AEM UNICORE UCM3000 Instruction Manual



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Unicore 3000

Innovation in Transformer Design and Manufacture

The Unicore machine is a computer controlled strip forming machine used to manufacture three dimensional, shaped, single or multiple faced transformer cores from electrical steel.

The Unicores are built up from the inside out, each lamination is accurately produced so it nests perfectly with the one before. Various core and face geometries are available via the UCS3000 software.

A Unicore production cell consists of the following equipment:

- * AEM Decoiler UDM4000 or alternative sourced by the customer
- * Unicore machine UCM3000
- * PC running UCS software

Unicore Machine UCM3000 UCS3000 Core Design and Production Software

Operating and Maintenance Instructions

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1 Overview of Unicore Machinery

The Unicore machine is a computer controlled strip forming machine used to manufacture three dimensional, shaped, single or multiple faced transformer cores from electrical steel.

The Unicores are built up from the inside out, each lamination is accurately produced so it nests perfectly with the one before. Various core and face geometries are available via the UCS3000 software.

A Unicore production cell consists of the following equipment:

- AEM Decoiler UDM4000 or alternative sourced by the customer
- Unicore machine UCM3000
- PC running UCS3000 software
- Materials handling equipment to load the steel onto the Decoiler and to hold and transport finished cores, must be supplied by the customer.

NOTE: for safe use of non-AEM equipment please refer to the suppliers Safety and Operating Instructions.



A typical Unicore Machine Installation

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2 Unicore Machine Features and Controls

The Unicore machine consists of a CABINET that houses electrical, pneumatic and hydraulic components.

A safety hood covers the Unicore machine ROLL_FEEDER and FOLD/CUT Head.

2.1 Main Rotary POWER Isolator

This is the main Power Isolator for the Unicore machine. It is also a door safety interlock for the electrical cabinet and will trip if a power fault is detected.



Location of Rotary Power Isolator

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2.2 Front Console Panel

A four-button control console is mounted on the front of the Unicore machine safety hood.



Front control panel

In order these controls are:

- 1. Emergency Stop
- 2. Run button
- 3. Hold button
- 4. Jog button

2.2.1 Emergency Stop

The red self latching mushroom push button on the hood is the Emergency Stop. It will shut down everything, remove power to the drive, shut down the hydraulics, relax the pneumatics and shutdown all control and power circuits in the switchboard. The core definition program will also be deleted. Pull the red mushroom OUT to reset.



2.2.2 Run

The START push button starts a new Unicore program cycle or Unicore segment. It also acknowledges the removal of the HOLD button and continues the program from where it left off.

2.2.3 Hold

At anytime during a program cycle, pushing the HOLD button on the console will halt the current program execution. The button will illuminate and latch in, and the machine will come to an orderly stop. To continue, the operator must first release the HOLD push button then acknowledge with RUN.

Note: This circuit is known as the Interlock circuit and incorporates several functions. If you hit HOLD during a move, the Unicore machine will complete the move and then come to an orderly stop. Pressing HOLD during a fold or cut operation will allow the Unicore machine to complete the fold or cut movement and them come to an orderly stop.

HOLD can be pressed as many times as needed during a program cycle.

HOLD function allows the operator to catch up, take a break, attend to other business... it acts as a work hold facility.

The Interlock Circuit is connected to the safety hood. If any of the doors of the safety hood are opened the HOLD function will activate. Therefore, if the operator opens the hood whilst the program is in cycle then the Unicore machine will instigate a HOLD function and come to an orderly stop. The HOLD button will automatically become illuminated. (If the HOLD button illuminates for no obvious reason look for an incorrectly closed safety hood door.) Once the safety hood has been closed, the program can continue with an acknowledgment via the RUN button.

2.2.4 Jog

Pushing and holding in the JOG button will cause the strip to slowly move forward until the JOG button is released.

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2.3 Side Console Panel

A three-button control console is mounted on the side of the Unicore machine safety hood.



UCM Side Console Panel

2.3.1 Power On

Push this button to turn on the Unicore machine.

2.3.2 Roller

This toggle switch lifts or lowers the Upper Roller. Lift the roller while loading the strip, then lower the roller for production.

2.3.3 Jog

Pushing and holding in the JOG button will cause the strip to slowly move forward until the JOG button is released.

2.4 Safety Hood – Front Door

Do NOT lift this door whilst the machine is running a program.

When the door is opened, the machine will automatically be put in HOLD mode.

Lift this door to access the Fold Angle Adjuster or to perform maintenance.

To close the door, lift it slightly first, then lower.



Safety Hood showing Front Door

2.5 Fold Angle Adjuster

To make adjustments to the fold angle:

- 1. Loosen the two locking screws.
- 2. Turn the adjuster wheel clockwise to close the fold angle.
- 3. Turn the adjuster wheel anticlockwise to open the fold angle.
- 4. Tighten the two locking screws.





2.6 Safety Hood – Side Door

- Do NOT lift this door whilst the machine is operating.
- When the door is opened, the machine will automatically be put in HOLD mode.
- Lift this door to load the strip, or when adjusting the strip guides or to perform maintenance.
- To close the door, lift it slightly first, then lower.



Safety Hood showing Side Door and Strip Guide Adjuster

2.7 Strip Guide Adjuster

- Do NOT move this adjuster while the machine is running.
- Turn the knob to adjust the strip guides to suit the width of the strip being used.
- The strip guides should allow approximately 1 mm of clearance for the strip.

2.8 Front Work Shelf (Optional)

This shelf may be used when making small Unicores or removed to make large Unicores.

To remove this shelf, while an assistant holds the shelf, use a spanner to remove the four fixing bolts.



for Optional Front Work Shelf

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3 Unicore Machine Operation and Unicore production

The basic steps in making Unicores are as follows:

- 1. Turn on the Unicore machine and Decoiler
- 2. Load the correct steel strip onto the Decoiler
- 3. Load the strip into the Unicore machine
- 4. Measure the strip thickness
- 5. Design the Unicore using UCS3000
- 6. Enter the production data on the Production Screen of UCS3000
- 7. Run the Unicore machine and build the Unicore

The cycle is completed when the final Build Up has been reached. The RUN button will light up and when pushed, the machine will begin the next core or core segment.

What follows is a detailed explanation of all of the steps necessary to safely operate a Unicore machine.

3.1 Power on

Unicore machine UCM3000	Turn main rotary isolator on and push Power On button on side console. Ensure E-Stop is unlatched
AEM Decoiler UDM4000	Refer to Operating Instructions for AEM Decoiler UDM4000
Alternative Decoiler	Refer to manufacturer's or supplier's Operating Instructions

3.2 Load steel strip onto Decoiler

AEM Decoiler UDM4000 Refer to Operating Instructions for AEM Decoiler UDM4000

Alternative Decoiler Refer to manufacturer's or supplier's Operating Instructions

- Ensure the steel is the correct grade, thickness and width.
- Ensure it is of adequate quality by ensuring it is free of surface defects, slitting deformities, twist, "oil can effect", coil break or "wavy edge". The lower the stress in the parent coil, the better the Unicore produced.
- Ensure there is sufficient quantity of steel.
- Load steel onto Decoiler ensuring the strip coil de-coils forward from the top of the coil.
- Ensure the on-demand feed sensor of the Decoiler operates so that it does not place any load on the feed mechanism of the Unicore machine.

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3.3 Load the strip into the Unicore machine

- Activate the strip Decoiler and release sufficient strip to reach the Unicore machine.
- Open the side door of the safety hood.
- Lift the top roller using the Roller Toggle Switch on the side console panel.
- Open the strip guides/arms using the Strip Guide Adjuster so that they are wider than the strip.
- Pass the strip between the guide arms, under the safety guard, over the base-plate and between the strip guides. Then push it forward through the roll-feeder rollers until it is protruding from the front of the machine by 25 mm or more.
- Open or close the strip guides so that there is at least 1 mm of clearance on the strip.
- Lower the upper roller.
- Close the safety hood side door.
- If necessary at this point the JOG button can be used to slowly move the strip forward.



Red strip shows path into Unicore Machine

3.4 Measure the strip thickness (TEST 10)

When the power is turned on to the Unicore machine, a default program is available that automatically cuts ten short pieces of strip. If another program has previously been loaded to the Unicore machine, simply push pause and then release the E-stop to reload the TEST 10 program.

• Push the RUN button to start the TEST 10 program.

- The first piece produced is part of the machine's homing routine and should be discarded.
- Collect the ten pieces and measure the total thickness with a micrometer.
- Divide the reading by 10 to get the strip thickness (ST).

Note that this value for ST *includes* the Stacking Factor for the strip.

We recommend rounding UP the ST to the next micron.

Record this value (on the job/batch card or directly onto 1 of the 10 pieces is a good place) for later entry into UCS3000. UCS3000 will base it's calculations on this measurement, the quality of the core will be affected if this measurement is erroneous.

It is quite important to establish a consistent method of using a micrometer between operators. Those with a heavy hand will tend to measure a Strip Thickness that is slightly less than other.



3.5 Design the Unicore using UCS3000^{less}

Refer to the UCS3000 Software Manual.

3.6 Enter the production data into the UCS3000 Production Screen

Refer to the UCS3000 Software Manual.

3.7 Make the Unicore laminations and build the Unicore

The HAND SKILLS of the operator are important for the ease of manufacture and also the quality of the Unicore produced. These must be taught to you by an experienced operator and practiced under supervision until they are performed to a competent degree. If running two strips in the machine to produce two Unicores simultaneously, practice these hand skills only after becoming competent with one strip.

The basic principles are:

- 1. Wear the correct Personal Protection Equipment
- 2. Be fully aware of what type of core has been selected and what it will be

produced next. Strip is ejected from the front of the machine at considerable speed. If you are expecting a short lamination and a long one is ejected you may cut your hands. (Refer to the section on Unicore Types and Faces for detailed information.)

- 3. With your hand approach the lamination/s from the side (not front), then grasp it with thumb and forefinger as your hear the guillotine cut the lamination.
- 4. Ensure the lamination is removed before the next one starts to be formed.
- 5. Remove the lamination to the Front Shelf or workbench and wrap it around the previous stack of laminations. The Unicore is built up from the inside out, inner most lamination first.
- 6. Reposition yourself close to the machine ready to grasp the next lamination/s.

Press the RUN button to begin the production..



Unicore Machine Control Panel. ESTOP, Run and Hold buttons are located here

The first piece produced is part of the machine's homing routine, which ensure that the lamination starts with a clean edge, and is the correct length. This homing piece and should be discarded. This piece will also be made at the start of each segment of multi segment cores.

Depending on the core type selected, your Unicore machine may make Assembly Helper Laminations which should be place to one side.

Next the machine will begin to make the Unicore Laminations which the operator should stack on the Front Shelf or place onto a workbench.

After the first few laminations have been produced, check the dimensions are correct and if necessary adjust the fold angle by adjusting the Folder Bar and then continue with program execution, or restart the program from the beginning.

If the program loaded is for a multi segment Unicore, the machine will stop after each segment. At this point the RUN button will be flashing. When it stops flashing, push it to start the next segment.

When the Unicore is completed it should be removed from the immediate work area.

Press RUN to begin a new core.

If the operator needs to stop production at any time, press HOLD. To restart press HOLD

again and then RUN.

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ALL CLEANING AND MAINTENANCE MUST BE PERFORMED BY QUALIFIED AND TRAINED MAINTENANCE STAFF.

FOR ALL CLEANING AND MAINTENANCE OF THE UNICORE MACHINE THE POWER MUST BE TURNED OFF AT THE MAIN ROTARY POWER ISOLATOR AND THE E-STOP IS PUSHED IN.

(Unless instructed otherwise by this manual)

4.1 Scheduled Maintenance OR UCS Flagged Maintenance

Appropriate Cleaning and Maintenance is essential to ensure optimum performance of the Unicore machine. The UCS3000 software which controls the Unicore machine will "flag" or prompt the operator when maintenance is required. Alternatively, the purchaser may prefer to perform scheduled maintenance. If so we recommend the following maintenance schedules.

BEFORE attempting any Cleaning or Maintenance refer to the Unicore Machine Maintenance Instructions section of this manual for detailed instructions.



UCS Maintenance page

4.2 Cleaning Schedule

The Unicore machine MUST BE KEPT CLEAN. The coating on most electrical steels creates abrasive powder when cut and folded. This will build up on the feed rollers, over the work area and inside the machine fold/cut head and roll feeder. The following cleaning schedule should be adhered to, to ensure core quality and machine performance is maintained.

Hourly

• The area directly above and below the lifter plate should be cleaned to prevent a build up of particles that can be impacted into the lifter plate. This can be done carefully, using dry compressed air.

Per shift, approximately every. 8 operating hours

• Use the green scourer pad provided in the AEM tool kit to clean the upper and lower feed rollers.

To access the Upper roller, open the safety hood side door and remove the upper roller guard.

To access the Lower roller, remove the roll feeder "kick plate" and fully open the strip guide arms.

Turn the rollers by hand to fully clean the complete surface.

• Clean the cabinet top, shelf and surrounds.

4.3 Daily

The following maintenance items should be addressed in addition to the 'per shift' maintenance.

- Remove and clean the lower blade and clamp bar and then clean the fold/cut head.
- Inspect the clamp bar for flatness and damage and if apparent, report to Maintenance department.
- Inspect the head area under the lifter plate and the lower blade seat for damage and if apparent, report to Maintenance department.
- Clean the roll feeder base plate and strip entry points.
- Check oil level in the sight glass.

4.4 Weekly

 Clean air filters on electrical cabinet door and rear of machine.



Loaction of air filters

• Check and empty the Legris Service Unit filter bowls (note that this may be required more frequently if the compresses air supply has not been passed through a refrigerated dryer).



- Remove and clean the lower guillotine blade and clamp bar and then clean the fold/ cut head.
- Inspect the clamp bar for damage and flatness. If bent by more than 2 mm over its length, then replace it. If damage has resulted in any high spots, then remove them with the diamond honing stone provided in the tool kit.
- Inspect the head area under the lifter plate and the lower blade seat for damage. Remove any high spots by LIGHTLY honing with the diamond honing stone.
- Remove and clean the folder bar and inspect the folding radius.
- Remove and clean the clamp bar. Inspect the O-rings and shoulder bolts and replace if damaged.
- Without removing it, inspect the upper blade carbide cutting edge for damage.

Important maintenance:

As carbide blades have a longer cutting life than tool steel blades the regular cleaning routine is often forgotten. It is important to remove the Lower Guillotine Blade and Lifter Plate (but not Upper Guillotine) at least weekly and remove any build up of powder and steel debris as damage to the lower guillotine seat may occur. Removing these two items is quick and easy and will not necessitate a reset of the Upper Guillotine.

4.5 Monthly

The following maintenance items should be addressed in addition to the weekly scheduled maintenance.

- 1. Flush and dry the die cages to remove dust particles.
- 2. Liberally squirt a light machine oil (WD40) onto the exposed bearing cages of the head.
- Use the Cut500 diagnostic routine in UCS 3000 to oscillate the fold and cut actions to work this oil through the cages. Be generous with the oil in an attempt to flush dirt out.
- 4. Clean and dry the cages with compressed air and rags to ensure there is no residual oil left to attract more dust.

Locating the Cut500 diagnostic routine in UCS

CUT500 can be located in UCS3000 by the following:



Location of die cages

- Turn on your UCM and Load UCS3000 software
- Wait for the connection with the UCM to be established



Click on UCM details



- Click on Diagnostics
- Select Cut 500.

It is critical that the cages are blown dry and all residual oil is removed before resuming operation

4.6 Quarterly

The following maintenance items should be addressed in addition to the weekly and monthly scheduled maintenance.

• Grease bridge plate. Only use one pump of grease gun per nipple.

• Lubricate the upper roller bearing slides.



4.7 12 Monthly

Location of Grease Nipples

The following maintenance items should be addressed in addition to the weekly and monthly scheduled maintenance.

- Remove safety hood.
- Check for air.
- Check for oil leaks.
- Thoroughly clean the machine including the rollers.
- Check condition and tension of the drive belt. (Do not over-tighten).
- Clean the drive pulleys and check for wear. Also check that they are tight on their shafts.
- Lubricate the upper roller bearing slides.
- Check hydraulic filter, replace if necessary.

4.8 24 Monthly

The following maintenance items should be addressed in addition to the weekly and monthly scheduled maintenance.

- Thoroughly CLEAN the machine.
- Drain and replace hydraulic oil.
- LIGHTLY roughen the rollers using 80 grit emery paper until matte finish.
- In addition, perform standard 12 monthly inspection.

4.9 UCS Initiated Maintenance

The UCS3000 software monitors the number of fold and cut and other operations within your Unicore Machine. After certain numbers of operations UCS3000 will call for maintenance to be performed, This section details the maintenance procedures to be carried out. UCS3000 will also indicate what is to be done.

4.9.1 Head Cleaning

- Remove LOWER BLADE and LIFTER PLATE.
- Clean head thoroughly with dry rag, use no solvent.
- Check condition of CONICAL SPRINGS before refitting LIFTER PLATE.
- Inspect under side of LIFTER PLATE (and LOWER JAW of head) for peening or pitting from dust impaction.
- Report any damage to maintenance staff.
- CLEAN lower blade SEAT before replacing LOWER BLADE.

4.9.2 Pneumatic Service Unit

- Empty WATER bowl if required.
- Check both BLUE SILENCERS, replace if yellow with oil or otherwise clogged.

4.9.3 Lifter Plate

- Remove LIFTER PLATE and inspect for flatness.
- If bent by more than 2 mm in 300 mm length then discard and replace with new.
- Replace CONICAL SPRINGS and SHOULDER BOLTS.
- Inspect under side of LIFTER PLATE (and LOWER JAW of head) for peening or pitting from dust impaction.

4.9.4 Clamp Bar

- Remove and inspect CLAMP BAR.
- Check lower WEAR SURFACE is flat and undamaged. If more than 1 degree off square, replace entire CLAMP BAR.
- Replace all DIE SPRINGS and SHOULDER BOLTS.
- Ensure B110 'O' rings inserted under heads of shoulder bolts.

4.9.5 Folder Bar

- Check RADIUS of folding edge for wear.
- Check alignment of FOLDER BAR using the OFFSET CAMS in FOLDER PLATTEN to ensure lamination legs sit flat after folding





5 Bleeding the Hydraulic System

This procedure only needs to be performed if air has entered the hydraulic system. This is usually only possible if a part of the system has been disconnected for replacement or repair. It is also carried out at initial installation after the hydraulic oil has been added to the machine.



The hydraulic system must have all the air bled before the first operation and each time the oil is replaced

Hydraulic Maintenance MUST be performed by competent and suitably qualified electrical and mechanical trades persons.

BEFORE STARTING THIS PROCEDURE ENSURE ALL HYDRAULIC FITTINGS ARE TIGHT.





Remove the top of the safety hood.

Connect the clear plastic bleeding tube (found in the AEM tool kit) to the TOP bleeder valve of the hydraulic cylinders. Remove the hydraulic tank filler cap and insert the free end of the bleeding tube into the tank. Ensure that the tube is secured in the tank so that oil is not spilt.

Pull out the red E-STOP button on the front console panel.

Ensure power is OFF at the main rotary isolator mounted on the door of the electrical cabinet. Open the electrical cabinet door.

Locate relays R3 and R6 inside the electrical cabinet. Pull out the blue manual override tags on both. Close the door and turn ON the main rotary isolator, which will start the hydraulic motor and cause the guillotine hydraulic ram to descend. The relief valve will open and the hydraulic motor will load up as pressure is applied.

Loosen the TOP bleeder valve (with tube attached) half a turn until oil flows



When no air is visible tighten fitting.

- Turn OFF power.
- Remove the bleeder tube from the top bleeder valve.
- Connect it to the BOTTOM of the bleeder valve of the hydraulic cylinders. Ensure that the opposite end of the tube is still secured in the tank so that oil is not spilt.
- Open the electrical cabinet door. Turn OFF R3 relay by pushing in the blue manual override. Activate R4 relay by pulling out blue manual override tag. Close electrical cabinet door and turn ON power. The hydraulic rams will retract into the up position.
- Loosen the BOTTOM bleeder valve (with tube attached) half a turn until oil flows.
- When no air is visible tighten fitting.

Repeat above steps at least once more, or until no air is visible in the oil.

- 1. Turn OFF power and open electrical cabinet door.
- 2. Push in the blue manual override tags of relay R6 and R4.
- 3. At this point check that ALL manual override tags are in and then close the door.
- 4. Ensure both bleeder valves are tight.
- 5. Remove the plastic tube.
- 6. Refit the safety hood top panel.

Note: If the guillotine makes a loud "crack" each time it cuts steel, then this is an indicator of residual air in the system. The hydraulics will self bleed to a small extent, but the majority of the air must be removed with conventional bleeding techniques as described above.
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6 Carbide Blade Installation and Resharpen Procedure

This procedure outlines the steps required to install and sharpen the tungsten carbide tooling used in the Unicore UCHB2500 head. This must only be performed by a competent trades person or maintenance personnel who have read and understood this document.



This work must be undertaken by competent, qualified and experienced trades personnel only. Due to the brittle nature of the Carbide Blades, they must be handled with extreme

care.

Failure to do so may cause premature damage or wear and compromise the cutting performance resulting in void of warranty.

It is strongly recommended that the person performing the grinding operation should be familiar with the action of the head and the mechanics involved.

The Tungsten Carbide Blades provided by AEM Cores are fabricated from a strip of carbide, bedded in epoxy and bolted to a tool steel holder. These blades are brittle and require careful handling.

A tooling set comprises three items, all of which require grinding during re-sharpen:

- 1. Upper Guillotine
- 2. Lower Guillotine
- 3. Lifter Plate

The Upper Guillotine Blade includes slotted bolt holes which allow lateral movement to facilitate the setting of the blade clearance.

Blade clearance is set with a 0.0125 mm (0.0005") shim.

This is a good time to thoroughly clean the head and components within.

Any sign of impact damage due to debris caught under the Lifter Plate must be noted.

Take particular note of the Lower Guillotine Blade seat, this must be flat and without damage to the top lip (from debris caught under the Lifter Plate). This is a good opportunity to run a fine hone stone over the lower blade seat and look for high spots.

There is no guarantee of performance with a carbide blade. Typically we expect between 300,000 to 500,000 cut operations between re-sharpening.

Each blade has at least 3 mm of life when new. A typical re-sharpen (without excessive wear or blade damage) would likely remove 0.05-0.1 mm of life.

Refer to the attached drawing "Guillotine Blade Resharpen Detail" for specific details on which faces to grind and how the blades interact in operation.

Incorrect grinding and fit up practices have led to field failures or low cut performance, we strongly suggest the recommendations in this document be passed on to all personnel involved.

Unless specifically stated otherwise, throughout this entire procedure and whenever there are personnel working 'within' the head area, the red mushroom ESTOP push button must be pushed IN and all power to the Unicore machine must be OFF at the rotary isolator on the door.

6.1 General Overview of the Head

This picture shows the lower jaw of the Unicore head UCHB2500 ready for Carbide Blade installation. The Lower Guillotine has been removed, the Upper Guillotine has been fitted loosely and the Lifter Plate is used to set the height of the die so the Upper Guillotine overlaps the Lower.

The head is now ready for the Lower Guillotine to be fitted and the clearance to be set.



Follow the instructions to see how this is done

- 1. Remove ALL tooling and clean the head thoroughly.
- 2. Inspect the underside of the Lifter Plate and the corresponding top surface of the 'lower jaw' of the frame. It is possible for steel slivers to be caught under the Lifter Plate and be hammered into the lower jaw. Inadequate cleaning, magnetised tooling or incorrect removal of the laminations by the operator is the primary cause of such damage.
- 3. If there is damage to the lower jaw, run a **fine hone (diamond) stone** along the front face of the lower guillotine seat to check for high spots. If the seat has been damaged by debris caught under the Lifter Plate it will show as **shiny high spots** along the top edge of the seat. These are easily removed with the hone stone until flat.
- 4. With the Lower Guillotine blade REMOVED we set the height of the Upper Guillotine blade in the 'down cut' position by using the Lifter Plate as a height gauge.
- Clean and fit the Upper Guillotine blade into the recess provided in the Guillotine Platen. Use SIX M6 x 25 mm SHCS bolts to loosely secure the blade. The centre bolt is inaccessible, but you can reach 6 of the 7 available bolts with the standard V2500 Unicore head.
- 6. The Carbide Blades have 1.5 mm lateral movement on the slotted bolt holes to facilitate the

setting of the blade clearance. The Upper Guillotine should be loosely supported by these bolts with just enough pressure on the bolts to enable the blade to slide with firm finger pressure.

7. Push the Upper Guillotine firmly towards the **rear** of the machine before proceeding.



- 8. Fit the Lifter Plate into the head WITHOUT the springs, using 2 x M10 x 40 mm shoulder bolts.
- 9. Lower the Upper Guillotine blade down onto the Lifter using the hydraulics as follows:
 - Ensure the machine is OFF and open electrical cabinet door.
 - Pull out blue manual override tag on relay R6 (hydraulic motor start contactor).
 - Pull out blue manual override tag on relay R3 (guillotine down contactor).
 - Close cabinet door and turn machine ON at rotary isolator. This will start the hydraulic pump and push the Upper Guillotine down onto the Lifter Plate.
 - Turn the machine OFF and open the electrical cabinet door.
 - Reset relays R6 and R3 by pushing in the blue manual override tags.
 - Pull out the blue manual override tag on relay R4 (guillotine up contactor), but leave relay R6 OFF.
 - Close the door and turn the machine on with the rotary isolator. This will allow the hydraulic valve spool to release the pressure on the cylinder.
 - Turn the machine OFF, open the door and reset the manual tag on relay R4.
 - Ensure the machine is turned OFF before proceeding to the next step.
- 10.Remove the Lifter Plate from under the Upper Guillotine, some slight upwards assistance on the Guillotine Platen may be required.
- 11. The Upper Guillotine should now be at the 'down position' for a cut. It is important that the Upper Guillotine Blade completely overlaps the Lower Guillotine to ensure the correct

clearance can be set

12.With the Lifter Plate removed, ensure the Upper Guillotine is pushed towards the **rear** of the machine. Clean and fit the Lower Guillotine Blade into position using all five retaining bolts. Tighten all bolts firmly. Only use high tensile socket head cap screws class 12.9. torque M10 bolts to 70 Nm (52ft,lbs), M8 bolts to 36 Nm (27ft.lbs).

This photograph shows the Upper Guillotine Blade in the 'down cut' position, with the Lower Guillotine installed ready to set the clearance with shims.



Guillo in down/cut position

- 13.Insert 0.0125 mm (0.0005") stainless steel shim (Starrett 12" feeler stock part number 667-1/2) between the Upper and Lower Guillotine Blades in two places, 50 mm (2") in from either end. This shim sets the clearance between the blades so there must be an overlap between the Upper and Lower Blade. If not, remove the Lower Guillotine and repeat step number 4.
- 14. Turn off air in hydraulic cabinet with blue shuttle valve.
- 15.Either **pull** the Upper Guillotine Blade on to the shims, or (after raising the plastic strip dampener) use a helper to **push** the aluminium sheet (supplied with the machine) into the rear throat of the machine as shown in the photograph. This aluminium sheet is used to push on the back of the Upper Guillotine Blade. With the Upper Guillotine Blade pushed and held firmly against the shims, tighten the bolts holding the Upper Guillotine. Only use high tensile socket head cap screws class 12.9. Torque M6 bolts to 15 Nm (11ft. Lbs). Use all six available bolt holes in Upper Guillotine Blade (centre hole not accessible). Progressively tighten the six bolts until full torque has been achieved, ensure the shim has not moved during tightening.

This photograph shows the steel plate used to push the Upper Guillotine forward onto the shims.

- 16.CHECK both shims are held firmly once the bolts are tight. If one is loose then the blade has come away from the lower blade and the clearance will be wrong. (if this is the case your must repeat step number 8).
- 17.once satisfied that the blade clearance is correct, and all retaining screws in the Upper Guillotine are tight then **remove** the Lower Guillotine Blade and retrieve the shims.
- 18.Lift the Guillotine Platen as follows:
 - Open the electrical cabinet, pull on the blue manual override tag on relays R6 (Hydraulic Motor Start) and R4 (Guillotine Up).

- Close door and turn on, this will lift the Guillotine Platen.
- Turn Off, open the door and reset relays R6 and R4.
- 19.Reinstall the Lifter Plate with the conical compression springs and shoulder bolts. The springs 'point' downwards, smallest diameter at the bottom.
- 20.Reinstall the Lower Guillotine Blade, ensuring the Lower Seat is perfectly clean. Be sure to tighten the screws firmly and check the 1 mm radius on the forward fold edge of the blade (refer to drawing). Only use high tensile socket head cap screws class 12.9. Torque M10 bolts to 70 Nm (52ft.lbs), M8 bolts to 36Nm (27ft.lbs).
- 21. Turn on air in hydraulic cabinet with blue shuttle valve.
- 22.Install Clamp Bar, note spring condition, replace if necessary. Ensure BS-110 O-Rings are under the head of the shoulder bolts.
- 23.Reinstall the Folder Bar.
- 24.Installation procedure complete, close Safety Hood and power up the machine.



Caution Do not operate the Guillotine without strip on initial start up. There is a risk of clashing if the blade set up has not been performed correctly. Wear safety glasses and cut wide strip on first run after a blade reset.

Important maintenance:

As carbide blades have a longer cutting life than tool steel blades the regular cleaning routine is often forgotten. It is important to remove the Lower Guillotine Blade and Lifter Plate (but not Upper Guillotine) at least weekly and remove any build up of powder and steel debris as damage to the lower guillotine seat may occur. Removing these two items is quick and easy and will not necessitate a reset of the Upper Guillotine.

6.2 Introduction

The Unicore machine blade system comprises the following three components, Upper Guillotine, Lower Guillotine and Lifter Plate. All three must be ground to sharpen the 'set'. All components are designed to be sharpened using conventional grinding equipment. The blades consist of a carbide insert bedded in epoxy resin and bolted to a steel holder. This bond permanent and will last the life of the blade unit. Care must be taken not to cause localised over heating of the carbide whilst grinding. This may affect the epoxy and cause voids under the carbide.

6.3 Upper Guillotine

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This is a stress relieved spring steel holder with a bonded carbide insert. When handling the blade always protect the carbide edge. The blade life and performance can be maintained by ensuring the integrity of this edge, any chipping or damage to this edge will reduce the quality of the cut.

• The upper blade has a 1.5 mm shear along its length which must match the shear in the Lifter Plate.

- There is also 0.1 mm (0.0005") negative rake ground into the shear face.
- A 0.1 mm step protects the carbide from impact with the Lifter Plate.
- These angles must be maintained to ensure correct blade performance.

6.4 Lower Guillotine

This is a thru-hardened, tool steel holder with a bonded carbide insert. When handling the blade, always protect the carbide edge. The blade life and performance can be maintained by enduring the integrity of this edge, any chipping of this edge will reduce the quality of the cut to the laminations.

- The lower blade cutting faces are ground square.
- All tool holder faces must be ground flush to the carbide insert.
- The blade holder is manufactured from tool steel, thru-hardened to 58 HRC.
- The 1 mm fold radius needs to be checked after each grind. A simple hand hone and radius gauge will suffice.

6.5 Lifter Plate

The Lifter Plate is manufactured from softer mild steel.

- It has 1.5 mm longitudinal shear along its length to match the upper blade.
- Only grind top surface, remove the same amount as was ground off Lower Guillotine Blade.

6.6 Recommended Grinding Practices



This work must be undertaken by competent, qualified and experienced trades personnel only.

Due to the brittle nature of the Carbide Blades, they must be handled with extreme care.

Failure to do so may cause premature damage or wear and compromise the cutting performance resulting in void of warranty.

- Suggested grinding wheel for carbide: DN180-R100-BA-1/8. This wheel and grinding advice available from American Diamond Tool Co USA see www.americandiamondtool.com.
- Most grinding shops would grind the tool steel holders with a conventional wheel and the carbide with a diamond wheel. It is important to select the correct wheel for the material to avoid localised heating, wheel loading or excessive stress on the blades.
- AEM has been successful in grinding both the tool steel and carbide faces with the same diamond wheel when merely re-sharpening blades. If removing more material (to grind a chip out) then we recommend separate grinding wheels and only sharpen the final edge with the same diamond wheel. This will depend on the

operating procedure employed in your grinding shop.

- Cobalt compatible water based **COOLANT** should be used whilst grinding the carbide.
- Coolant MUST be used to grind the tool steel holder to avoid over heating of the epoxy bed.
- Fine feeds only to be used whilst grinding the carbide, ensure a rotational speed in excess of 4400sfpm.
- Remove the **absolute minimum** material from each blade.
- There is no guarantee of performance with a carbide blade. Typically we expect between 300,000 to 500,000 cut operations between re-sharpening.
- Each blade has at least 3 mm of life when new, a typical re-sharpen (without excessive wear or blade damage) would likely remove 0.05-0.1 mm of life.
- Refer to the drawing "Guillo Blade Resharpen Detail" for details on which surfaces to grind.
- Check parallel surfaces of the Upper Guillotine after grinding the cut face before deciding to touch the shear face. If this is necessary then ensure the 0.1 mm negative rake is maintained.
- Measure the height of the Lower Guillotine Blade before and after sharpening, remove the same amount from the top of the Lifter Plate taking care to maintain the 1.5 mm longitudinal shear.
- Only remove material from the top surface of the Lower Guillotine Blade.
- Avoid localised hot spots whilst grinding the tungsten carbide, this may cause stress points leading to micro-fractures and premature failure.
- The blades must be clocked to within 0.01 mm (0.0005") longitudinally before grinding.
- Demagnetise all tooling after grinding.



6.7 Guillotine Blade Resharpen Detail



6.8 Lifter Plate Regrind Detail



6.9 Lower Guillotine Blade Resharpen Detail



6.10 **Upper Guillotine Blade Resharpen Detail**

Carbide Blade Installation and Resharpen Procedure

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Unicore 3000 Part



7 Technical Drawings

7.1 Hydraulic Schematic







Technical Drawings

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Technical Drawings

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Unicore 3000 Part



8 Unicore Machine Installation

8.1 Services Required before Installation

Electrical:

- 20 Amp, 3 phase AC supply required
- 20 Amp Motor Start fuses.

Pneumatic:

- 1/2" or 12mm line supplying clean and dry(refrigerated dryer should be fitted to compressor) at 8 bar.
- Minimum of 12 c.f.m. is required.

The following will also be required:

- Minimum 1000kg rated lifting strap x Length=3m and Crane or Forklift.
- 30L of Standard Hydraulic Oil, SAE 32 or equivalent with Vicosity range 32-38.

8.2 Unicore Machine Installation and Commission

The Unicore machine crate has been designed to be opened in a specific order to ensure that the machine is handled in a safe and responsible manner. Please ensure these instructions are read and understood fully before attempting to commission the Unicore machine.

8.3 Floor Plan

The drawing below indicates the required operating floor space needed for the Unicore machine and Decoiler. Arrange a suitable area as per the drawing and allow sufficient room for materials handling equipment, such as work benches or trolleys to stack and remove finished cores. Also allow for a small work bench to site the Unicore machine PC and monitor.



8.4 Unpack and Position

The machine is packed on its front face in a wooden crate measuring approximately 1900 mm long x 1100 mm deep x 1400 mm high, weighing approximately 850 kg.



Please note

Machine has a high centre of gravity when stood vertical.

Unpacking should be **SUPERVISED BY A COMPETENT PERSON**.

- 1. Inspect the crate for transport damage and photograph if any damage visible. Report any transport damage to AEM Cores AND your Transport Company.
- 2. Remove one side of the crate ONLY (as marked on the box) by undoing the teksrews. Carefully remove the document package, toolbox, front shelf and computer equipment. Photograph and report any damage to the machine. Refit the side of the crate securely to ensure integrity of the box whilst standing the machine upright.
- 3. Under strict supervision, carefully and gently stand the machine and crate up onto the end with the wooden bearers.

- 4. Remove the sides and top of the crate. Remove the plastic packing and closely inspect for any transport damage. Photograph and report any damage.
- 5. Carefully slide the blades of a fork lift between the Unicore machine and the wooden crate base.
- 6. Elevate and secure the machine safely. The machine is bolted to this base, support the weight of the wooden crate and unscrew the four 3/8" UNF x 4 inch long hex head bolts holding the assembly together. These are located under the crate and screw UP into the feet of the machine.
- 7. Screw the rubber foot supplied into the recess in the underside of each foot until 2-3mm of rubber is still showing proud of the bottom.



- 8. Place the Unicore machine on the floor in the desired location and level the machine by adjusting the feet.
- 9. The Unicore machine must be level with equal weight applied to each foot. A spirit level placed on any flat, machined surface will suffice as a datum.
- 10.Open each side door with the Southco Key and check internal components for transport damage. Photograph and report any damage.



NOTE

The "Southco" keys are needed for access to the electrical and pneumatic/hydraulic cabinets and should **NOT BE GIVEN TO OPERATORS**. They should remain in the possession of management of the maintenance department. Operators are not to be allowed access to the machine cabinets.

8.5 Air Supply

Connect the air supply to the bulkhead fitting located under the Decoiler power outlet.



Location of Compressed Air Connector

The fitting is a female 3/8" BSP.

Take care to use a spanner to prevent the bulkhead fitting from rotating while making this connection. Incorrect fit up may cause the air line inside the cabinet to be pinched off and restrict air flow.

The air supply must be clean and FREE OF OIL.

The pneumatic valves MUST NOT BE LUBRICATED otherwise they will fill with oil and slow down the machine operation

8.6 Safety

If an AEM Decoiler is being used with the Unicore machine, refer to the Decoiler Instruction Manual

The safety enclosures should be integrated with the safety circuit of the Unicore Machine. Instructions for doing this are in a following section.

1. Erect appropriate safety enclosure around the Decoiler and cable tray to rear of Unicore machine.

The safety enclosure should be integrated with the Interlock / Hold feature of the Unicore machine. Instructions for connecting the safety enclosures are found

ProceduretoIntegrateExternalSafetyGuardingwithUCM3000InterlockHoldCircuit solution only in the pdf

2. Erect safety signs around enclosure similar to the ones depicted here



8.7 Hydraulic

- Fill the hydraulic tank with standard hydraulic oil, Fuch Neodrol SAE32 or equivalent with a viscosity range from 32-38.
- Total tank capacity is approximately 30 litres.
- Fill the tank until the sight glass shows an oil level 10 mm below the TOP mark.

A fresh oil filter has been fitted before shipment, no need to check this item.

8.8 Electrical Connection



The following power connection should be performed by a licensed electrician ONLY.

- 1. Connect 3 phase AC power to the terminal box on the rear of the machine.
- 2. Open the electrical cabinet door and check that the incoming power is connected to the appropriate tap on the Auto Transformer matching your supply voltage.
- 3. 20 Amp motor start fuses are required, total current draw in operation is typically 6-8 Amps, motor start is by DOL contactor (1.5 kW electric motor on hydraulic pack).

Note Australian wire codes as follows:

- RED phase 1
- WHITE phase 2
- BLUE phase 3
- BLACK neutral
- YELLOW / GREEN earth



DO NOT TURN ON POWER

8.9 External Safety Guard Interlock/Hold Circuit



PILZ Psen-ix1 (green and grey component)

- Turn off power
- Identify PILZ Psen-ix1 (green and grey component) as shown in the switchboard photo (above).
- Remove link from Psen-ix1 terminals 41-42.
- Remove link from Psen-ix1 terminals 43-44.

The Psen-ix1 is a multi channel input converter to the PILZ PNOZ-s5 safety relay (right hand yellow component in photo), which handles the watchdog interlock circuit throughout the machine. Both hood doors and the HOLD push button interface to the Psen-ix1 through to the PNOZ-s5. The red link wires in terminals 41-42, 43-44 represent the 4th (spare) channel to the PNOZ device.

Any external interlock circuit can be connected to the 4th channel so long as it provides two separate Normally Closed inputs to the terminal pairs: 41-42 and 43-44.

PILZ safety relay PNOZ-s5 required both Normally Closed circuits to be made by ALL interlock hardware before allowing reset (HI signal to PLC) via a monitored rising edge acknowledgment of the closed gate condition.

- Bridge terminal 41 to 42 via a Normally Closed safety switch mounted on external safety gate hardware (circuit closed when gate is shut).
- Bridge terminal 43 to 44 via a Normally Closed safety switch mounted on external safety gate hardware (circuit closed when gate is shut).



8.10 Commisioning



DO NOT TURN ON POWER

The Unicore machine is now ready for on site commissioning.

This should only be done by AEM Agent Service personnel.

Contact your agent and inform them that the Unicore machine is ready for commissioning.
Unicore 3000 Part



9 Appendix

9.1 Agent Contact Details

First point of contact should be your Agent.

North America

Unicore Machines (USA) LLC

New Jersey, USA

Tel 908 245 0566

Fax 908 245 1770

mmayer@unicoremachines .us

UNICORE Machines (USA) LLC

India, Bangladesh, Pakistan, Sri Lanka

AEM Unicore Machinery India New Delhi, India Tel 91 11 4101 9214 Fax 91 11 2678 1405 aem_india@yahoo.com

South Africa & South America



Alloy Magnetic Cores Pty Ltd Johannesburg, South Africa Tel (27) 11 825 1010 Fax (27) 11 825 1045 sales@amccores.com



Moscow

TC Windeq Domodedovskoe shosse, 1/3 Moscow 142116 T/F 7 495 543 72 60 Tel 79 261 939 494 Fax 79 263 789 898 info@windeq.ru

www.windeq.ru

Europe

Jan Loksa Frenstat p. R., Czech Republic Tel 420 608 834 747 Fax 420 556 831 701 info@ruff.cz



Japan

Kisco Ltd Tokyo, Japan Tel 03 5600 6222 Fax 03 5600 6226 tsuto@kisconet.co.jp



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9.2 UCM3000 Risk Assessment

Hazard	Yes/No	Control in place
Entanglement Can operator get caught in machine at all?	Yes	Safety hood is fitted, machine adequately signed and operators trained.
Crushing Can operator be crushed by any moving parts?	Yes	Safety hood and guards are fitted, machine adequately signed and operators trained.
Cutting Can the operator be cut or stabbed or punctured by any part of the machine?	Yes	Safety hood fitted. Access to cutting blades limited. Operators adequately trained.
Impact Can anyone be struck by any moving parts of the machine?	Yes	Safety hood and guards fitted. Operators adequately trained.
Temperature Can the operator be affected by the temperature of the machine?	No	
Noise Can the operator be injured by the noise made by the machine?	Yes	Hearing protection must be worn.
Hazardous Substances Can the operator be affected by any hazardous substances created by the machine?	Yes	Dust mask must be worn.
Pressure Can the operator be injured by any pressure vessels used in the machine?	No	
Electrical Can the operator be injured through electrocution or electrical fire?	Yes	Access to electrical cabinet is controlled by safety sign, dual keyed door locks and mains isolator that physically locks the door closed when power is on. Access only by licensed Electrician
Slipping, tripping or falling Can the operator slip, trip or fall anywhere around the plant?	Yes	Access to area between Unicore machine and Decoiler to be limited by safety guarding. User is responsible for safety of work area surrounding the machinery.
Fall from heights Can the operator fall from a height?	No	
Ergonomics Can the operator develop muscular or skeletal injuries whilst using the machine?	Yes	Operator must be adequately trained and job rotation is recommended.

Note:

The UCM3000 Unicore machine is designed and built to comply with the following safety of machinery related standards where applicable:

• AS 4024.1

- IEC 60204-1
- EL-017
- EC 98/37/EC
- EMC 89/336/EEC
- EMCLV 71/23/EEC
- Compliance with Electrical Standard AS3000



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