consider the following aspects which will determine the QUALITY of the full Unicore produced.

11.2   The dimensions of the core must be correct and within tolerance

The first check should be on the very first lamination. With a suitable ruler the Window Length and Window Width must be verified, the Strip Width can also be measured at this point. The position of the Cut is also checked, as well as the type of corner. The first lamination will show whether the folder has been correctly set for selected corner angle.

11.3   Fold Angle must be correct

The perfect lamination does not necessarily make the perfect Unicore. It is the summation of all the laminations in the build up which we are interested in. Therefore do not be discouraged if the first few laminations are not perfectly square, because this is not what we want. Take a careful look at the distance between the folds on each corner. For the majority of cores this is set at a default of

3 or 4 mm between folds. A 45 degree corner is produced by folding twice and by altering the spacing between folds. To produce a 90 degree corner, this space between folds is kept constant through the entire core Build Up. For a 45 degree corner, the increment starts at 3 or 4 mm and indexes out to produce a diverging fold line. For a 30 degree corner, there are three folds at approximately 30 degrees each to make up a corner with a more rounded profile.

The 3 or 4 mm default corner "radius" can cause a problem in the first 5-10 laminations because the action of folding the second (or third) fold in a corner has a habit of opening out the first fold. This phenomena will decrease and eventually disappear as the increment between folds increases with each lamination produced. There is a point of diminishing returns reached whereby there is no further degradation of the first fold due to the action of the second. This is usually around the 5th to 10th lamination of any core.

> By the time the 10th laminations has been made, the Fold Angle should be confirmed to be correctly set.

A correctly folded lamination should be close to rectangular or a little "open" it should never be "over" folded so that the legs of the lamination point inwards. Do not be concerned if the innermost 5 to 10 laminations appear a little too "open". Set the 10th lamination to have the correct fold angle and shape characteristic and the resultant finished core will be correct. This is a desirable condition for two reasons:

1. The "open" inner laminations exert an outward pressure on the core and keep the inner window firm without fear of collapse.

2. If the inner laminations were square this means the outer laminations would be over folded and the core would be too tight to assemble.

Set the 10th lamination as described. Always try to bring the Folder Bar DOWN to set the correct angle. This way the trial laminations produced will always be under-folded and still usable in a core. So far we have not scrapped any material. All of these modifications can be done "on the run", on the first core, without any waste.

11.4   The faces should meet without overlap or gap

At this stage the operator should have at least 10 laminations on the table, the last of which should be a slightly open rectangle. Assemble these laminations from the inside out and tap them flat on the table. Due to the tight tolerances used in producing each lamination, they will not nest if they are sitting up off the table. Each lamination must be placed around the previous one such that their edges are flat. This is an assembly technique which is quite natural and takes no time for the operator.

At this point the operator should be inspecting the gap between the faces. Obviously the first thing to check is if it is the correct face required by the work instruction. Circumferential pressure on the core stack will bring the faces together until they meet. Check that they do so. If not the core is too tight, which could be an

over folded corner, or an incorrectly measured or entered Strip Thickness.

A Gapped core should have the gap measured with a suitable ruler to check it is within tolerance.

11.5   The legs of the core must not be twisted, the core must sit flat

When assembling the Unicore on the table, it is very important to ensure each lamination is sitting flush with the table and not sticking up above the side of the core. If this is correctly performed and the legs of the core are still twisted then this is indicative of either warped strip or an incorrectly ground lower guillotine fold radius.

To investigate whether there is a problem with the fold radius on the lower guillotine blade ask your Maintenance Technician to examine the following.

When re-grinding the blades, if the tooling shop was not careful in honing a consistent radius on the front of the Lower Guillotine blade then the fold may appear skewed which results in a twisted lamination. This is a vary rare occurrence because general tool sharpening practices tend to minimise error. However, you must always inspect any work performed on the Lower Guillotine blade before fit up. The actual radius is not that critical however it should be in the order of 1-1.5 mm. What IS important is it should be consistent and not tapered along the length of the front edge of the Lower Guillotine blade. A tapered radius will cause the fold to skew across the strip width and the legs of the Unicore will be twisted.

Incorrect radius is a very rare occurrence. Most leg twist will be due to strip deformation and not the machine.

11.6   The folds making up the corners must nest exactly with each other

Still on the Fold Angle, a close inspection of the corners will show if they are nesting correctly. Each lamination should nest perfectly with the one before. There must not be any "pulling" of the laminations or interference with the inside edges. Two factors affect the corner nesting, one is the Tightness and the other is the Fold Angle. Extensive testing of the software has resulted in a trigonometric model of the correct corner feeds and increments. An unusual property of the strip steel may cause a divergence from this model. However, an incorrectly set Fold Angle will very quickly cause problems with nesting.

Essentially, the Fold Angle must be correctly set before any further interpretation of the core makes sense. The 10th lamination must be a slightly open rectangle, and the corner must nest without interference.

11.7 There must not be any mismatched laminations

A lamination is unacceptable when it is not sitting flush with the ones on either side, or has an air gap at the point of folding with respect to the previous lamination. Mismatched laminations are usually due to a physical factor of the strip, or incorrect operator handling.

If the strip is oily, burred, wavy, cambered or in any other way defective then this will have a detrimental effect on the core. Air gaps, pinching, waves, twist and pulling at the corners are all indicators of bad strip. Interestingly this may only occur at infrequent times throughout the core. If the entire coil of strip is affected then the chances of producing a good Unicore are low. You must have good steel to make good Unicores. However, if the damage to the coil is only on one edge, due to handling faults for instance, then only the occasional lamination may be affected and the Unicore may pass inspection at the discretion of the user. Often the odd mismatched lamination will straighten out in the annealing process.

Operator interference is a common cause of mismatched laminations, but usually only in the early stages of training. Any heavy handed operators soon learn not to "grab" the strip, rather they lightly support or hold the lamination and allow the Unicore machine to guillotine the lamination free. If the operator pulls, twists or in any way attempts to extract the lamination from the Unicore machine before the guillotine operation, then this tends to stretch the lamination, open the fold and causes the lamination mismatch.

Always be on guard when training new operators for over eagerness to grab the lamination before it has been completely formed by the Unicore machine. Human intervention and degraded strip is the main cause of mismatched laminations.

11.8 The core must be of the correct tightness

Tightness is a very subjective term. AEM Cores cannot specify exactly what degree of tightness is acceptable for every customer. We can demonstrate several techniques to indicate how a core should be interpreted and what to do about it.

A core that is too TIGHT:

- Will not assemble easily and about 15-20 mm into the Build Up, the laminations will begin to pull on the corners.

- Will not have meeting faces and the gap will increase as the Build Up progressively increases.

- Will not pyramid with reasonable force.

A core that is too LOOSE:

- Will exhibit "slop" and excessive air gaps between the laminations. With the core flat on the table you will be able to move the inner laminations around sideways with respect to the outer laminations.

- The faces will begin to overlap with increasing Build Up.

- The core will pyramid easily, to the point of being difficult to handle in the extreme case.

If the Fold Angle has been set correctly, and the cores are still too tight then increase the Strip Thickness by one micron. Alternatively, if the core is too loose, then decrease the Strip Thickness by 1 micron.

It is certainly beneficial to the smooth flow of product from the Unicore machine to hand the responsibility of interpreting the core to the operator. These are small (yet important) variations the operator can make to the product which will yield a better core without absorbing supervisory resources. The Unicore machine should operate as a standalone cell, no jigs, fixtures, or mandrels involved in the production of cores.

We consider the techniques of core interpretation to be an important first pass inspection in the Quality Control process and encourage our clients to hand this responsibility to the operator. Although there is some new terminology to learn, and some careful observations to make, there are really only two variables to focus on and get right, Fold Angle and Strip Thickness. Neither of these are difficult concepts to grasp or liable to cause problems in the continual production of Unicores.

11.9   The strip must not be wavy, cambered or deformed

Garbage in, garbage out. The strip loaded to the Unicore machine must be acceptable for making cores. The feed roller may help to flatten any edge burr on a coil of strip, but other phenomena such as camber and wavy strip may not fare so well.

Unicores are produced by a precision feed-fold sequence, the programming is in microns, the tolerances in the decimals of a millimetre. Introducing dimensionally unstable coil strip into this system will produce varying results.

Induced stresses in the strip such as "oil can" effect, camber, twist and waviness are all unacceptable characteristics and should not be used. Their effect on the core is pronounced and will show up as mismatched laminations (more than the occasional one or two) and a core that will not sit flat on the table. Twisted legs, flared faces, air gaps and tight corners are all indicative of deformed strip.

Do not confuse this phenomena with the occasional mismatched lamination. Usually the occasional damaged lamination can be accepted (depending on the level of Quality Control used the by client). What we are discussing here is an entire roll of strip steel which is consistently producing unacceptable cores.

The Unicore machine is not at fault, change strip.

11.10 The legs should be straight or bowed out slightly, never inwards

It is important to understand the relationship between Fold Angle and the tightness of a core.

A cores is too tight if:

- The laminations cannot be pushed into a pyramid shape with reasonable force.

- The corners pull tight and do not nest correctly.

- The faces diverge and do not meet with reasonable circumferential force.

- The laminations just do not stack at all and the core ends up like an open fan.

- The inner faces meet at each cut, but the outer laminations have a gap.

These are all indicators of excessive tightness.

There is a particular bias associated with tightness and Fold Angle. A core with a slightly over fold corner will very quickly become too tight to assemble. Yet a core with the same slight degree of under-folding will fit together perfectly. There is a more detrimental bias to over-folding. The Fold Angle MUST be set correctly before any interpretations can be made with regards to the Tightness of a core. There is very little to be gained from inspecting a core which has an incorrect Fold Angle.

One indicator of the over-folded lamination is the inwardly bowed lamination legs. This will be evident in a single lamination to the trained eye, but most evident in a partially built up core where the legs (especially the Window Width) will be bowed inwards. There is no necessity to waste this core and start again, simply interrupt the program flow with the HOLD function, raise the Folder Bar slightly and continue. Unless the over-fold is severe (in which case it should have been recognised earlier) then the core will still be usable.

11.11 The cut edge burr must be acceptable

Burr on the cut edge is an important consideration when making Unicores. A burr of less than 0.025 mm is considered very good, less than 0.05 mm is certainly acceptable and some applications can tolerate as much as 0.08 mm. We aim for close to zero burr.

Burr is easy to notice, difficult to measure and certainly subjective with regards to Quality Control. In some Unicore applications the cut burr will not cause any problem although in other applications it may. AEM is committed to an ongoing research program targeting this problem.

Over time a burr will develop and the cut edge will deteriorate. When the burr is

unacceptable the guillotine blades need to be removed and sharpened.

11.12 The Perfect Unicore

In any production environment, quality AND production output are both important for success. Therefore we emphasise that a perfect Unicore does not need to have every one of its thousands of feeds and folds or its hundreds of cuts and laminations perfect. A small number of imperfections are NOT noticeable in the final performance of the core.
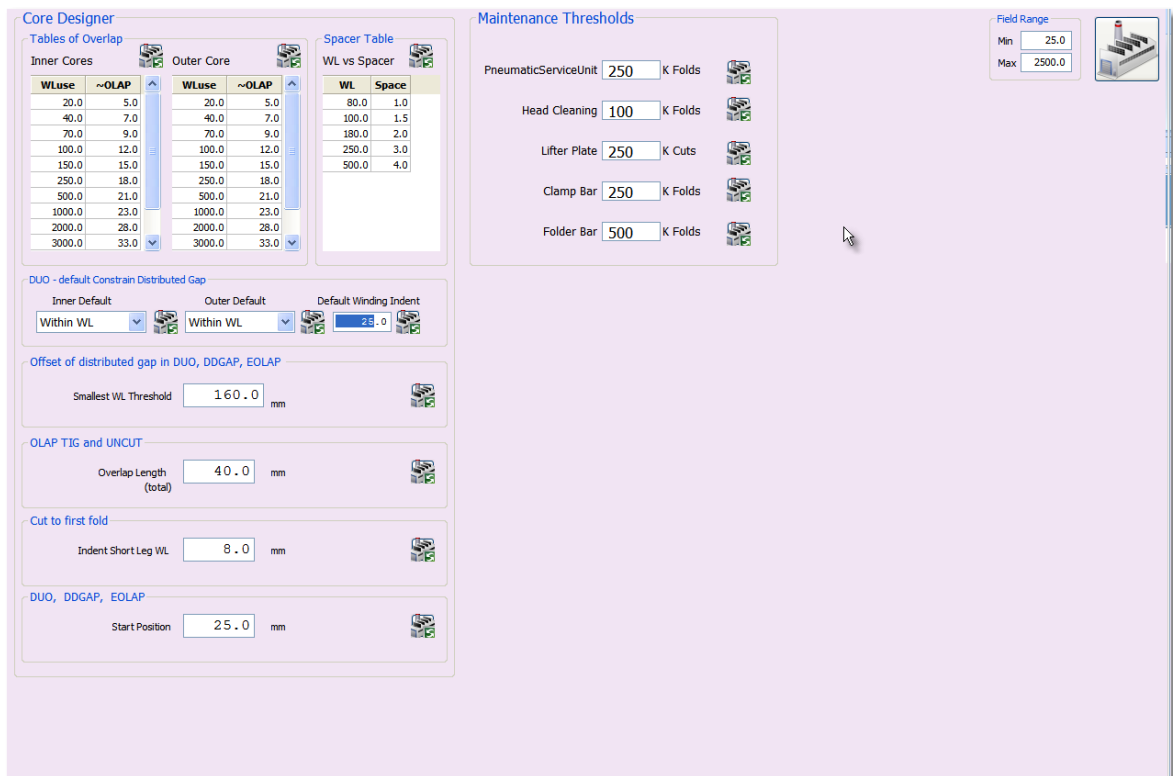
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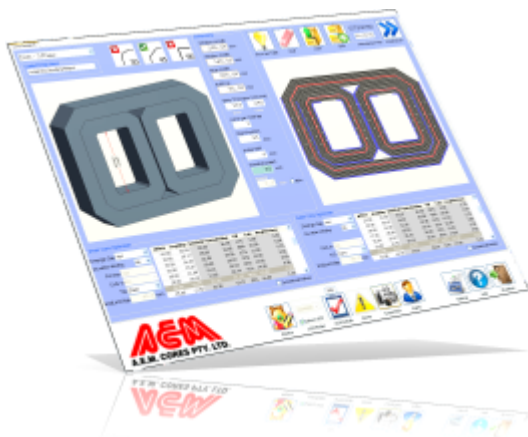
12   Settings Screen

The Settings Screen is used to configure various software items. It looks like this:

Software Settings Screen

The Settings Screen is accessed using the [icon] icon on the Menu Bar. Settings is always available, and you can only launch one Settings Screen. If you are viewing another screen and there is already a Settings Screen open clicking the [icon] icon will simply switch to the already open Settings Screen.

> Changes made to items on the Settings Screen have immediate effect and are preserved when UCS is stopped and then restarted.

Factory Settings

You will notice that each setting has a small icon to the right, the return to factory settings icon.

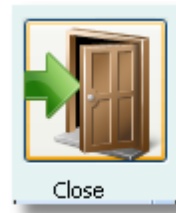Clicking the icon will return the setting to the factory default setting.

Clicking the large factory icon in the top right hand corner of the settings page, returns ALL settings to their default factory settings.

Closing the Settings Screen

To close the Settings Page, make sure you are viewing the Settings notebook page and then use the close icon on the Menu Bar

12.1   Tables Of Overlap

Tables of Overlap are used as a first approximation in our core optimisation maths.

There are two tables: one for Single phase and Three phase inner cores and the other for three phase outer cores.

The tables provide starting approximations for the Overlap for a given Window Length Usable. The values are in millimeters.

Tables of Overlap				
Inner Cores		**Outer Core**		
WLuse	**~OLAP**	**WLuse**	**~OLAP**	
20.0	5.0	20.0	5.0	
40.0	7.0	40.0	7.0	
70.0	9.0	70.0	9.0	
100.0	12.0	100.0	12.0	
150.0	15.0	150.0	15.0	
250.0	18.0	250.0	18.0	
500.0	21.0	500.0	21.0	
1000.0	23.0	1000.0	23.0	
2000.0	28.0	2000.0	28.0	
3000.0	33.0	3000.0	33.0	

Window Length Usable is the term given to that part of the Window length in a core design that may be used to distribute cuts along. This can be caculated by subtracting the 2 corners from the .

20.0mm

Lower Limit

2500.0mm

Upper Limit

Factory Settings:

As pictured above

When Would I Change These Values?

The simple answer is, there should be absolutely no reason to change the values in this table unless your company design policies specify a particular overlap condition, such as "minimum overlap on a xxx mm long/wide core must not be less than yyy mm".

Remember the overlap tables are a first approximation for the optimiser to then refine as per the mathematics for a core face. It's a first pass look up to kick start the optimising process close to the values in the table.

Setting an exact over lap in the table is not likely to force any optimised core to give you that exact overlap. Rather the overlap derived by optimisation will not be less than that corresponding value in the table.

The values within the tables are generally accepted dimensions, based on sound magnetic designs, and therefore unlikely to need modification, UNLESS you have a specific design condition pertinent to their company design policies.

> ### Warning:
>
> The Tables of Overlap should not need changing in normal use. However, if you decide to edit them you must observe the following:
>
> Each Row of WLuse must increase in value, each column of ~OLAP should also increase in value.
>
> You will be prevented from editing any value to a number greater than 2500.0mm the maximum Window Length, however you will note that the last entry in each table is for a WLuse of 3000mm which is greater than 2500.0mm. You must not edit or remove the last entry of 3000.0mm WLuse. If this is done you will need to use the factory settings button , to return the entire table to factory settings loosing any other changes you may have made.

Changing Settings

When you enter a value in the Spacer Table, UCS automatically formats it to 1 decimal point. Therefore you will not be successful trying to set a value with more than 1 decimal point.

When you click on the table, be sure that only a single cell has a blue bar through it, not a row.

The following images shows what happens when you click repeatedly on the Spacer Table cell you wish to edit

88.0	2.2
101.0	3.3
184.3	4.4
251.0	5.5
501.0	6.6

Row selected   Cell selected   Ready to edit

When you wish to change a setting,

- Click on the field you wish to change (follow the above images),

- Change the value to the value you wish to use

- Use the tab or enter key to signal your entry is complete

> If you do not use tab or enter to signal your change is complete, the new value will not be used.

To check that your value is the one being used:

- Set the value

- Tab or enter away from the field

- Close the Setup Page

- Open the Setup Page

Your changed value should appear

Overlap Table Value ERROR

The Overlap Table will only accept values in the range 0.0 - 2500.0 If you enter a value outside this range, UCS will return the changed value to the last legal setting for that cell and prompt you with a message like the one shown here.

Inner Overlap Table

Value Error: Overlap Table values must be in the range 0.0 - 2500.0 Returning to last valid setting
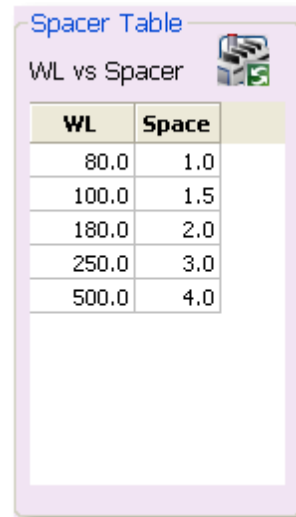
OK
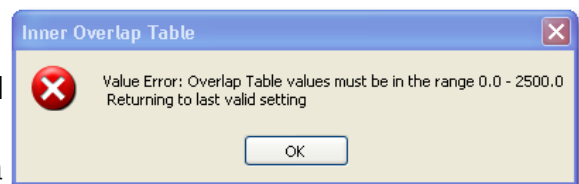
12.2 Spacer Table

The spacer table is used to automatically select the width of the spacer material that is inserted between the 2 inner cores in a three phase core.
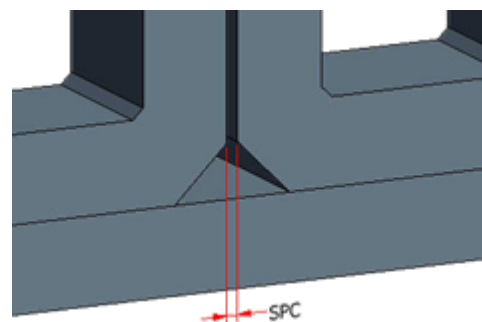
The table is populated by AEM Cores recommended spacer widths, but you may have different materials and material widths that you use.

WL	Space
80.0	1.0
100.0	1.5
180.0	2.0
250.0	3.0
500.0	4.0

Spacer Table
WL vs Spacer

Edit the table entries to suit the material you use. The table should be read as:

- From 0 to 79,999 use a 1.0mm spacer

- From 80.0 to 100.0 use a spacer of 1.5mm width.

You can over-ride the automatic selection of spacers using the Spacer [93] setting in the Core Designer.

Lower Limit   There are no limit's imposed on the space table fields, you will be able to enter any value you wish.

Upper Limit   2500.0mm

Factory Settings:

As pictured above

Changing Settings

When you enter a value in the Spacer Table, UCS automatically formats it to 1 decimal point. Therefore you will not be successful trying to set a value with more than 1 decimal point. When you click on the table, be sure that only a single cell has a blue bar through it, not a row.

The following images shows what happens when you click repeatedly on the Spacer Table cell you wish to edit

88.0	2.2		88.0	2.2		88.0	2.2

Row selected   Cell selected   Ready to edit

When you wish to change a setting,

- Click on the field you wish to change (follow the above images),

- Change the value to the value you wish to use

- Use the tab or enter key to signal your entry is complete

> If you do not use tab or enter to signal your change is complete, the new value will not be used.

To check that your value is the one being used:

- Set the value

- Tab or enter away from the field

- Close the Setup Page

- Open the Setup Page

Your changed value should appear

Spacer Table Value ERROR

The Spacer Table will only accept values in the range 0.0 - 2500.0

If you enter a value outside this range, UCS will return the changed value to the last legal setting for that cell and prompt you with a message like the one shown here.
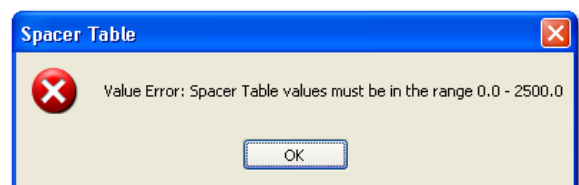
12.3 Constrain DG Box

This area of the Settings Screen is used to configure the default behaviour of the Core Designer for DUO Cores.

The default Winding Indent setting is used on DUO cores when the Diverge Gap setting is set to 'Within Winding'.
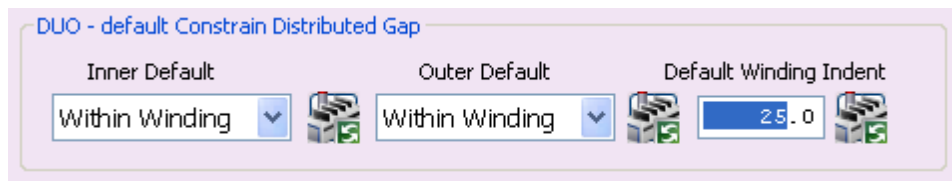
In effect the Winding is constrained but with the 'Within Winding' setting it is constrained to the Window Length less the corner area and less the default Winding Indent

Inner Default This setting is used by default on both new Single Phase DUO designs and the inner core for new 3 Phase DUO designs

Outer Default This setting is used by default on all new 3 phase DUO designs

Default Winding Indent has the following limitations:

4.0mm
Lower Limit

200.0mm
Upper Limit

For DUO cores only
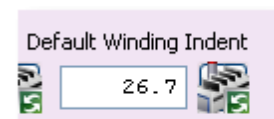Please read in conjunction with [Diverge Gap](#) 99

Factory Settings:

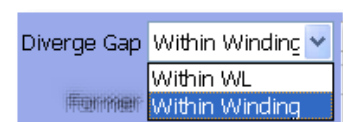Inner Default: Within Winding

Outer Default: Within Winding

Default Winding Indent 25.0mm

12.3.1 Winding Indent

When a DUO core face is selected, the Winding Indent field is populated with the default Winding Indent as set in this field.

If this value is changed, the Winding Indent is changed only for DUO cores with [Diverge Gap](#) 99 set to Within Winding.

25.0mm

Lower Limit

2500.0mm

Upper Limit

If DivergeGap is set to 'Within WL' and then is changed to 'Within Winding', the Winding Indent for that core is then set to the default Winding Indent's field value.

Factory Default setting 25.0mm determined by the UCM's Fold Cut[103] setting.

12.4   Smallest Window Length Threshold

This is the smallest Window Length threshold under which the distributed gap needs to be shuffled towards one end of the Window Length[78] to maximise the overlap length. Above this threshold the gaps are centred along the leg.

This value is UCM model dependent and determined empirically.

Offset of distributed gap in DUO, DDGAP, EOLAP

Smallest WL Threshold   160.0   mm

150.0mm

Lower Limit

2500.0mm

Upper Limit

Factory Settings:

160.0mm

12.5   OLAP Length

The value entered in this input field sets the Core Designer's default OLAP length setting.

OLAP TIG and UNCUT

Overlap Length   40.0   mm
(total)

0.0mm

Lower Limit

100.0mm

Upper Limit

The input field is the TOTAL length of the overlap which is evenly distributed about the centre line

Factory Settings:

40.0mm

12.6 Indent Short Leg

This is the shortest move from the first cut to the first fold, of the first lamination of a core ignoring the Former lamination. The default value is 8.0mm.

Cut to first fold

Indent Short Leg WL   8.0   mm

4.0mm

Lower Limit

200.0mm

Upper Limit

Factory Default setting 8.0mm

12.7   Maintenance Thresholds

The Maintenance Thresholds set the number of machine operations (cuts and folds) between maintenance events. These thresholds are factory set and should only be changed with written approval from AEM Cores. See [Maintenance Page](174) [174]

The maintenance system in UCS monitors the number of cuts and folds and the strip movements and notifies the operator when the machine is coming due for maintenance and when maintenance is overdue.

Maintenance Thresholds

PneumaticServiceUnit	250	K Folds
Head Cleaning	100	K Folds
Lifter Plate	250	K Cuts
Clamp Bar	250	K Folds
Folder Bar	500	K Folds

Lower Limit   0 operations

Upper Limit   500, 000 operations

Tampering or raising the maintenance thresholds without written permission from AEM Cores, may invalidate your UCM warranty.

When maintenance is carried out, the servicing technician records the maintenance event in the [Maintenance Screen](174) [174].

Maintenance falling due, maintenance being carried out and the changing of maintenance thresholds are all logged by UCS. This information may be used by AEM Cores to make determinations about warrantee claims.

Factory Settings:

As pictured above.

12.8   Restore all Settings

Clicking this button will return all settings on the setting page to their factory defaults.

Use with care!

Restore All Settings

Factory Settings:

12.9   Start Position

Start Position refers to the starting position of the cuts in a leg. See <u>Start Position</u>⌐90⌐

10.0

Lower Limit

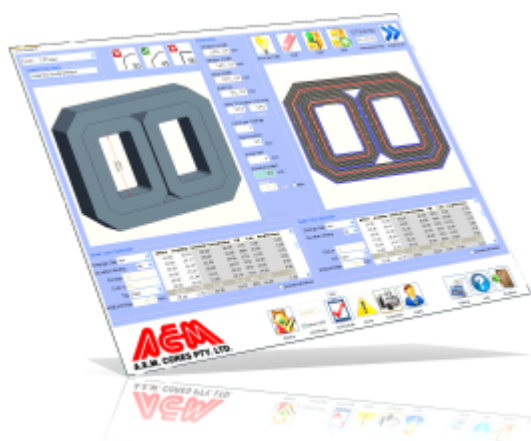99.0

Upper Limit

Factory Settings:

25.0

Designing and Making Cores with UCS

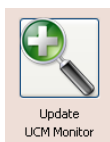# Part XIII

13   UCM Details Screen

This screen shows status information and settings related to the connected UNICORE machine. This screen cannot be accessed without a UCM connected and turned on, and communicating correctly.

UCM Operations Sub-Menu

This menu bar offers a number of choices.

Update the register display. This is only required under special circumstances, and will usually only be used under direction of AEM support staff.
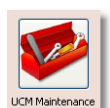
This button opens the UCM maintenance 174 screen. This screen is used to record maintenance performed and to check how long before maintenance is due.
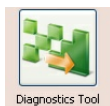
This button takes the operator to the Diagnostic screen 185.

The diagnostics screen allows an operator to perform special machine operations normally associated with UCM maintenance.

ℹ   You cant enter the diagnostics screen if the UCM is in production.

> If there is a Diagnostics tab already open, clicking this button will switch tabs to display it.

13.1   Machine ID

The Machine ID window displays the UCM serial number and software version reported by the UCM.

The UCM Serial number is the one reported by the onboard computer. It must match the serial number recorded on your UCM.

Machine ID

UCM Serial `3997`

UCM Software `Version 3111`

The UCM Software version is the currently loaded version of software installing in your UCM and is completely different to the UCS software version. Note that UCM software version and UCS software R numbers are linked and will not work as a mismatched pair. If UCS detects that the software in your UCM is too old to safely operate with it will automatically update₁₉₇ the UCM software to the correct version.

13.2   Operation Counters

These counters record the TOTAL number of cuts, folds, feed distance, and operating hours that the machine has completed during its operating life.

Operation Counters

Cuts	219
Folds	666000
Distance	43.5 Meters
Operating Hours	177 days, 05:30

13.3   UCM Temperature

The internal UCM control computer monitors it's temperature constantly.

This panel displays the

- current temperature,
- lowest temperature seen
- highest temperature seen

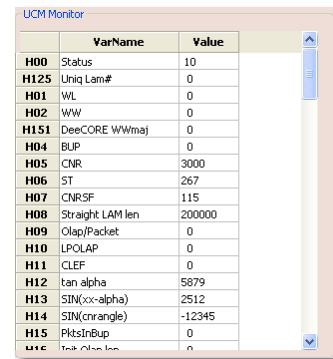These temperatures are only the lowest and highest seen by the current run of

Temperatures

	Current	Lowest	Highest
	18 C	15 C	18 C

UCS. If you restart UCS the lowest and highest temperatures will be the same as the current temperature initially.

13.4 Unicore Machine Registers

The UCM Monitor displays the contents of control registers in the UCM control computer. In normal operation this is of little value to an operator.

However, should an issue arise AEM staff may request a screen shot or ask what the value of a certain register is.

	VarName	Value
H00	Status	10
H125	Uniq Lam#	0
H01	WL	0
H02	WW	0
H151	DeeCORE WWmaj	0
H04	BUP	0
H05	CNR	3000
H06	ST	267
H07	CNRSF	115
H08	Straight LAM len	200000
H09	Olap/Packet	0
H10	LPOLAP	0
H11	CLEF	0
H12	tan alpha	5879
H13	SIN(xx-alpha)	2512
H14	SIN(cnrangle)	-12345
H15	PktsInBup	0
H16	Init Olap len	0

Update UCM Monitor

Updates to the UCM monitor grid are automatic. Every time a value is communicated between the UCM and UCS it is recorded and showing in the monitor grid.
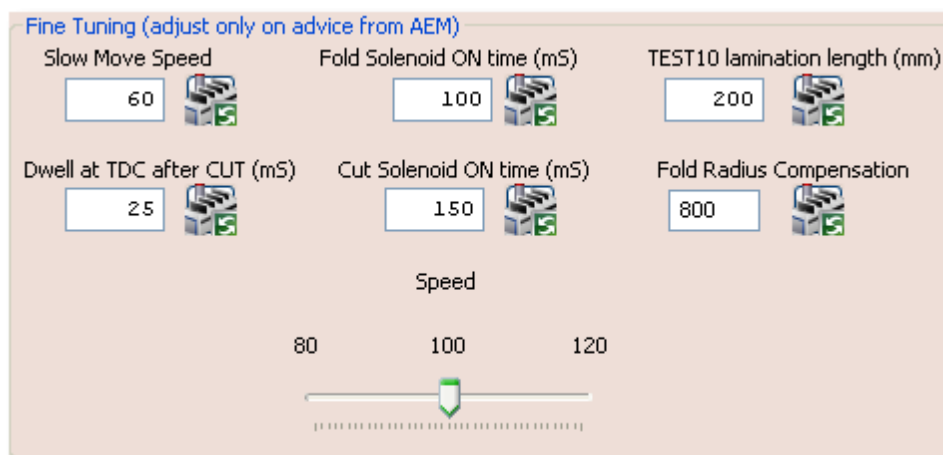
Sometimes we like to be absolutely sure that we are seeing the latest value, so the Update UCM Monitor button is used to immediately read the contents of all registers.

13.5 Fine Tuning

The settings in this panel are used to fine tune UCM behaviour.

It is not recommended that operators change these settings.

However, sometimes AEM Cores support staff may request that you alter these settings if you are experiencing core quality issues.

UCS will remember these settings from run to run.

These settings are applied IMMEDIATELY to the UCM.

UCM Speed

The bottom slider control is used to vary UCM feed speed.

The centre number on the slider is the currently set speed.
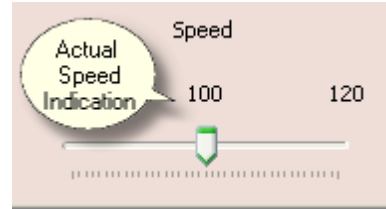
The ability to alter the feed rate has been implemented for 2 reasons:

- Manufacturers of small cores may wish to slow down the feed rate of the machine to help operators keep up with lamination output.

- Manufacturers of large cores with large build ups may wish to speed up the machine feed rate to reduce production time.

Term	What it means	Why adjust?	Benefits	Dis-advantages	Recommend-ations
Slow Move Speed	Reduced feed speed for TEST10 and JOG	To accommodate different operator reaction times	Less likelihood of dropped laminations if the feed is too fast	Slower operation	Leave at Factory Default unless experiencing operator difficulty
Fold Solenoid On time	The length of time for the down stroke of the fold	If experiencing inconsistent folding due to changes in strip resilience	Increasing time gives more consistent folds of extra thick or resilient strip	Slower operation if increase time too much	Leave at Factory default unless instructed otherwise by AEM
Test10 Lamination length	The length of the lamination from a TEST10	Can reduce strip consumption if performing lots of TEST10 measurements	Shorter length's use less strip	Difficult to catch small laminations	The 100mm factory setting gives best results
Dwell at TDC after CUT	Allows time for Lifter Plate to clear strip over lower guillotine	If experiencing strip clashing due to slow Lifter Plate	Can account for binding, or slow, Lifter Plate response	Increasing this parameter will slow core production	Inspect and replace Lifter Plate springs and shoulder bolts before adjusting this time Check Lifter Plate dimensions are correct and match lower blade. Check feed rollers are clean, no tape stuck to them.
Cut Solenoid ON time	The length of time for the down stroke of the cut	If incomplete cut, increase this delay	Able to cut through thicker materials without stalling the hydraulics **UCM may be damaged.**	Increasing this delay will slow core production	Leave at Factory default unless instructed otherwise by AEM.
Fold Radius Compensation (FRC)	Accounts for the actual radius the neutral axis of strip is bent over	If folder bar radius, or lower guillotine front radius, becomes worn or not ground to specified radii	Equalises the cut leg lengths of a double cut core : DUO, BUTT	Unable to reverse laminations in a double cut core if FRC incorrect	Grind lower guillotine radius correctly, replace Folder Bar. Refer procedure to measure FRC

Upper and Lower Limits

Control	Lower Limit	Upper Limit
Slow Move Speed	20% of feed speed	100% of feed speed
Fold Solenoid On time	50mS	300mS
Test10 Lamination length	50mm	500mm
Dwell at TDC after CUT	0mS	mS
Cut Solenoid ON time	100mS	300mS
Fold Radius Compensation (FRC)	0um	2000um

13.6 Agent

This is the input place for your agent to enter their name and contact details. This

information is used by the button on the main menu.

Your company name should appear in the Owner Field at the top

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14   Diagnostics Screen

The diagnostics screen permits maintenance personal to exercise the UCM in support of maintenance activities.

> For all maintenance procedures refer to the manual accompanying your UCM.
>
> eg UCM3000 Owners Manual or UCM4000 Owners Manual

The diagnostics screen has a button to initiate each diagnostic procedure and a brief description of what will be performed.
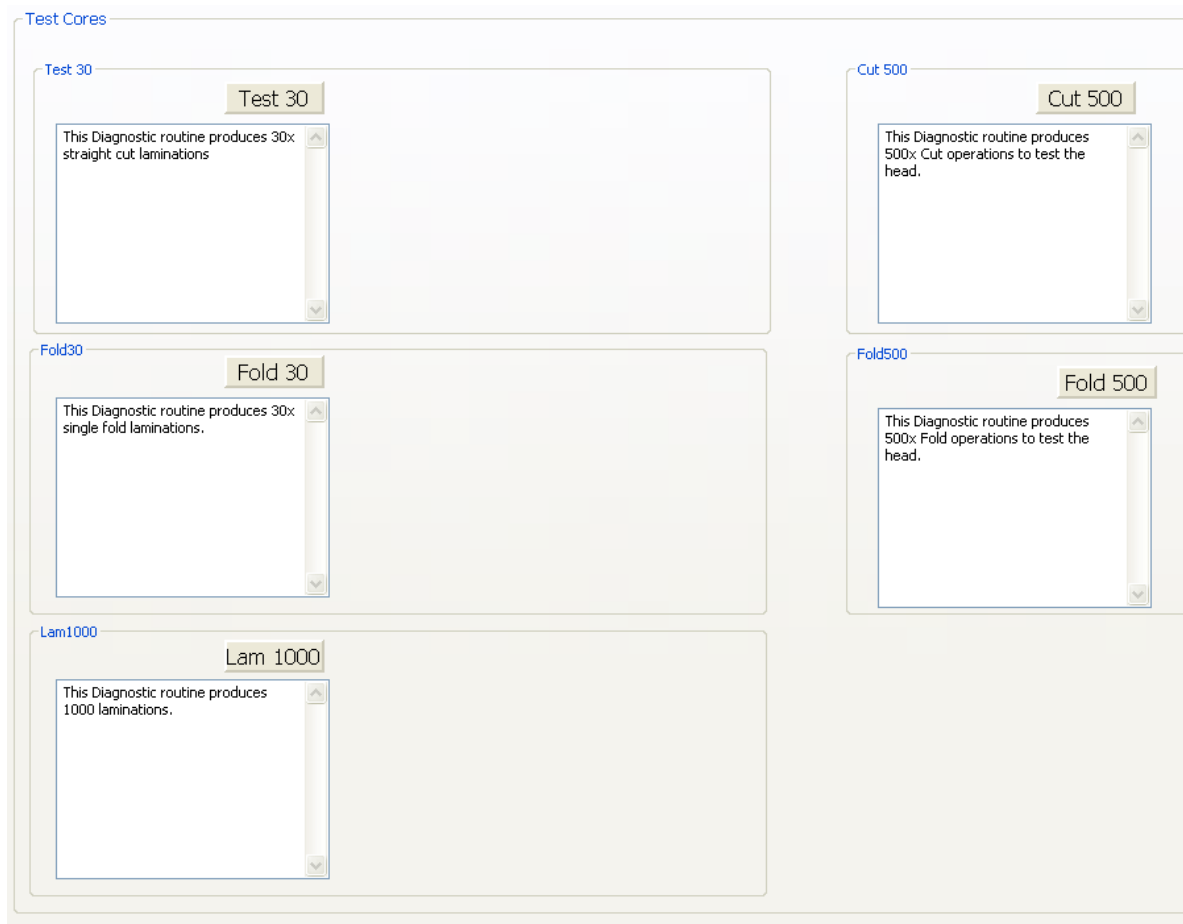
The Diagnostics Screen

Clicking on a diagnostics button will command the UCM to prepare for the diagnostic operation, but the actual operation will not commence until you press the UCM Run button.

When a test button is clicked a small window with pop up informing you that the UCM is configured ready to perform the test.
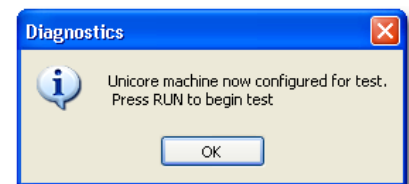
Test Loaded Dialog

Click ok, and the use the UCM Run, Hold and ESTOP

buttons to control the UCM directly.

> **STOP** If performing these operations immediately following maintenance be sure that the UCM is free of obstructions and is in a condition where operations are safe for both the humans and the UCM.

14.1 How to run Diagnostics

To run diagnostic routine you need:

- UCS running on the computer connected to the UCM

- The UCM in an operable state.

- UCM powered on and UCS indicating that a connection has been made.
  See UCM Detail icon indicators[54]

UCM Connected

- Click the UCM connected icon to enter the UCM Details Screen[177]

- Click the Diagnostics Screen button in the menu on the right hand side of the screen

Diagnostics Tool

14.2 Fold and Cut Testing

In this area of the diagnostics screen you may select fold and cut diagnostics routines. These are used to check head operation for correct folding and cutting operation.
These tests may be run with and without strip installed in the machine.

Testing without strip will allow you to:

- check air supplies,

- bleed hydraulics,

- power supply voltages,
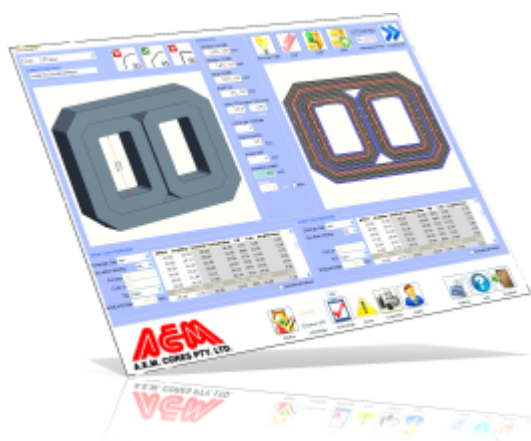
- flush bearing cages

all without producing scrap strip

Test Name	What is Produced	What to look for
Test 30	Thirty 100mm laminations are emitted. Used to confirm that both the feed and cut are working correctly and repeatedly. Used with strip loaded to check lamination quality and length. The length may be altered in the setup page by altering the Test 10 length	• Lamination should be 100 mm long • Consistent lamination length • Make sure that the cut is clean • Check cut burr • Look for lamination deformation
Fold 30	Thirty 100mm laminations consisting of a 100mm length, a single fold and then another 100mm length, allowing for your cut to fold setting[103] in the setup page. Usually used with strip loaded to check lamination quality, and fold repeatability. The length may be altered in the setup page by altering the Test 10 length.	Check that all the folds are the same angle which will depend on where the folder bar is set. For example if the machine was set up to make 45 degree corners the fold angle will be 45 degrees. The fold angle itself isn't really important just so long as it is producing identical laminations. Check for strip deformation around the fold, this confirms.
Lam 1000	1000 Straight Laminations, usually used without strip to flush bearing cages	
Cut 500 Fold 500	The Cut and Fold tests just move the cutting and folding mechanisms 500 times respectively. This is done with no strip and therefore no drive moves are done.	

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XV

15 Maintenance Screen

**All Maintenance MUST be performed with
the Unicore Machine powered OFF**

**All maintenance MUST be performed by
qualified Engineering Staff**

The maintenance of your Unicore machine is critical to maintaining core quality. Your UCM is a precision computer controlled machine and as such can only perform and minimising operating costs when it is correctly maintained. To help you do this, UCS maintains counts of machine operations such as cuts and folds and will warn your operators when maintenance is due.

You may examine the maintenance screen at any time a UCM is connected, by clicking the UCM Details button, and then the Maintenance|174 button on the UCM Details screen|54.

Please consult your UCM manual for specific maintenance procedures.

At the commencement of each batch of cores, these operations counters|178 are compared with the preset Maintenance Thresholds|174 on the Software Setting|165 page. If the operations count approaches the maintenance threshold, the

Production Page|139 maintenance indicators|143 will show that the UCM requires maintenance. At this point AEM Cores recommends that the operator informs your maintenance department, so that personnel with the appropriate qualifications may perform the maintenance.

A better way to manage your UCM maintenance requirements is to have your maintenance staff monitor the Maintenance Screen and perform maintenance before it falls due.

Maintenance screen showing Lifter Plate overdue for maintenance
Head nearly due for a clean

Refer also to the Unicore Machine Maintenance Instructions section of you Unicore machine's operating manual.

Note that maintenance other than cleaning should be performed by qualified maintenance staff.

Maintenance Items

Each maintenance item has it's own area on the screen that looks like this:

The status icon shows the state of the maintenance item.

Item does not need attention

Item has now completed 80% or more of the actions, perform maintenance when it suits your production schedule.

 Maintenance item is now due or overdue. Core quality and machine reliability is being compromised.

The bar graph immediately under the status icon gives a quick visual representation of how close to the next maintenance event this item is. In the illustrated case above, this is a new machine so the bar graph is empty. Maintenance is a long way off in the future.

The next fields show how many actions have been done out of the maintenance interval. So in this case only 670 folds out 50000 folds have been done.

The large text box contains a summary of the maintenance action. It is not a complete maintenance procedure and it is not to be followed.

 Maintenance procedures for your UCM are documented in your UCM manual. The instructions contained in the UCM manual are the authoritative maintenance procedures. UCS only summarises these procedures.

Marking Maintenance Done

When the toolbox associated with a maintenance item becomes coloured , maintenance staff are able to mark the maintenance as done.

A confirmation dialog will appear
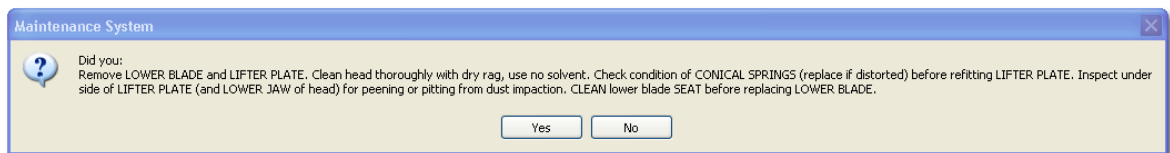
Maintenance Confirmation Dialog

asking your maintenance staff to confirm that the maintenance has been performed. Clicking yes marks the maintenance complete. UCS will the start a new maintenance interval for that item.

 This item may be configured on the [Settings Page](#) 59

15.1 Finding The Maintenance Screen

To find the maintenance screen:

- UCS running on the computer connected to the UCM

- The UCM in an operable state.

- UCM powered on and UCS indicating that a connection has been made.
  See UCM Detail icon indicators 54

UCM Connected

- Click the UCM connected icon to enter the UCM Details Screen 177

- Click the Maintenance Screen button in the menu on the right hand side of the screen

UCM Maintenance

15.2   Maintenance Required Screen

If you enter the production page 139 and your UCM is in need of maintenance, this pop up box will appear to let you know that maintenance is now due.

Remember maintenance is about maintaining core quality, customer satisfaction and maximising the return on your UCM investment.

This pop up makes sure that your operator knows that maintenance is required before commencing every batch of cores until such time as the maintenance activity is recorded.

From here, the operator may choose one of two courses of action.
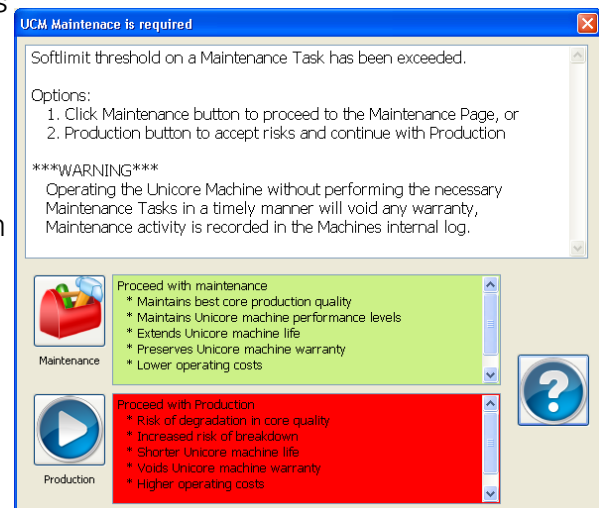
This dialog pops up when your UCM requires maintenance

Icon	Action
	Enter's the Maintenance Screen 192. Here, maintenance items can be examined.
	Operator can continue to produce the current batch of cores. This choice may effect core quality and should damage occur to the UCM, will void warrantee.

Icon	Action
	Pop's up a help window to this page

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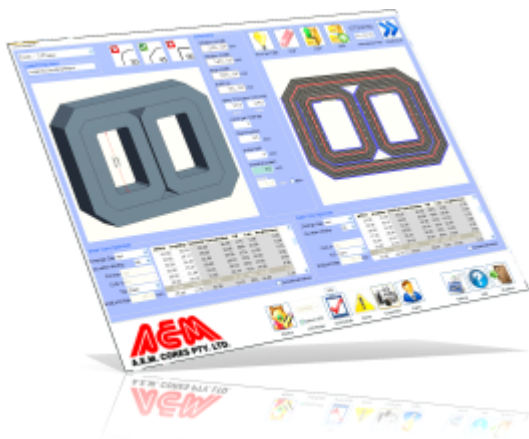
16 Birthing UCMs

When a UNICORE machine is first assembled, the internal computer must be told what model and serial number machine it is installed in.

The process is called Birthing.

This should be done once on the AEM factory floor and then never again. However, in the event the internal computer should fail you may see the Birthing screen appear upon connection. You cannot navigate to, or select this screen - it will be presented when it is needed.

Birthing Screen

Notice that the connection icon shows a green tick. Communications are working normally. You cannot click this button at this time - the UCM has no software on board and cannot make cores or respond to any other requests. You will find that the Test10 feature (see UCM manual) will not work either.

UCM is connected

16.1 Birthing Procedure

UCM3000 Manufactured Prior to June 2009

UCM3000's manufactured prior to June 2009 are in the field and operating. These machines are working with UCS R504TXXX versions of UCS. Upon installing UCS1.6 and connecting to the UCM3000, UCS will automatically birth these machines with no

> human intervention. Indeed you may connect the UCM3000, start UCS and look away from the machine. The process takes less than 2 minutes and requires no operator input.

Birthing is a very simple procedure. Make sure that the power to the UCM is maintained throughout the process.

There is no turning off or on or rebooting of anything.

Step 1 Enter the UCM serial number (it is stamped on the head on the right hand side. It is in line with the right side power control buttons. Lift the right hand side panel up and it should be visible), and then click

to have the serial number written into the onboard UCM computer.

While the serial number field is empty or contains an illegal serial number, the button will display
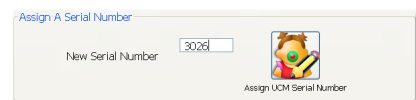
Enter UCM Serial Number

When the serial number has been written (very fast) the icon on the button changes to
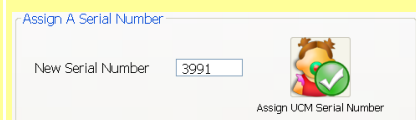
Serial Nuimber Assigned

Step 2 At this point the UCM software download will automatically begin. A progress window will pop up indicating how the download is proceeding.

snap of the progress window

Step 3 At the end of the download process a SUCCESS or FAIL message will appear..

If you see a message FAIL Contact AEM Cores support, please immediately do so.

Download UCM Software

2.

Commence Download

The UCM connected has now had it's serial number assigned and the UCM software downloaded. It is now ready for testing. Close the Birthing panel with the door icon on the menu bar.
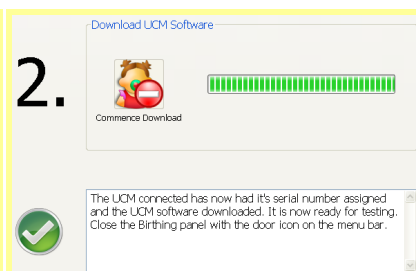
Birthing Completed

If the download is successful the birthing window will automatically close and UCS will commence normal operation by loading the core designer, and you will see that after a short pause, UCS will connect to the UCM ready for confidence testing.

16.2 UCM Automatic Software Upgrade

If you update your installed version of UCS, the next first time you run the new version of UCS with the UCM connected and powered on, you may see a progress bar appear indicating that your UCM's internal software is being updated. This process is fairly quick and if you are not watching the screen when it happens you may miss it.

When the update is complete the on board computer in the UCM is rebooted and the icon to the right is displayed whilst the UCM reboot is taking place.

UCM being Kick Started

	Downgrading UCS on your computer is fairly easy, but downgrading the UCM software is difficult and will probably require a service call.

	If you are using more than one computer with a UCM you MUST upgrade all computers to the same version of UCS at the same time. You should not connect an older version of UCS to an updated UCM.

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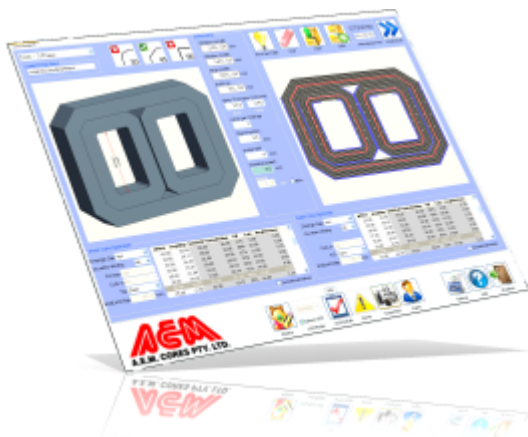
17   Screenshot

A screenshot is an image file that captures the entire UCS screen display as you see it. Since you can use the screenshot feature to capture the UCS screen at any time, you are able to capture displays and then use them as a record, or send them to AEM support to show us what you are seeing.

> Use screen shots to report issues

A sequence of screen shots can be used to document a sequence of events. If you are experiencing an issue, please start from the beginning and capture a series of screen shots that tell the story of how to reproduce your issue. You may then email AEM these screen shots, along with a description of your issue.

How To Make A Screenshot

Click this icon in the menu bar and it will immediately capture a screenshot. You will see the icon briefly change to the icon on the right whilst the photo is taken.

screen shots are automatically named in the form YYMMDD-HHMMSS.png and located in the UCS Screenshot directory.

17.1   File Location and Format

Each screen shot is named with the date and time is was captured. The name is in the format YYMMDD-HHMMSS.png
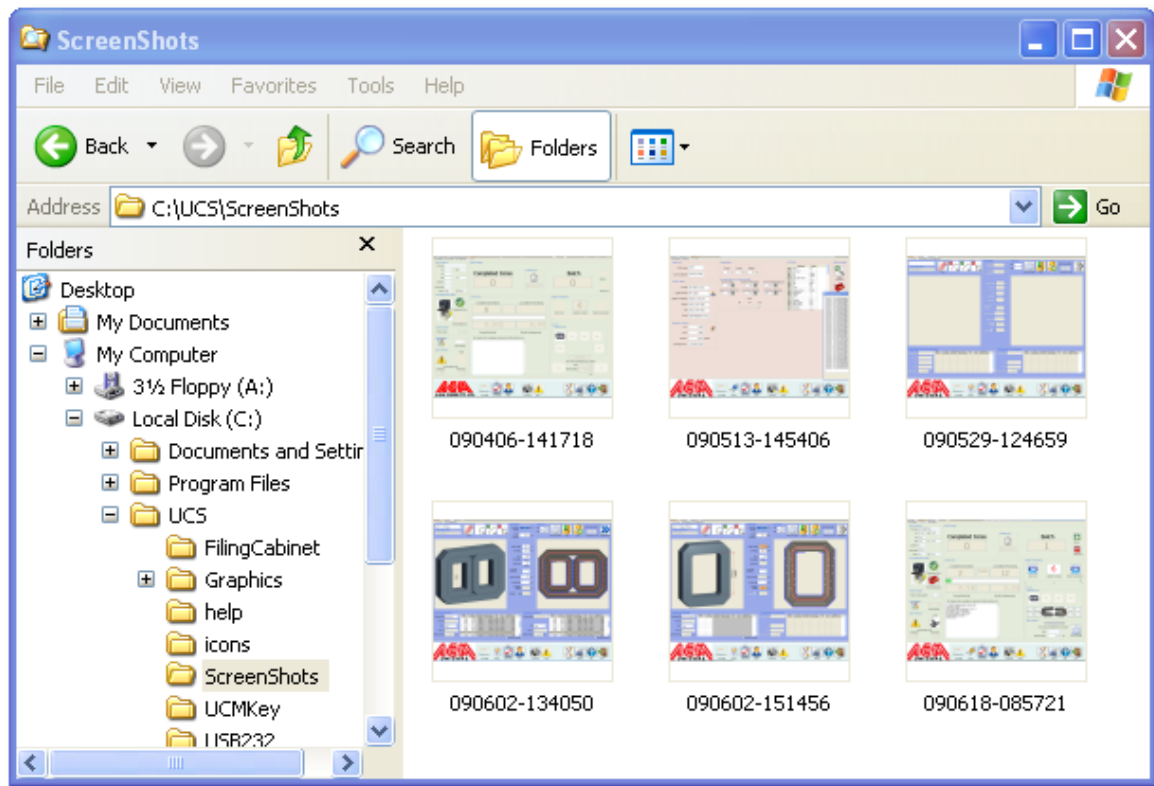
Screen shot directory showing thumbnails.
First screen shot shown here was taken 6 Apr 2009 at 14:17:18

We rely heavily on your computer having the correct date and time.

The screen shots are standard portable network graphic (png) files which are viewable in internet browsers and other picture viewing software. We have included a built in picture viewer to guarantee that you can view your screen shots.

This feature was originally developed to make software bug reporting much easier - it bypasses the need to record a lot of core settings. If you witness a UCS software bug please take a screenshot and email it to us.

Another great use of the screen shot feature is to record a sequence of screen shots showing a sequence of events. Since the images are all time stamped you can hit the screenshot button as often as you like and the time stamped file names preserve the sequence.

Screen shots are automatically saved in the subdirectory screen shots under the main installation directory. This is C:\UCS\screen shots

17.2 Sending Screenshots To AEM Via Email

If you wish to send a screenshot or several screen shots to AEM via email, simply attach the image files to your email. You will need to consult your email software's help to find out how this is done.

> There is no need to paste the screen shots into Microsoft Word documents or make PDF files from the screen shots.

17.3 Screenshot Viewer

The Screen Shot Viewer is a simple, separate application to view the screen shots taken by UCS.

The screen shots are in standard png graphical file format and can be used by all graphical viewing software.

We created this very simple utility to install on machines that had no other software installed on them and we wanted to be sure that you were always able to view the screen shots you take.

The screen shot viewer is bundled as a separate application in the UCS installer. The Screen Shot Viewer is not part of UCS. It can be run at the same time as UCS, even whilst cores are being made. To switch between UCS and the Screen Shot Viewer use Alt-tab key combinations.

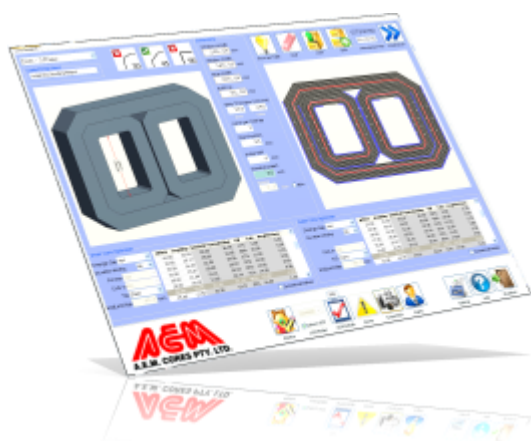### Menu Bar Icons

Screen Shot Viewer is present and available for use. Click the icon to load it.

Screen Shot Viewer application is not installed or missing.

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XVII

18   Reporting Faults

If you experience an issue with UCS or an issue with your Unicore machine you should generate a fault report.

Faults such as mechanical failures wont benefit from a fault report, but core dimension issues and software issues will benefit from you lodging a fault report.

A fault report will capture what you are seeing in UCS and the state of the Unicore Machine and relay that to the technical staff at AEM for analysis.

18.1   When to lodge a fault report

We would like to encourage you to make a fault reports:

- If you see any software behaviour that you feel is incorrect

- If you have any suggestions that you feel would make UCS better or more useful

Your fault report can be about anything.

18.2   How to lodge a fault report

First a few words about what makes a good fault report.

Because UNICORE technology goes into so many countries around the world we find that the biggest time delay in resolving issues is getting good fault information.

This leads to many cycles of question and answer which often due to the time difference makes easy problems drag on for days.

So please refrain from simple reports such as it doesn't work.

Try following these steps:

- Exit UCS

- Start UCS

- Hover your mouse over the AEM Cores Logo - after a moment a little message will pop up saying UCS $Revision: XXX $ where the XXX is a number - we need to know that number. This will tell us exactly what UCS you have installed.

- We need to know your UCM serial number.

- Now reproduce your bug, taking screen shots as you go. We would rather you sent us too many screen shots than too few.

- Please save the core settings you are using. Please attach the saved core file to your fault report.

- Explain to us the sequence of events that we can follow to reproduce your issue.

- Finally create an email with your fault description and attach the screen shots you have taken, as well as the saved core file. In the c:\UCS directory there are some files we would like to see, please attach them to your email - they are called 3XXX.ini (3XXX being your UCM3000 serial number) - or 4XXX.ini for the UCM4000, UCS.ini, and UCSErrorLog.txt

18.3   Reporting Communications Faults

If you think you have a communications fault between the UCM and UCS, the following is a check list of things to try and record before contacting AEM Cores support.

First thing to know is that we are sure the problem is not with UCS. Reinstalling UCS wont fix anything.

Fault Finding Procedure

Here are several things to step through which may fix the problem and will help us collect more information about the problem. Please follow these steps and then send all your screen shots to us. Remember to take screen shots when ever you see evidence of a fault.

1. Check your UCM connection

2. Make sure that only the device you are using is connected. ie if you have a UCM that uses the USB11A device don't have USB232 devices connected. If you have more than one device connected, remove them all and only connect the required device.

> It is important that the required device is removed and reconnected after all other removals, and that only ONE device is connected at a time.

3. Ensure that your UCM is powered up.

4. Ensure that your UCMKey is inserted into the computer. Check that your UCMKey is operating correctly by following the topic Testing UCMKey 34.

5. Start UCS up

6. Hover your mouse over the AEM Cores Logo - after a moment a little message will pop up saying UCS $Revision: XXX $ where the XXX is a number - we need to know that number. This will tell us exactly what UCS you have installed.

7. Confirm that the check box labeled Detect UCM near the AEM logo is ticked. If it is not, tick it and wait for at least 1 minute.

8. Close UCS

9. In the c:\UCS directory there are some files we would like to see, please attach them to your email - they are called 3XXX.ini (3XXX being your UCM3000 serial number) or 4XXX.ini for UCM4000 series machines, UCS.ini, and UCSErrorLog. txt

10.Turn the UCM off

11.Turn the computer off

12.Take note of where the USB-RS232 device is connected.

13.Disconnect the USB-RS232 device from the computer AND the UCM - this is critical.

> ⚠️ With everything turned off and disconnected, you MUST wait for 2 or 3 minutes.

Be sure to follow these steps in order please

1. Turn on the UCM

2. Turn on the computer and run UCS

3. Make sure that the Detect UCM check box is ticked ☑ Detect UCM

4. There is a yellow led indicator on the com port end of the USB-RS232 device. Please watch this led for activity (You may need to cover it with your hand to see the light)

5. Connect the USB cable to the computer (use the same port you disconnected it from - or you may experience driver installation issues)

6. If Windows starts requesting a driver, exit UCS and follow the procedure Installing the USB-RS232 [42]. When complete begin this page again.

7. Wait for 2 minutes - watching the led

8. Tell us if the led flashed - it should be flashing for a while and then stop for a while, then flash again - continuously.

9. Now gather all the files mentioned in step 5 at the top of this page, and the screen shots you have taken. Please email all that you have taken.

10.Please remember to send us the actual screen shot files not a pdf of them

11.Let us know what was happening when you noticed the problem, was the machine making cores, were you doing maintenance, have there been any power failures recently.

Designing and Making Cores with UCS

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