

Technical Systems

MARKET LEADER IN
FEED CONVEYING

Infini-T™ Recoiling System

Operator's Manual & Installation Guide

Revision 6



Conformité Européenne

The equipment described in this document conforms to
the Essential Requirements of the following EU directives:

Directive 2006/42/EC: Machinery Directive

Directive 2006/95/EC: Low Voltage Directive

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Technical Systems extends a 5 (five) year warranty for the Infini-T™ Recoiling system against all defects arising from faulty workmanship or materials during the aforesaid periods, commencing on the date of delivery to the customer.

The warranty does not apply to damage caused by normal wear and tear over time, or for defects and damage arising after the guarantee periods referred to above.

Any attempt to alter, dismantle or change the standard specifications of the product will render this warranty null and void. This warranty does not cover consequential damages and/or loss of or damage to products due to negligence or misuse.

This warranty is made to the original purchaser of the product and is not transferable.

The warranty obligation, including defects liability arising from faulty workmanship, is subject to our standard Terms and Conditions.

Conditions & Limitations

The product must be installed by and operated in accordance with the instructions as provided by the manufacturer or the warranty will be void.

The Warranty will be void if all components of the Infini-T™ Recoiling system are not original equipment supplied by the manufacturer. Malfunctions or failure resulting from misuse, abuse, negligence, alteration, accident, or lack of proper maintenance or a failure to comply with the conditions of sale shall not be considered defects under the warranty and will be excluded.

This warranty applies only to systems for the care of poultry, pig and livestock. Any other applications of our products and systems are not covered by this warranty. The warranty for the Infini-T™ Recoiling system applies only when used together with a Technical Systems Infini-T™ Auger mothercoil in terms of the manual, instructions or specifications supplied by Technical Systems. In the event of the mothercoil being used with another recoiling system, this warranty will only cover the mothercoil if such other recoiling system has been approved by a representative of Technical Systems prior to or on installation of the mothercoil and system by the customer.

Technical Systems shall not be liable for any consequential or special damage which any purchaser may suffer or claim to suffer as a result of any defect in the product. Consequential or special damages as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost orders, lost income, increase overhead, labour and incidental costs and operational inefficiencies.

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SAFETY

Although measures have been taken to reduce safety hazards, the installation, operation and maintenance of the machinery described in this manual can still pose serious safety risks.

PERSONAL PROTECTION EQUIPMENT

Applicable personal protection equipment should be worn at all times when working on or with the machinery including, but not limited to:

- Hearing protection
WARNING: Noise levels during operation of the machinery can reach levels over 65dB. Long term exposure to these noise levels can be detrimental.
- Eye protection
- Hand protection

SAFETY AROUND THE MACHINERY

The machinery has many moving and rotating parts when in operation, therefore:

- The area where the machines are operated should be off limits to all unauthorised personnel. The area around the machinery should be clearly marked as restricted access.
- No loose clothing should be worn when operating the machines as this might catch onto moving/rotating parts.

AUTHORISED AND TRAINED PERSONNEL

Only persons that have been properly trained may operate or work on the machines. Training for operators must include at least all points addressed in this manual, but may be expanded as required.

Of special importance is making operators aware of the following:

- The risk of injury of all uncovered moving and rotating parts.
- Removal of the adjustment spanner for the coiler mandrel.
- Risk of injury when coiler mandrel adjustment nears its limits.
- The risk of injury against the angular uprights of the decoiler.
- The correct placement of the cover on the mothercoil.
- Checking that the steel core of the mothercoil is securely fastened.

For more information on the safety aspects of using these machinery kindly consult this manual.

Refer to **Appendix C** for a cautionary note when handling Infini-T™ Auger pallets



If an item is marked with this icon it means that this is an important point to consider in terms of personal safety. **Please pay special attention to these notes.**

INTRODUCTION

In support of our world-leading Infini-T auger products, which allow our customers to cut the desired auger lengths at their own premises, Technical Systems also developed the machinery to handle the decoiling, measuring and coiling of the auger, known as the Infini-T Recoiling System.

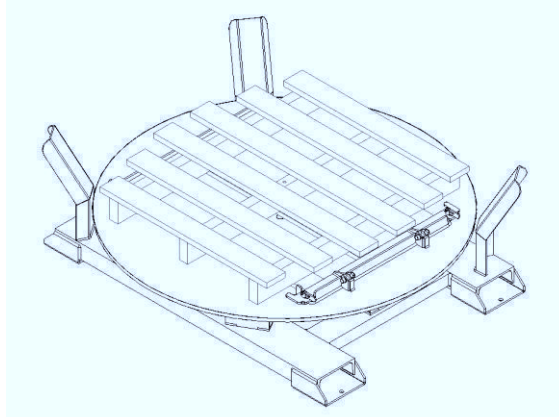
This document serves as a user manual for the Infini-T Recoiling System and aims to provide users with all the information necessary to run the system. However, it is strongly advised that you watch the demonstration video on our website, www.technicalsys.com for more clarity on the operation of the Infini-T Recoiling System.

SYSTEM OVERVIEW

The Infini-T™ Recoiling System consist out of three units and a handling tool namely:

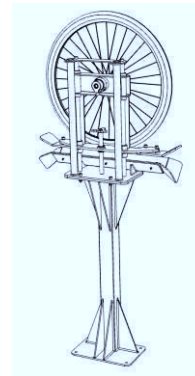
Automatic Decoiler

The pallet with the Infini-T mothercoil as ordered from Technical Systems is placed on this machine, which automatically rotates the entire pallet and coil as it is decoiled.



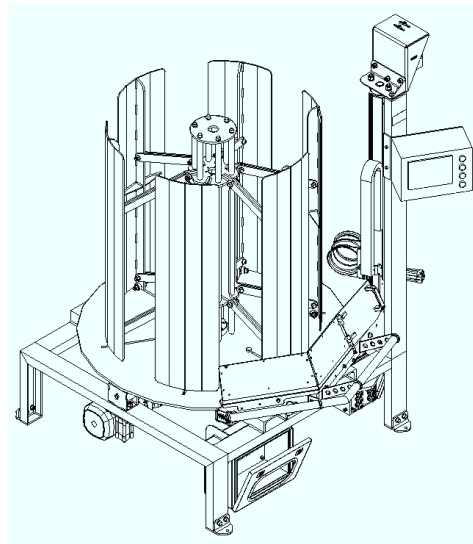
Length counter

This unit is used to measure the length of the auger being coiled to ensure that the correct lengths are consistently produced.



Automatic Coiler

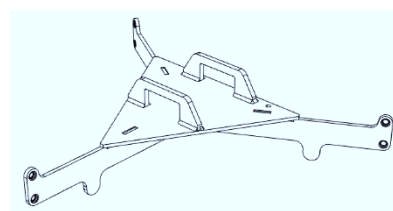
This unit is used to recoil auger into new, shorter auger coils with different coil diameters.



Coil Lifter

This tool is designed for easy handling of auger coils using either a forklift or an overhead crane.

(shown without chains and hooks.)



THE INFINI-T™ MOTHERCOIL

When shipped from Technical Systems the Infini-T mothercoil will be packaged as shown in Figure 1. Since the auger is truly continuous (without any welds or brazing), it has to be layered as it is wound onto a spool.

The first layer is coiled in an upwards direction until the spool is full. Wire is then looped from the inside of the coil to the outside and tightened in six places around the coil (see Figure 5: Wire fixing positions for more detail). This layer is then wrapped with a carton sheet before starting the second layer.

The second layer is coiled in a downwards direction until the spool is full and then also fixed with wire and wrapped with carton. This process is repeated for each layer, with the direction of the coiling alternating between the layers.

Hence, when the mothercoil is decoiled, the **six wire loops on each layer should be removed** along with the carton sheeting.

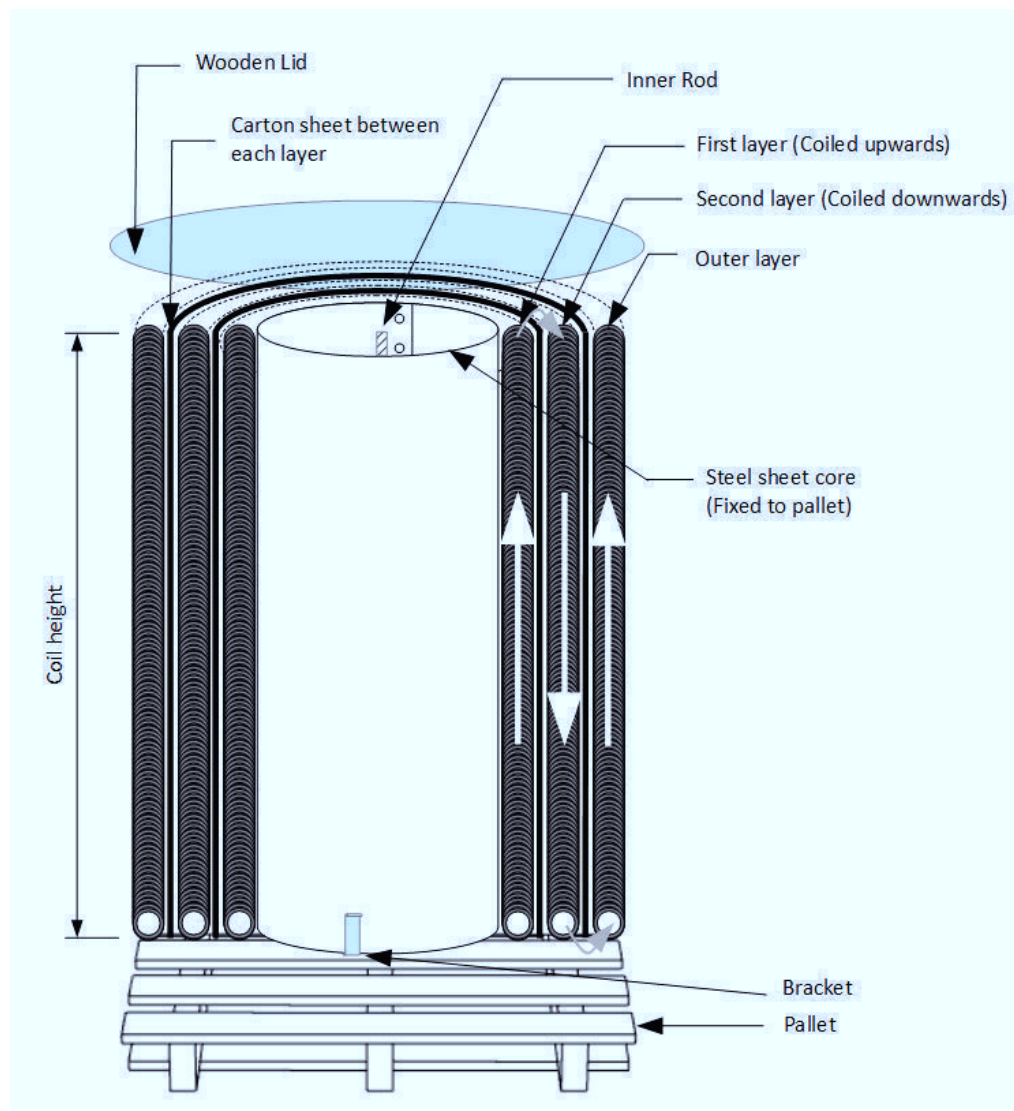


Figure 1: The Mothercoil (Cross-sectional view)

Note that with some layers the auger will uncoil from the bottom up, resulting in some layers sliding down, but this should not be a cause for concern. If decoiling is stopped midway, simply wrap the remaining piece of auger back onto the coil and use wire to secure the loose end to the auger itself.

The mothercoil is shipped with a steel inner core which is mounted to the pallet with **brackets**. The inner rod is bolted to the lid and the pallet with which places the assembly in compression. This ensures that the coil does not fall over or slide off the pallet.

It is extremely important to check that the core is still securely fixed to the pallet with the bracket and the inner rod when handling or decoiling the mothercoil.

The entire mothercoil will be strapped before shipping with **GREEN strapping**. When removing packaging these GREEN straps should be removed.



Ensure that the brackets, the inner rod and the lid which keeps the steel core positioned and fixed to the pallet is in place when removing packaging!

BASICS OF COILING AUGER

To easily understand the principles of recoiling auger, it is necessary to introduce some basic concepts first. Please take special note of the terminology used in this chapter as these will be used throughout the manual.

An auger, also known as a helicoil or spiral, is made of flat wire and is characterised by its outer diameter (OD), inner diameter (ID) and pitch (see Figure 2 below).

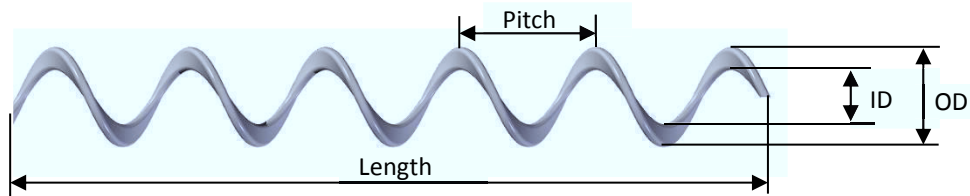


Figure 2: Auger characteristics

When a long length of auger is rolled into a coil for packaging and shipping, this coil is also characterised by a coil ID, a coil OD and a coil height. This is achieved by wrapping the auger around a core/pipe with a diameter equal to the desired coil ID. Each layer of auger is placed on top of the previous layer, forming a coil with a coil height as shown in Figure 3.

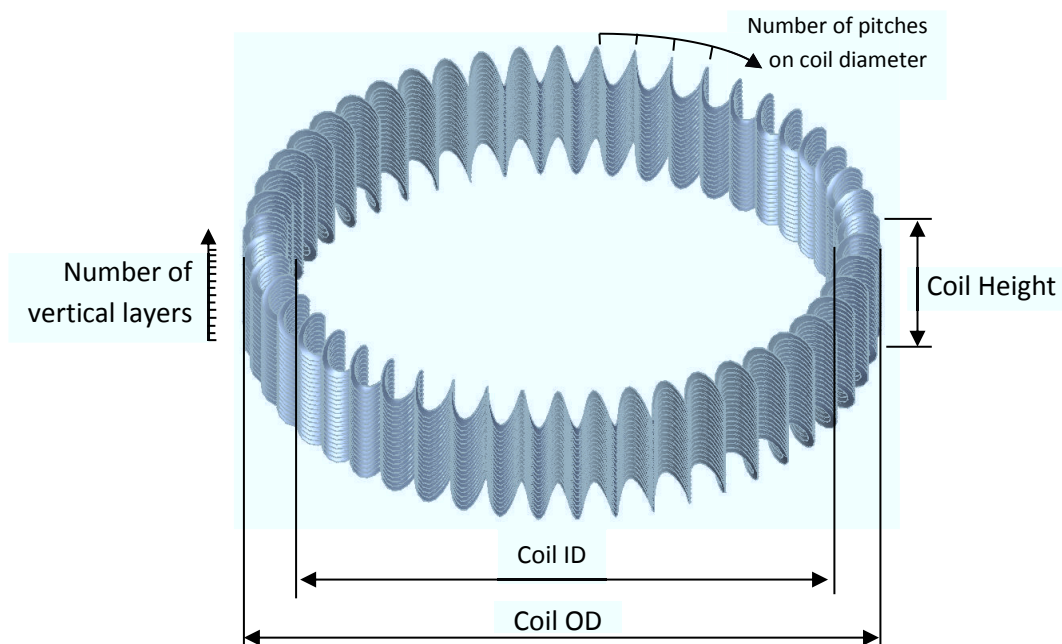


Figure 3: Auger coil characteristics

By having coils with different IDs, smaller coils can be placed inside larger coils to maximise packaging space. The coils can also be stacked on top of each other. This means one can have multiple stacks of coils inside each other on a single pallet, as shown in Figure 4.

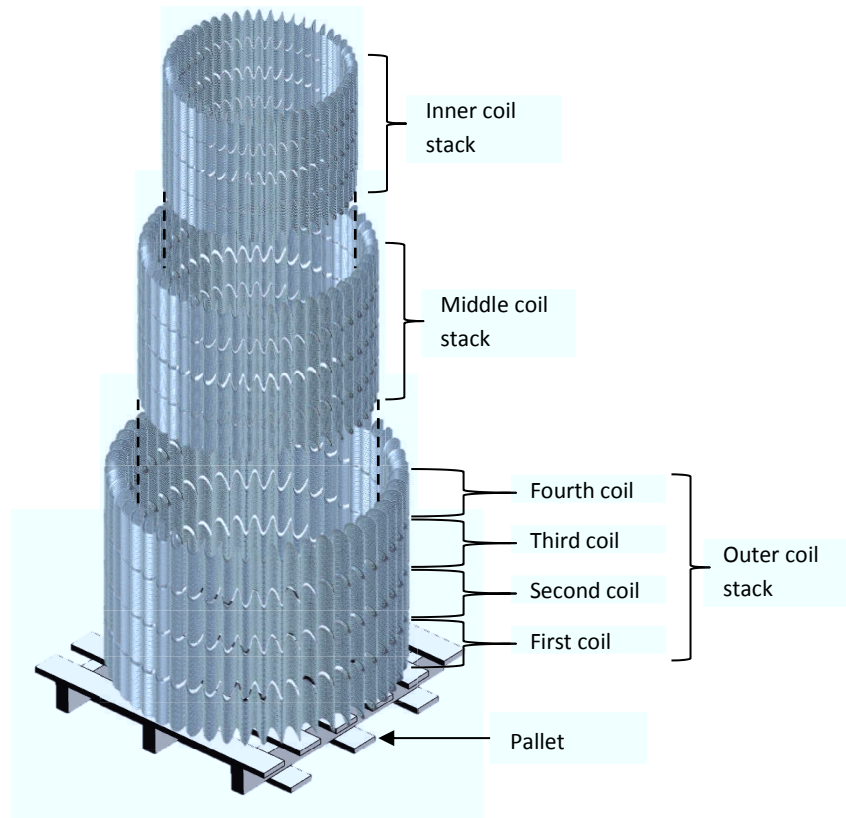


Figure 4: Stacking multiple coils inside each other

DETERMINING A COIL'S LENGTH

When an auger is rolled into a coil, the length of the auger can be calculated by multiplying the following:

$$\begin{aligned}
 \text{Auger length} = & \\
 & (\text{Auger pitch}) \\
 & \times (\text{Number of pitches around diameter of coil}) \\
 & \times (\text{Number of vertical layers on coil})
 \end{aligned}$$

For example, if the auger has a pitch of 50mm and the coil has 62 pitches around the diameter and 20 vertical layers, the length of auger on the coil is:

$$50\text{mm} \times 62 \times 20 = 62000\text{mm} = 62\text{m}$$

SELECTING A COIL'S DIAMETER

Since auger has a fixed pitch, it cannot be wrapped around any diameter. The diameter of the coil has to be calculated in increments of the auger's pitch. To calculate a coil's ID, the following formula should be used:

$$\text{Coil ID} = \frac{n \times \text{Pitch}}{3.14} - \text{Auger OD}$$

In this formula, n is the number of pitches around the coil diameter and can only be a whole number (e.g. 1, 2, 50, 51) and not a fraction of a number (e.g. 1.2, 3.8).

For example, if an auger has a pitch of 50mm, an OD of 69mm and there are 62 pitches around the coils' diameter, the coil ID will be:

$$Coil\ ID = \frac{62 \times 50mm}{3.14} - 69mm = \pm 918mm$$

However, in most cases one would need to know the number of pitches necessary in order for the auger coil to have a certain ID:

$$Number\ of\ pitches = \frac{3.14}{Pitch} \times (Coil\ ID + Auger\ OD)$$

For example, if a coil ID of 750mm is required for the same auger as above (pitch 50mm, OD 69mm), the number of pitches are calculated as:

$$Number\ of\ pitches = \frac{3.14}{50} \times (750 + 69) = 51.433$$

Since a fraction of a pitch cannot be used, the number is rounded up to 52 pitches, ensuring that the coil ID will not be smaller than 750mm. In this case the actual coil ID will be $\pm 759mm$.

Finally, should it be required to calculate the coil OD, the following formula can be used:

$$Coil\ OD = \frac{n \times Pitch}{3.14} + Auger\ OD$$

Table 1 provides a quick summary of the formulas discussed:

Table 1: Summary of auger coil formulas

Coil length	<i>Auger length = (Auger pitch) × (Number of pitches around diameter of coil) × (Number of vertical layers on coil)</i>
Coil ID	$Coil\ ID = \frac{n \times Pitch}{3.14} - Auger\ OD$
Coil OD	$Coil\ OD = \frac{n \times Pitch}{3.14} + Auger\ OD$
Number of pitches on coil diameter	$Number\ of\ pitches = \frac{3.14}{Pitch} \times (Coil\ ID + Auger\ OD)$

WIRING OF A COIL

When a coil has been successfully completed it must be secured with wire to ensure that it does not become undone during handling and shipping. It is suggested that **2mm Black baling wire** is used for this purpose. Firstly, fasten the loose ends of the coil to the coil itself using wire. Then, while the coil is still on the mandrel, add wire loops at six positions on the coil as shown in Figure 5.

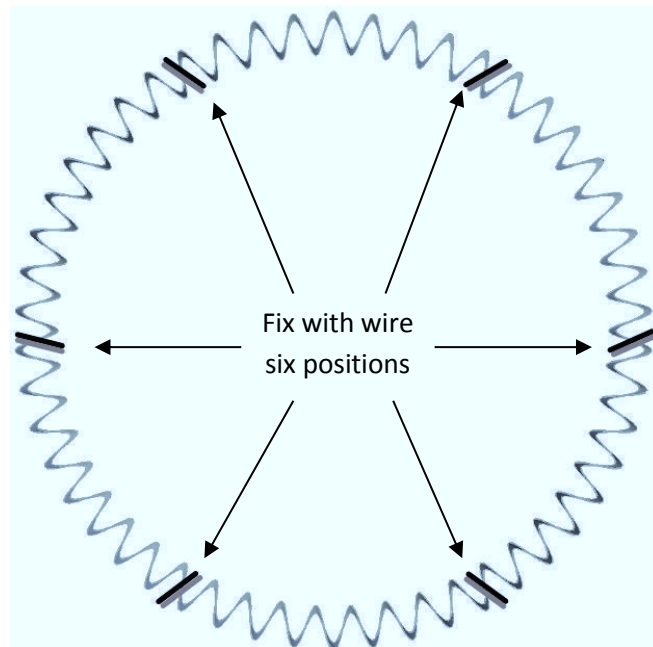
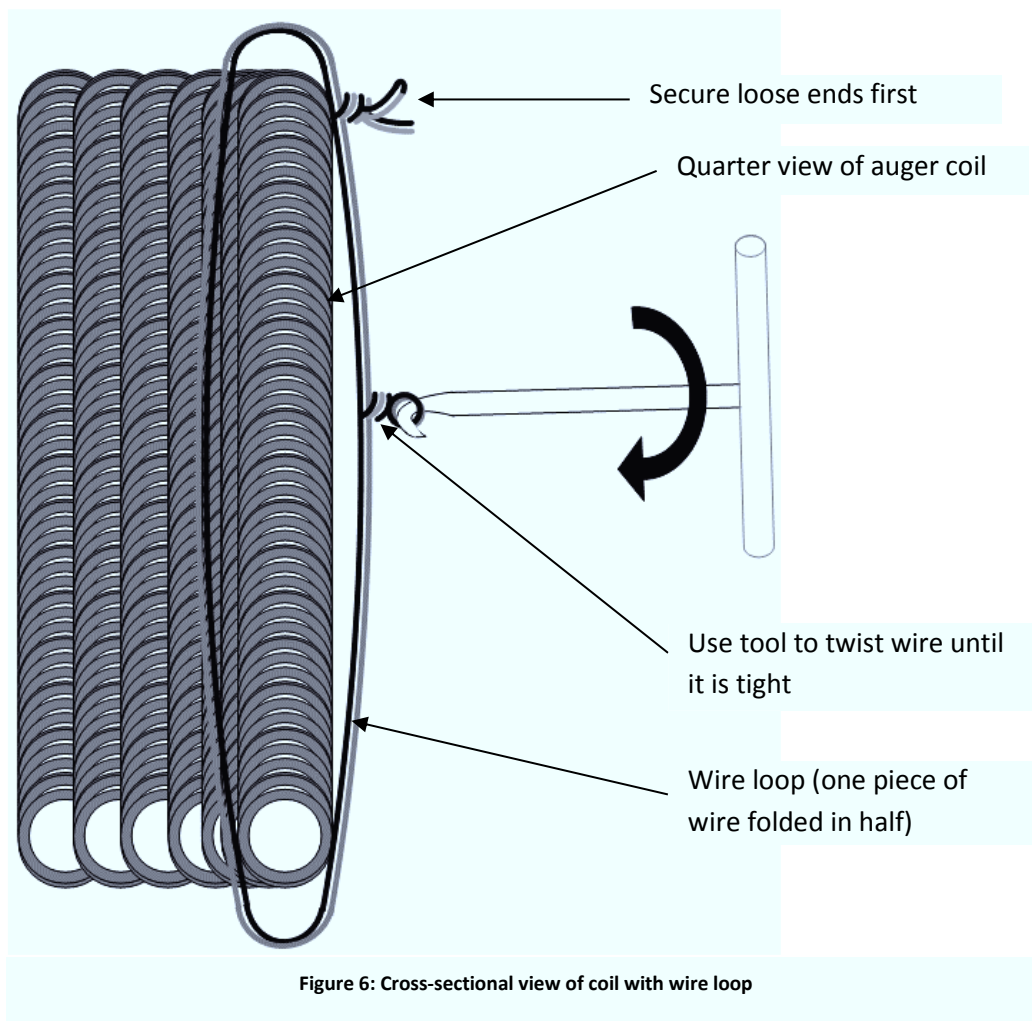


Figure 5: Wire fixing positions

To securely fasten the wire, follow these steps:

1. Cut a piece of wire double the length required for one loop
2. Fold this length in half
3. Now loop the folded wire around the coil as shown in Figure 6.
4. Tie the loose ends of the loop together. At this stage the wire loop will not be very tight.
5. Use the tool supplied to tighten the loop around the coil by grabbing the loop with the hook of the tool and then twisting the wire.
6. Bend all sharp ends of the wire away so that they cannot cause harm.
7. Repeat this at the six positions as shown in Figure 5.



MAKING THE AUGER SAFE FOR HANDLING

When the auger is cut, the ends of the flat wire might be very sharp and could be hazardous. It is therefore advised to ensure that the flat wire ends are filed to remove any sharp edges or points.

Furthermore, even if the flat wire ends have been smoothed, it is still advised to fit a small piece of tubing over the wire so that it extends beyond the end of the wire.

DECOILER

SAFETY CHECKS

1. When working on or near the decoiler, the system must be set to **MANUAL** to ensure that it will not start rotating accidentally.
2. Ensure that the core of the mothercoil is still securely fixed to the pallet as this could detach during shipping.
3. Ensure that there is no debris underneath the decoiler that can get caught and/or wound up around the machine.
4. Ensure that there is nothing lying on the turntable (see Figure 10) that can be thrown off when the decoiler spins.
5. Ensure that the pallet is loaded correctly. (See: Loading the pallet. Page 13)
6. Ensure that the bolts fixing the decoiler to the ground are intact and properly tightened to avoid the machine from sliding or tilting during operation.
7. To avoid the risk of injury, ALWAYS remain clear of the turntable when it's rotating.

RUNNING THE AUTO-DECOILER

The decoiler is motorized to ensure that the mothercoil is decoiled in a controlled manner, keeping the auger from stretching or getting tangled. This is achieved by a control system that controls the speed of both the coiler and decoiler to maintain a slight tension in the auger.

All the functions to control the decoiler are operated by the HMI (Human Machine Interface) screen (see Figure 7). The decoiler will automatically run when the system is operated in AUTO mode. The manual operation of the decoiler can be achieved by selecting the MANUAL RUN MODE button on the HOME screen (see Figure 8). This will open the MANUAL RUN SCREEN. To activate the decoiler, the DECOILER CONTROL function must be activated on the screen and the selection between FORWARD and REVERSE must be set (see Figure 9). If all functions are set correctly, the decoiler will run as intended by pressing and holding the GREEN PUSH BUTTON located to the right-hand side of the HMI screen. The decoiler will stop when the button is released.



Always take caution when selecting the mode on the MANUAL RUN SCREEN. Ensure that the coiler is not activated as this will cause the coiler to run when the GREEN PUSH BUTTON is pressed which may cause injury.

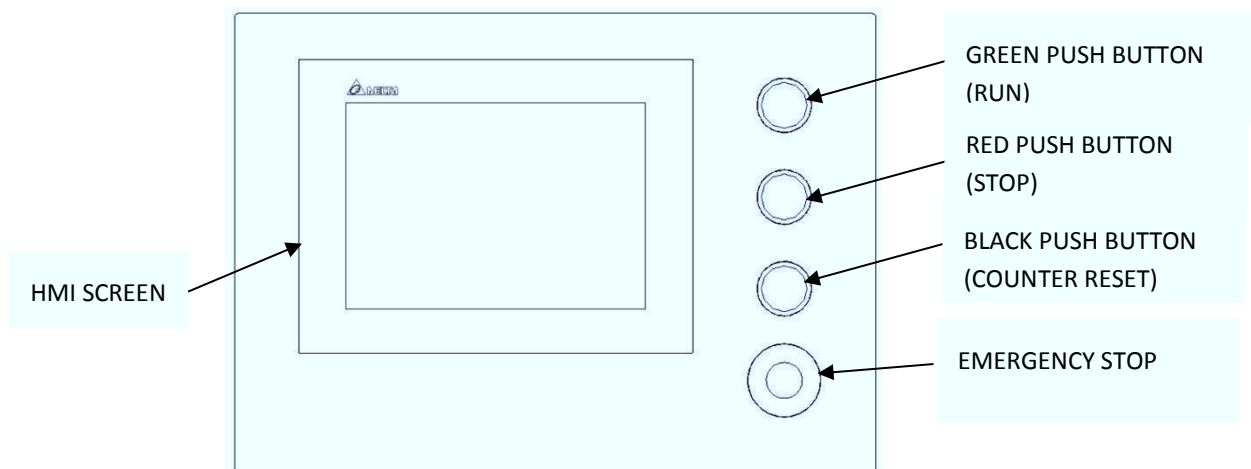


Figure 7: Control panel for system operation

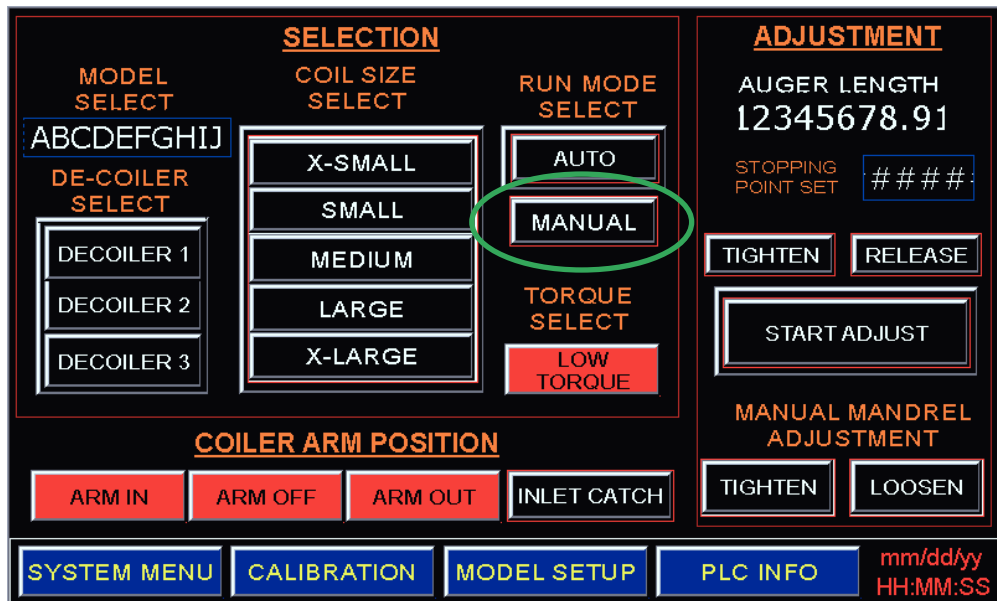


Figure 8: Home screen on HMI

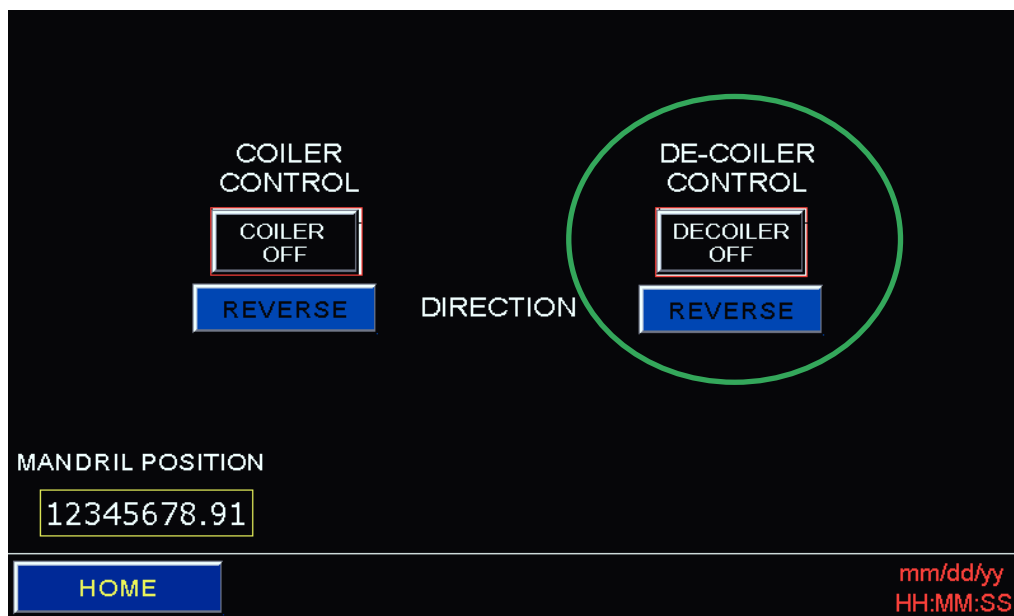


Figure 9: Manual run screen on HMI

LOADING THE PALLET

When loading the pallet, rotate the decoiler using MANUAL mode on the coiler so that the sides of the pallet are parallel with the locating brackets. Loosen the antiluce locks to flip open the clamp plates and swivel them to allow placement of the pallet between the locating brackets, onto the top plate of the decoiler. Take caution in placing the pallet correctly between the locating brackets. The pallet should not rest on any other part except the top plate of the decoiler. Once the pallet is positioned on the decoiler, flip the clamp plates closed and lock the antiluce locks. The pallet is now securely loaded onto the decoiler and is ready for decoiling. Figure 10 shows the decoiler with the clamp plates in the open position and the pallet loaded in the correct position.

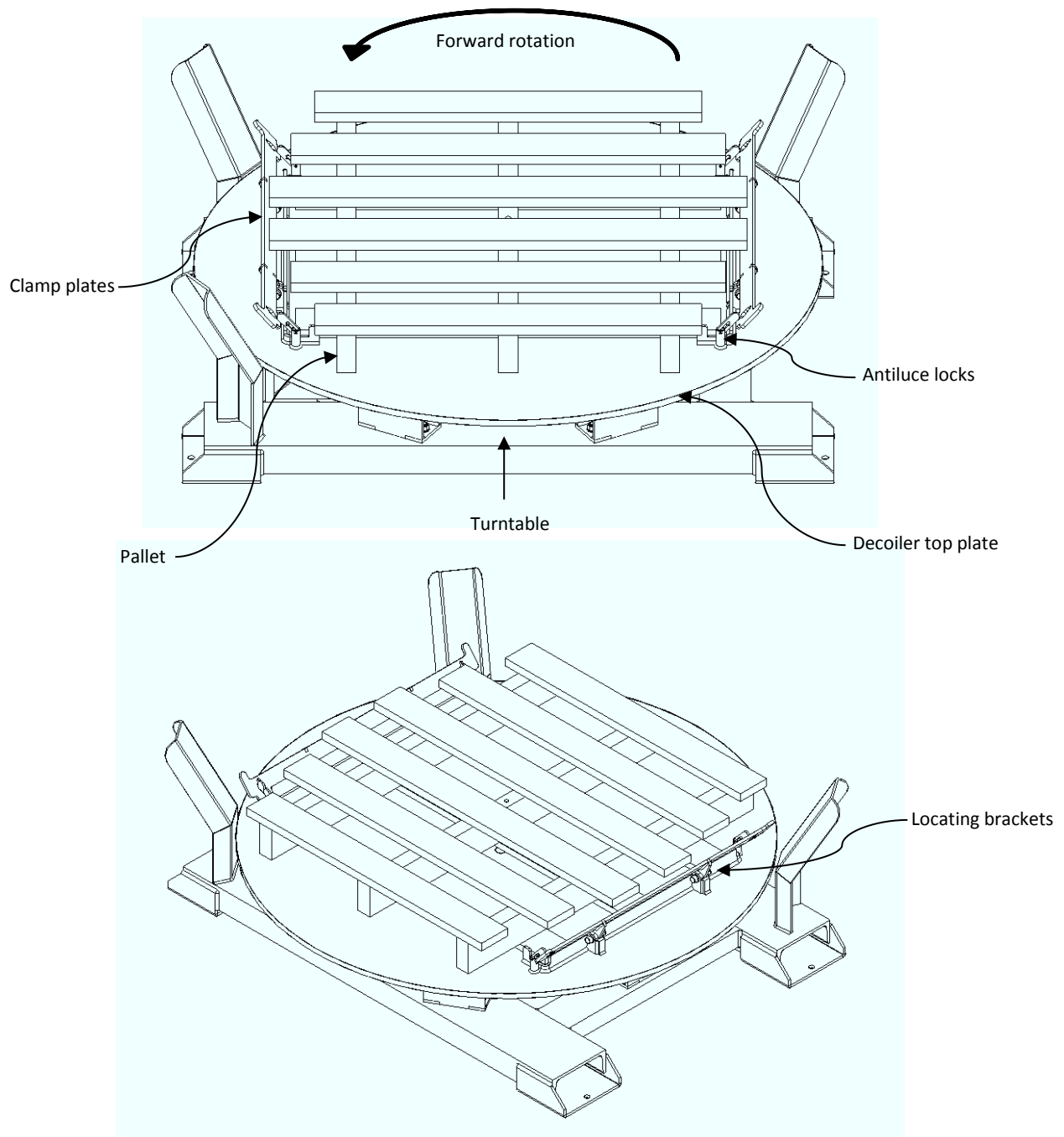


Figure 10: Pallet position on decoiler

UNCOILING THE MOTHERCOIL

The auger mothercoil is made up of layers of auger wound over each other. Each layer is separated by carton sheets and **individually strapped with wire at four points per layer** to prevent the mothercoil from collapsing during shipping. It also reduces the risk of the auger becoming tangled when uncoiling. When the mothercoil is being decoiled, the operator should take care to stop the process at the end of each layer to first **remove the carton sheets and the wire strapping**. Failure to do so could result in the mothercoil falling over.

DECOILER MAINTENANCE

Before any maintenance is done ensure that the entire system is completely switched off!

Please refer to Figure 11 for the following points:

- Check all bolts ensuring that they are tightened.
- Check main bearing under turntable to ensure it is still functioning properly. This bearing should be greased every 6 to 12 months, depending on usage.
- Check wheels supporting the turntable. Inspect wheel bearings every 6 to 12 months (depending on usage) and replace if needed.
- Check that the drive chain is correctly tensioned. Correct chain tension will ensure longer chain and sprocket life. To adjust the chain tension:
 - Loosen (do not remove completely) the four screws that keep the drive motor bracket in place
 - Slide the bracket forward/backward until desired chain tension is reached.
 - Tighten four screws and check that chain tension is still correct.
- The drive chain should be lubricated with a suitable chain lubricant
- Ensure that airflow over electric motor is not restricted

NOTE: The gearbox is a sealed unit that is “lubricated for life”, therefore the oil need not be replaced or checked. If the gearbox leaks oil please contact Technical Systems.

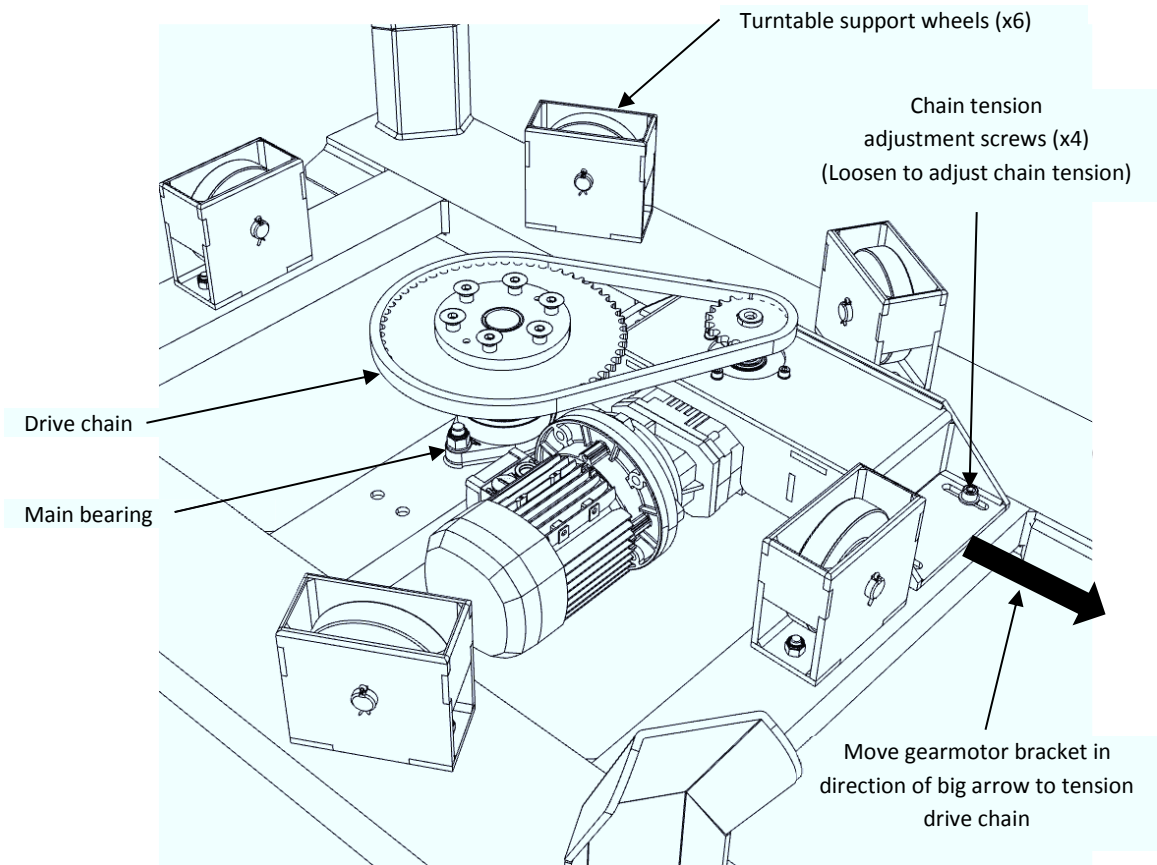


Figure 11: Decoiler maintenance (Top plate removed for clarity)

LENGTH COUNTER

The length counter uses a simple bicycle wheel to run over the auger as it is pulled through the unit. With proper calibration this unit is accurate to within 0.5% of the required length.

SAFETY CHECKS

1. Ensure that there is nothing that can get stuck in the spokes of the wheel.
2. Ensure that the unit is correctly adjusted for the specific auger being measured.
3. Ensure that the wheel is free to move up and down on the slide pillars.
4. Always ensure that no-one is near the unit when in operation to avoid risk of injury. The wheel spokes can cause serious injury when in operation.

ADJUSTING THE OPENING HEIGHT

To ensure that the length counter provides accurate and consistent measurements, it is important that the height of the upper guide shoe is adjusted correctly for each auger type.

To adjust the height, following these steps (Refer to Figure 12):

1. Lift the upper guide shoe by hand and feed the auger through the unit.
2. Turn the height adjustment knob until the shoe is no more than 0.5 mm from the auger.
3. Ensure that the wheel is making contact with the auger.
4. Pull auger through and check that the wheel is turning.

NOTE: If it is too difficult to pull the auger through the length counter, slightly increase the height of the upper guide shoe by turning the knob clockwise. Do not allow the gap to be too big otherwise this will affect the accuracy of the measurement.

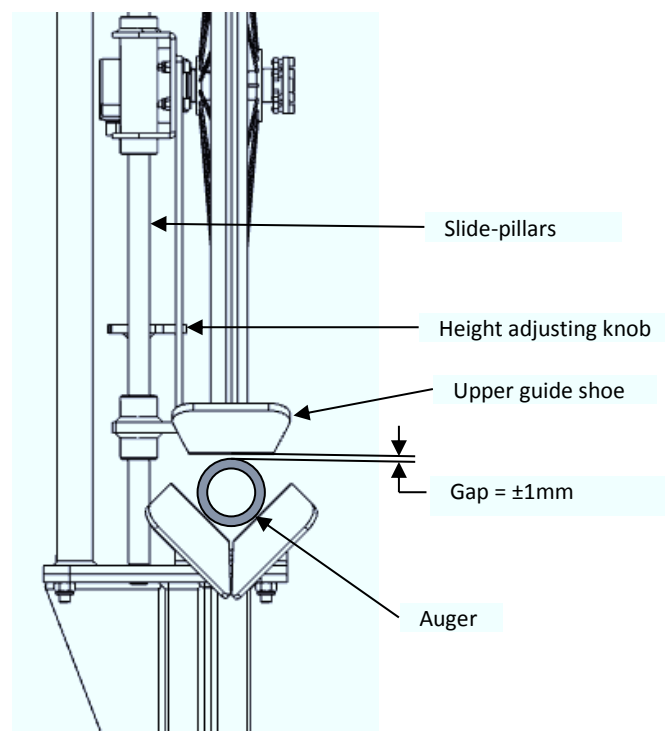


Figure 12: Adjusting upper guide shoe

CALIBRATION

If the unit is not measuring the lengths correctly, it might be necessary to calibrate the length counter. This is done by following the steps below (see Figure 13):

1. Take a 12 m long piece of auger, measure exactly 10 m from one end and make a mark on the auger.
2. Feed this auger into the length counter until the end of the auger is in line with the auger's "Zero point".
3. On the control panel, press the length reset button (black push button) until zero is displayed on the screen where the auger length is displayed (top right corner, home screen).
4. Pull the auger through the length counter by hand and stop when the 10 m mark reaches the "Zero point". Do not go past the "Zero point" and try to line up the 10 m mark on the auger as close as possible with the "Zero point".
5. Write down the auger length displayed on the screen.
6. Navigate to the CALIBRATION PAGE on the HMI screen (shown in Figure 14).
7. Calculate the new AUGER LENGTH SCALE value:

$$SCALE_{new} = SCALE_{old} \times \frac{10.00}{Measured\ Length}$$

8. Enter the new AUGER LENGTH SCALE value on the screen by pressing on the scale value displayed (see Figure 15).
9. Check if calibration is successful by repeating steps 1 to 3. If the measured length is displayed correctly, the calibration was successful.

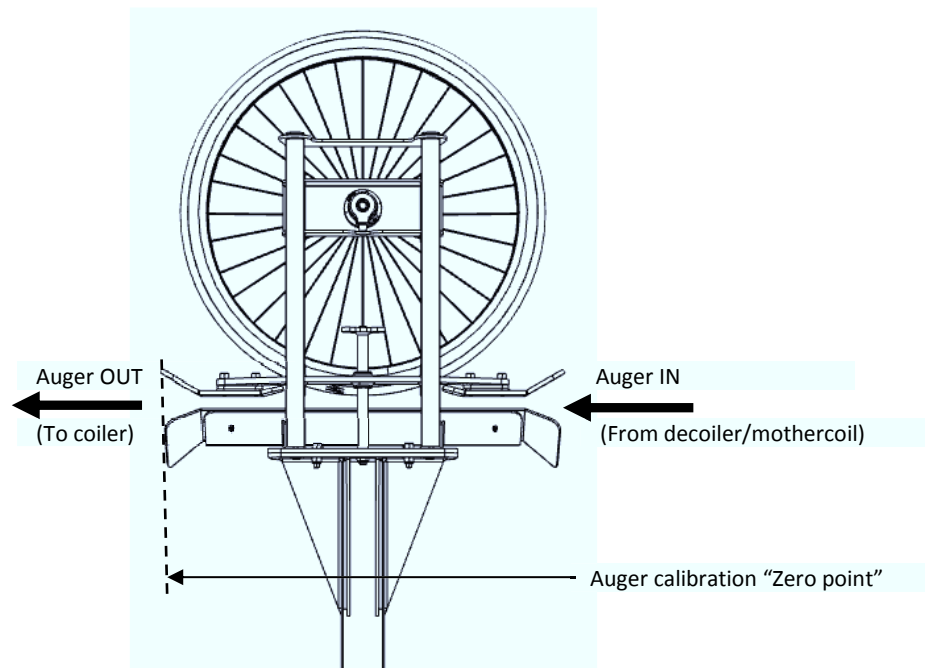


Figure 13: Zero point for calibration purposes

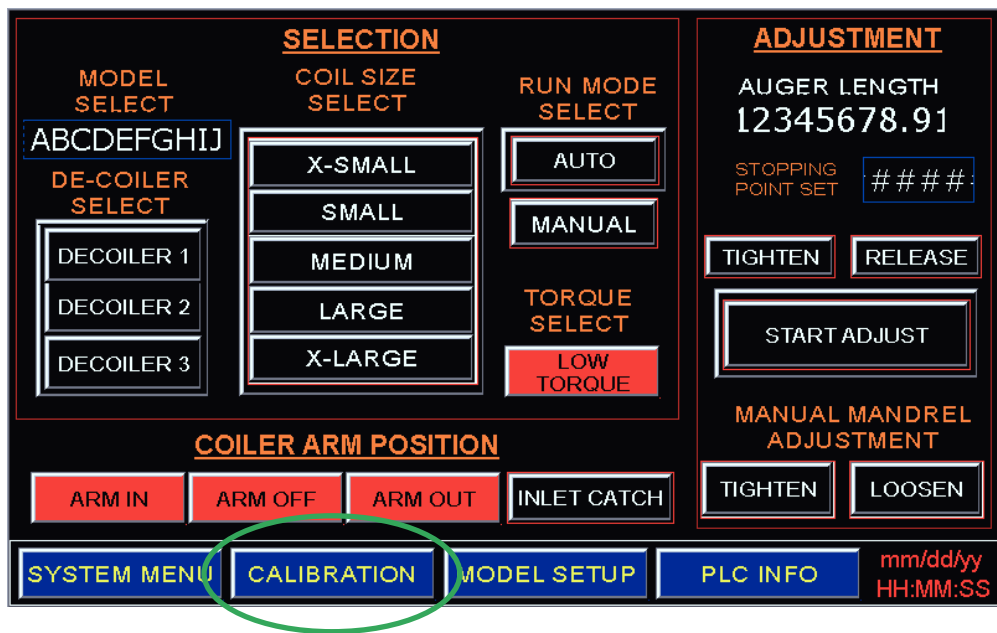


Figure 14: Home screen on HMI



Figure 15: Calibration screen on HMI

LENGTH COUNTER MAINTENANCE

This unit requires little maintenance. However, periodic checks are advisable to ensure that:

Refer to Figure 16 for the following points:

- The wheel spins freely
- The up/down movement of the wheel is smooth and easy. Lubricate if necessary.
- All bolts are still securely fastened.
- The tyre surface is not worn
- The steel wearplates are not worn
- Inspect wheel bearings every 6 to 12 months (depending on usage) and replace if necessary (Figure 17)

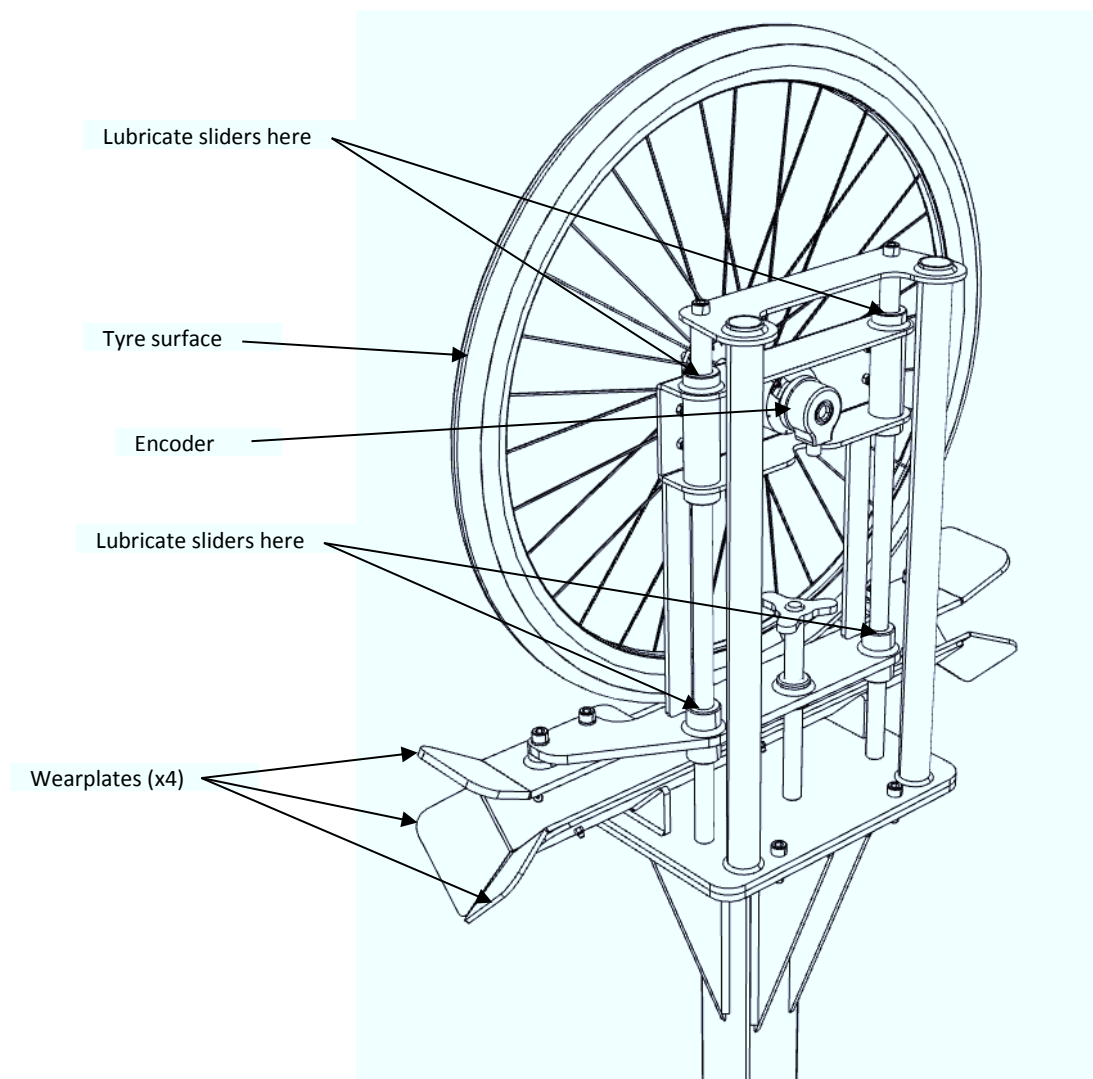
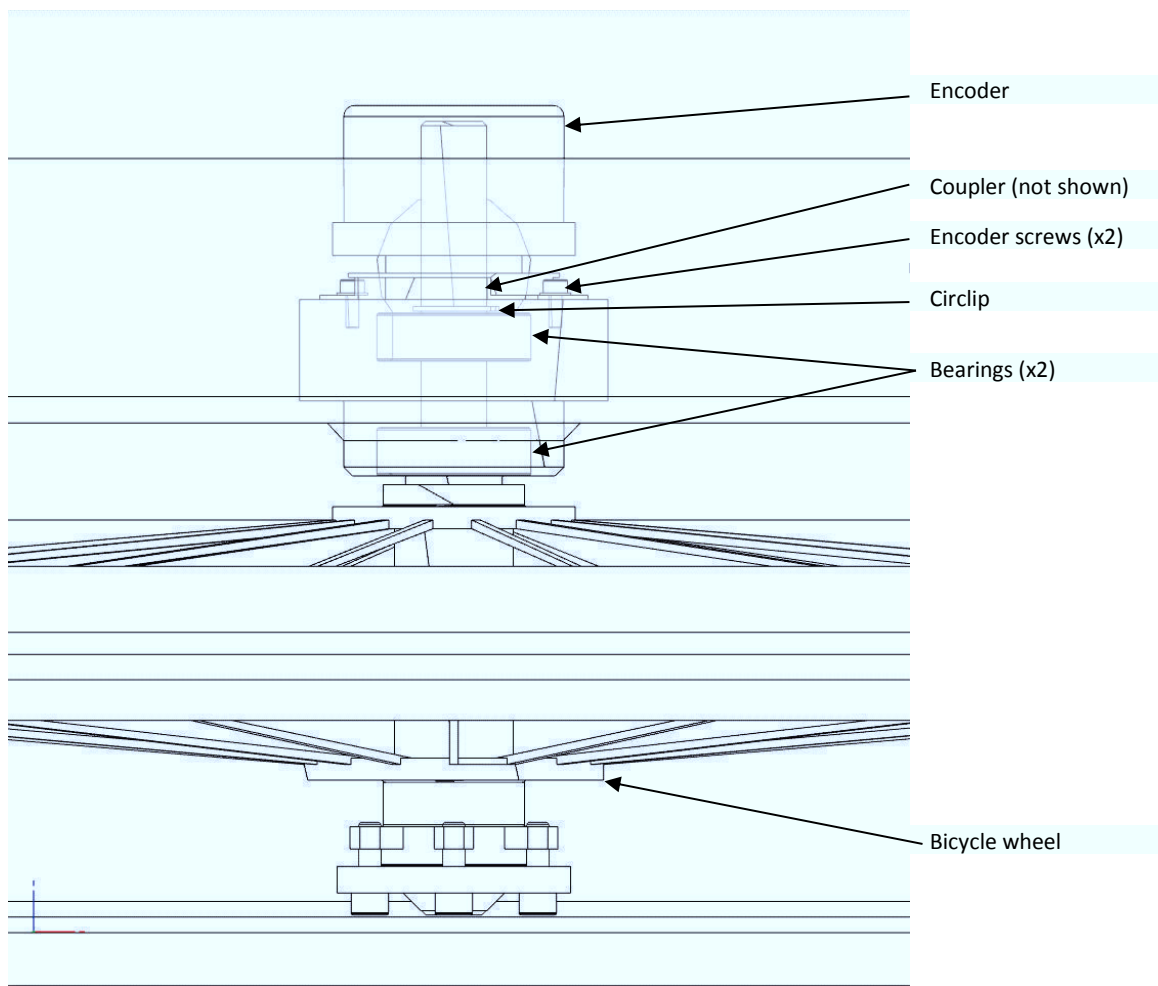


Figure 16: Length counter maintenance



Counter wheel removal instructions:

1. Release encoder coupler
2. Remove Encoder screws
3. Remove Encoder
4. Remove Circlip
5. Remove entire wheel and shaft assembly

Figure 17: Length counter bearing removal

COILER

OVERVIEW

SPECIAL NOTICE: THE COILER IS A POWERFUL MACHINE THAT CAN CAUSE SERIOUS BODILY HARM IF NOT OPERATED CORRECTLY.

Figure 18 below shows the coiler. The operator of this machine must at all times adhere to the guidelines stated in this manual. To avoid harm to others, always ensure that no-one except the operator is near the machine when it is operated. Since this machine is the driving force of the entire recoiling line, special care should be taken to ensure that all the other parts of the recoiling line (decoiler and length counter) are safe to operate before starting the coiler.

The coiler operates using pneumatic actuators and valves. A minimum air supply of 3 bar and a flow rate of approximately 65 l/m is recommended.

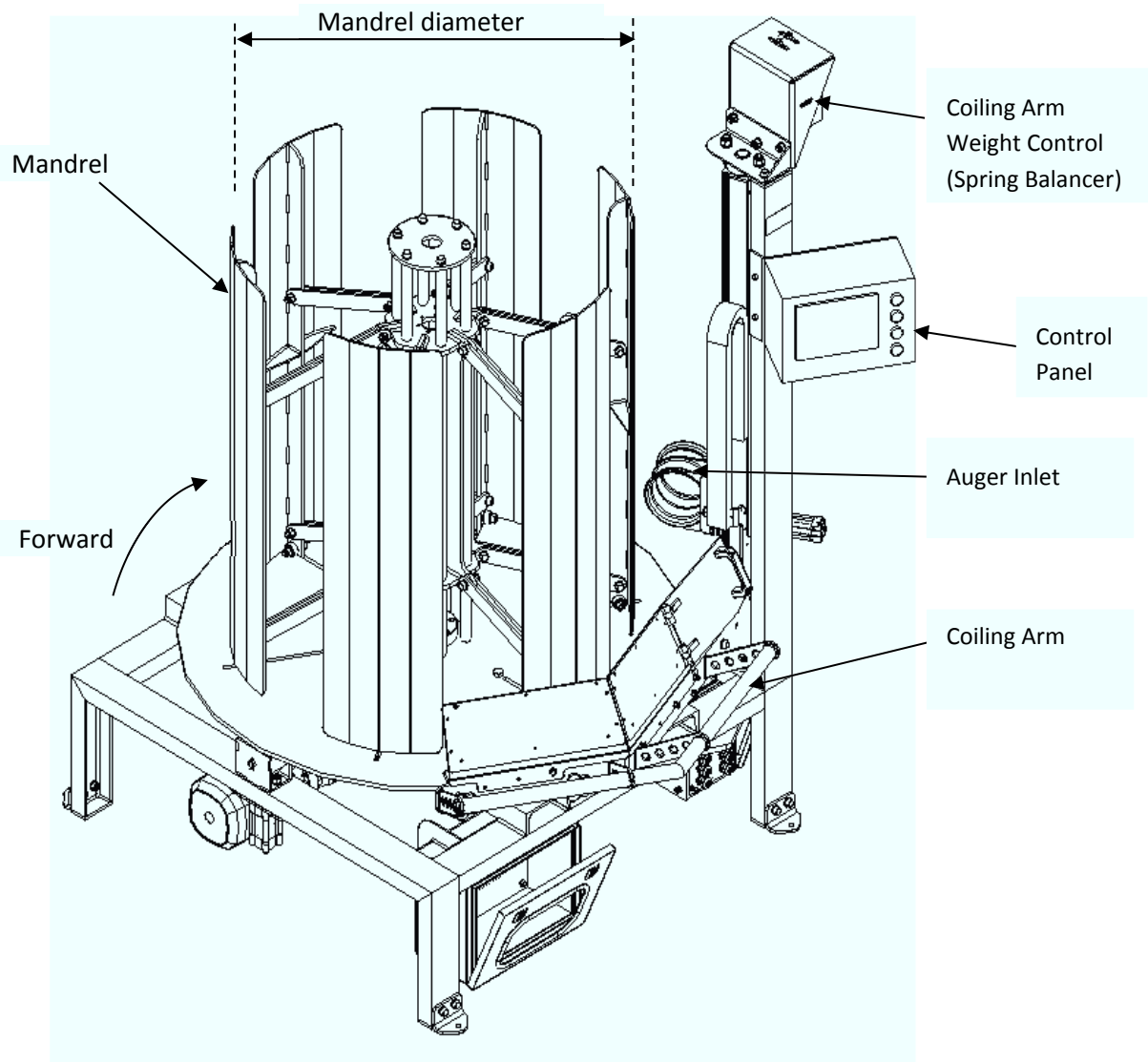


Figure 18: Coiler

SAFETY CHECKS

1. Is the decoiler ready for operation?
2. Is the length counter ready for operation?
3. Check that there is nothing on the machine that can become loose or fall off during operation.
4. Has the correct run mode been selected?
5. Ensure that the bolts fixing the coiler to the ground are intact and properly tightened to prevent the machine from sliding or tilting during operation.
6. To avoid the risk of injury, ALWAYS remain clear of the turntable when it's rotating.

RUNNING THE COILER

The system is designed to maintain a slight tension in the auger when running, to ensure that the auger does not tangle on the decoiler. This is achieved by a control system that controls the speed of both the coiler and decoiler.

The control system is activated when the system is set to run in AUTOMATIC (HIGH or LOW) mode (see Figure 19). Therefore, if the system is set to run in AUTOMATIC MODE THE DECOILER WILL ALSO ROTATE when the COILER is running! **Take special care to ensure it is safe to run the ENTIRE system before running in AUTOMATIC (HIGH or LOW) mode.**



The coiler must never be switched between AUTOMATIC and MANUAL run modes or be adjusted while the machine is running. The RED PUSH BUTTON located to the right of the HMI screen must be used to stop the coiler before any **adjustments or run setting changes** are made. **While running, the coiler can only be switched between HIGH and LOW TORQUE.**

AUTOMATIC MODE (HIGH OR LOW)

When the operator wants to coil auger, the system should be in AUTOMATIC MODE. In automatic mode the system will always run FORWARD. Automatic mode should therefore only be used for coiling auger. All other procedures must be completed while the system is in manual mode.

There are two automatic modes:

Automatic Low: This mode is used primarily for smaller auger models (20-, 45-Series) but should always be tried first before switching to Automatic High.

Automatic High: If there is difficulty in coiling auger in Automatic Low mode then Automatic High can be used. **Note that Automatic High will cause smaller auger models to stretch and get damaged.** It is advised to only use Automatic High on larger auger models (75-, 90-Series) when there is difficulty coiling. In all other cases Automatic Low is preferable.

Please see Figure 19 for instructions on switching between AUTOMATIC LOW and AUTOMATIC HIGH.

When the operator is ready, the correct selections have been made and all safety checks have been done, the GREEN PUSH BUTTON located to the right of the HMI screen (Figure 7, Page 11) can be pushed to start turning the coiler. The coiler is programmed to start slowly and then increase steadily to its maximum speed. This has been deliberately programmed into the motor drive to avoid personal injuries or damage to the machines.

Note that the system will slow down and then stop when the pre-set length on the counter is reached. Detailed operation of selecting, adjusting and running the coiler will follow in the next coming pages of this manual.

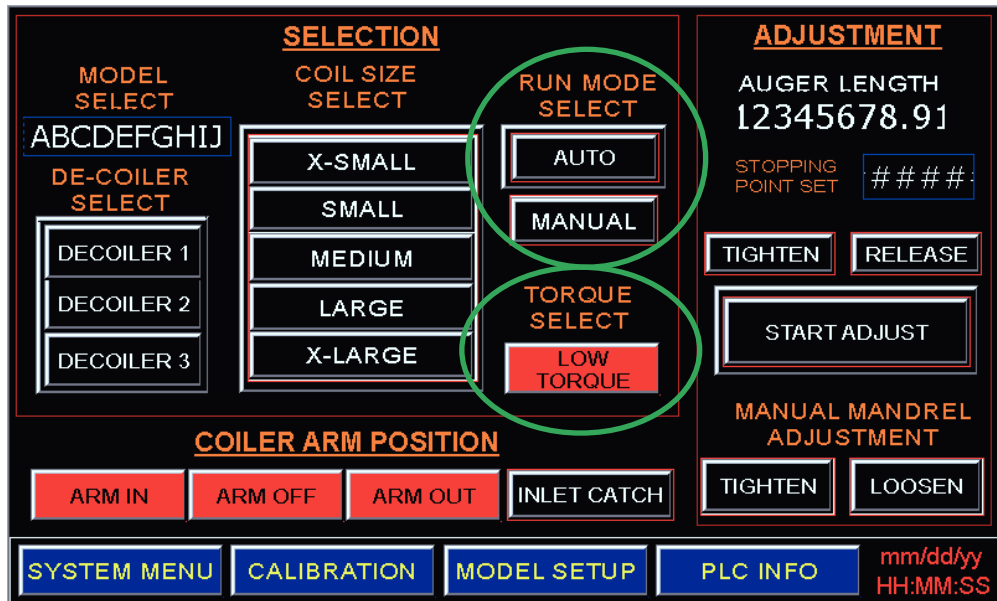


Figure 19: Home screen on HMI

MANUAL MODE

As with running the decoiler in MANUAL MODE, the coiler can also be run manually and independently from the decoiler. See Figure 8 (Page 12) for directions to navigate to the MANUAL RUN SCREEN on the HMI and Figure 20 below for selection of the coiler run settings. On the MANUAL RUN SCREEN the COILER CONTROL must be activated by pressing the button on the screen and selecting the direction of rotation. To run the coiler according to the selection made, the GREEN PUSH BUTTON to the right of the HMI screen must be pressed and held in. The coiler will slow down and stop once the button is released.

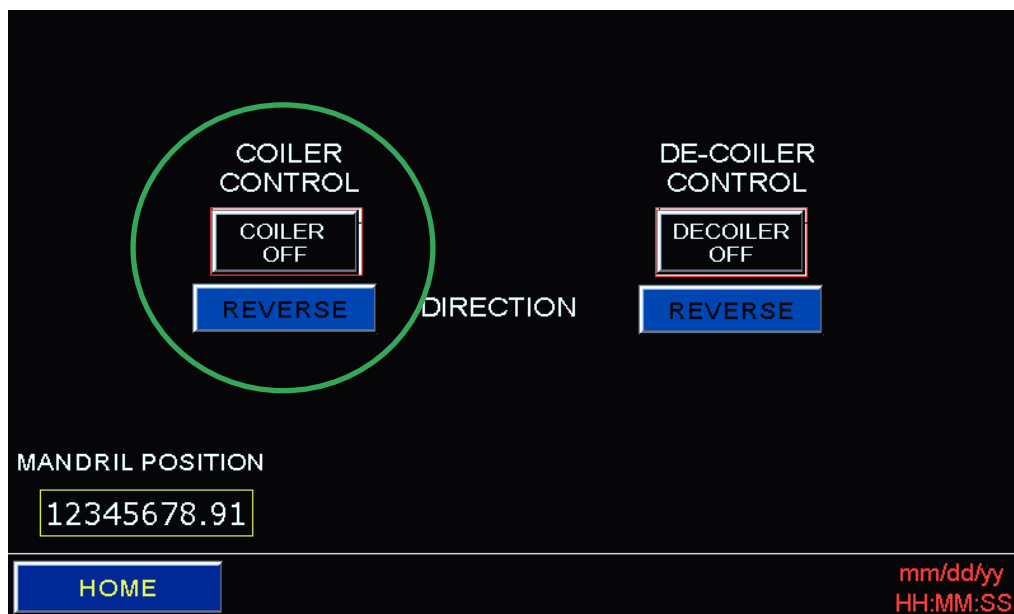


Figure 20: Manual run screen on HMI

CALIBRATING THE MANDREL

The mandrel zero position should be calibrated on a regular basis. Depending on the usage of the machine, it is advised to zero the mandrel at least 2 – 3 times during a normal 8 hour shift. The zeroing of the mandrel on a regular basis increases the accuracy of the mandrel size drastically. Should it be found that the mandrel size is inconsistent after any adjustment, zero the mandrel to ensure accurate values are obtained.

The calibration of the mandrel can be done by navigating to the CALIBRATION SCREEN from the home page as shown in Figure 14 (Page 18).

The following steps should be followed on the CALIBRATION SCREEN to zero the mandrel:

1. Ensure there is no obstruction on the coiler that could cause harm during calibration as the coiler rotates during the calibration process.
2. Activate the calibration function by pushing the CALIBRATION DEACTIVE button in the top middle of the screen (Figure 21). The button will change colour and calibration will be ACTIVE.
3. Push the MOVE TO ZERO button which is marked as STEP 1. The coiler will now automatically rotate to find the first zero reference point.
4. Push the START ADJUST button marked as STEP 2. The mandrel will now automatically adjust to the second zero reference point.
5. The last step marked as STEP 3 is to zero the mandrel position by pushing the MANDREL ZERO button. A PASSWORD will be requested. Please see APPENDIX B for passwords. After the password is entered correctly, the mandrel position will be set to zero. The mandrel is now calibrated successfully.
6. After the calibration is completed successfully, navigate back to the HOME SCREEN by pushing the HOME button in the bottom left corner of the screen.

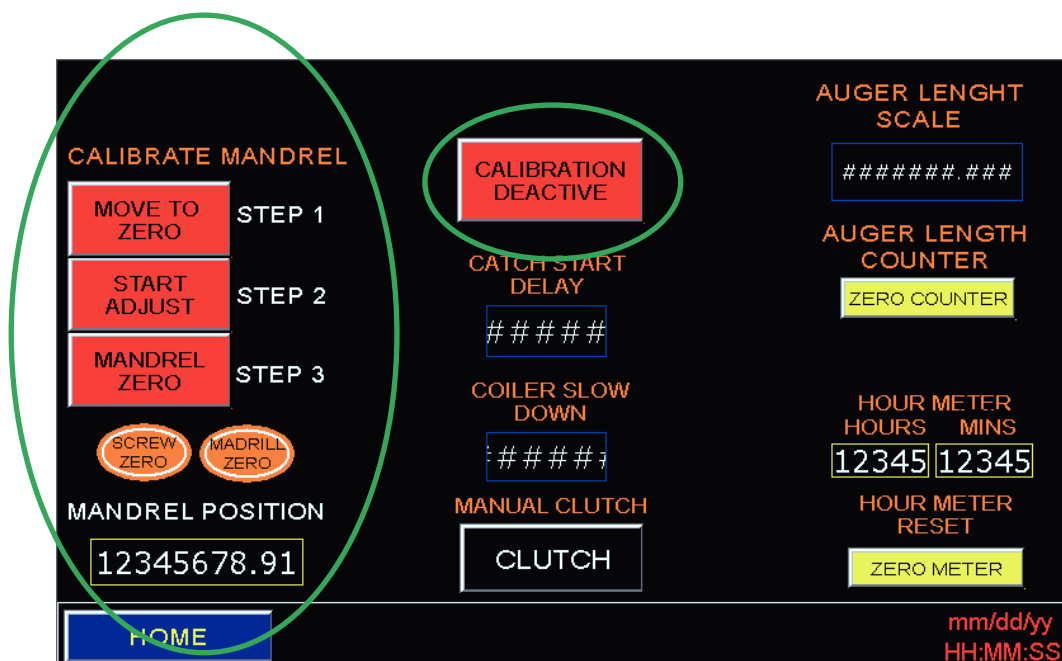


Figure 21: Calibration screen on HMI

COILING THE AUGER

The process of coiling the auger is described below with reference to sections later in the chapter. Some of the steps are explained on the assumption that all the previous sections and Appendix C have been read. Before any coiling can commence, the length counter and the mandrel must be properly CALLIBRATED and all safety checks, as previously explained, on the decoiler, length counter and coiler should have been completed.

Note that the auger models have been pre-programmed to accommodate coil sizes for stacking. The mandrel size adjustment is an automatic process controlled by the specific selections made on the HMI screen.

The coiler arm is also automatically controlled by means of a pneumatic cylinder which applies a constant pressure for the coiling process to be executed in a neatly controlled fashion.

- **Selecting the auger model from the pre-programmed list supplied:**
 1. Press the MODEL SELECT block in the top left corner on the home screen (Figure 22).
 2. Scroll through the pre-programmed auger models and select the desired model by pressing on the model to be coiled (Figure 24).
 3. The HMI will jump back to the home screen and the selected model will be displayed in the MODEL SELECT block. The selection is now complete.
- **Selecting the decoiler and setting the auger length:**
 4. The coiler is programmed to be able to run off 3 different decoilers. To run the coiler a decoiler must be selected. To select the decoiler choose either DECOILER 1, 2 or 3 situated on the left hand side on the HOME SCREEN on the HMI. See Figure 22.
 5. Enter the desired length of auger to coil (in meters) in the STOPPING POINT SET input block in the top right corner of the HOME SCREEN on the HMI below the displayed AUGER LENGTH. See Figure 22. The selection and auger length is now complete. More detail in reference to the measuring of the auger is discussed on page 28.
- **Coil size selection, mandrel adjustment and wrapping of the auger around the mandrel:**
 6. In the middle of the HOME SCREEN on the HMI (Figure 19, Page 23), select the coil size. This is the size of the MANDREL DIAMETER and will be pre-programmed so that small coils will fit into medium coils, medium into large etc. as explained on Page 7.
 7. Press the START ADJUST button on the right hand side of the HOME SCREEN on the HMI. The mandrel will automatically adjust to the correct size for the auger to be wrapped around the mandrel to form the first layer. More detail in reference to adjusting the mandrel is discussed on page 28.
 8. Run the decoiler FORWARD in MANUAL MODE as explained on page 11 to decoil the auger from the mother coil. As the auger decoils, feed it through the correctly set length counter (explained on page 16 "ADJUSTING THE OPENING HEIGHT").
 9. Feed the auger through the AUGER INLET GUIDE on the COILER up until the CUT-OFF POINT as shown in Figure 24.
 10. Reset the AUGER LENGTH by pushing the BLACK PUSH BUTTON on the right hand side of the HMI. The AUGER LENGTH must now be displayed as "0" while the end of the auger is at the CUT-OFF POINT and the **auger is tight between the length counter and the cut-off point** (Figure 24).
 11. Pull the auger through the AUGER INLET GUIDE and around the mandrel as displayed in Figure 25 while running the decoiler FORWARD in MANUAL MODE. The auger must be wrapped tightly around the mandrel and fixed to itself once a full revolution has been reached.
- **Tightening the mandrel, engaging the coiling arm and running the coiler in AUTO MODE:**
 12. After the auger has been fixed around the mandrel the TIGHTEN button located ABOVE the START ADJUSTMENT button must be pressed followed by the START ADJUST button to increase the mandrel

size to allow the auger to grip on the mandrel for coiling. **(Note: The mandrel can be manually opened and closed by pressing and holding the MANUAL MANDREL ADJUST buttons, TIGHTEN and LOOSEN located BELOW the START ADJUST BUTTON. Caution must be exercised when this function is used as over tightening of the mandrel can cause serious damage to the coiler.**

13. The coiler arm can now be engaged by pressing the ARM IN button on the HOME SCREEN on the HMI. The arm will move in automatically towards the mandrel and keep a constant pressure for coiling. The placement of the GUIDE SHOE and the setting of the PRESSURE PLATE must be adjusted correctly as explained in Figure 25 on page 29. More detail in reference to operating the coiler arm on page 29
 14. AUTO RUN MODE must be activated by pushing the AUTO button on the HOME SCREEN of the HMI.
 15. Ensure the correct torque setting is selected as discussed on page 22 "AUTOMATIC MODE (HIGH OR LOW)".
 16. Ensure that all is clear and safe for running the full recoiling system. The GREEN PUSH BUTTON on the right hand side the HMI can now be pushed and this will **start the coiling process**.
 17. During coiling, take care to stop in time to remove the packaging and wiring between layers on the mothercoil (see page 14).
 18. The coiling process is fully automatic. The system will slow down and stop at the desired length entered. **The system can be stopped at any point in time by pressing the RED PUSH BUTTON located on the right hand side of the HMI or the EMERGENCY STOP.**
- **Cutting, releasing and removing coiled auger:**
19. After the desired length has been reached, the system will automatically slow down and stop. The AUGER CATCH will automatically engage to keep the auger stable while cutting.
 20. Cut the auger at the CUT-OFF POINT (Figure 24).
 21. Fix the loose cut end to the coiled auger.
 22. The coiler arm can now be opened by pressing the ARM OUT button on the HOME SCREEN. **Assist the arm while it is moving outward and downward to avoid the arm dropping down uncontrolled.**
 23. Use wire to strap and tighten the coil at six positions (Page 9).
 24. The mandrel can now be RELEASED by pushing the RELEASE button located above the START ADJUST button followed by pushing the START ADJUST button. The mandrel will automatically adjust to a smaller diameter freeing the coil and allowing easy removal.
 25. The coil can now be removed by using the coil lifter (Page 33).

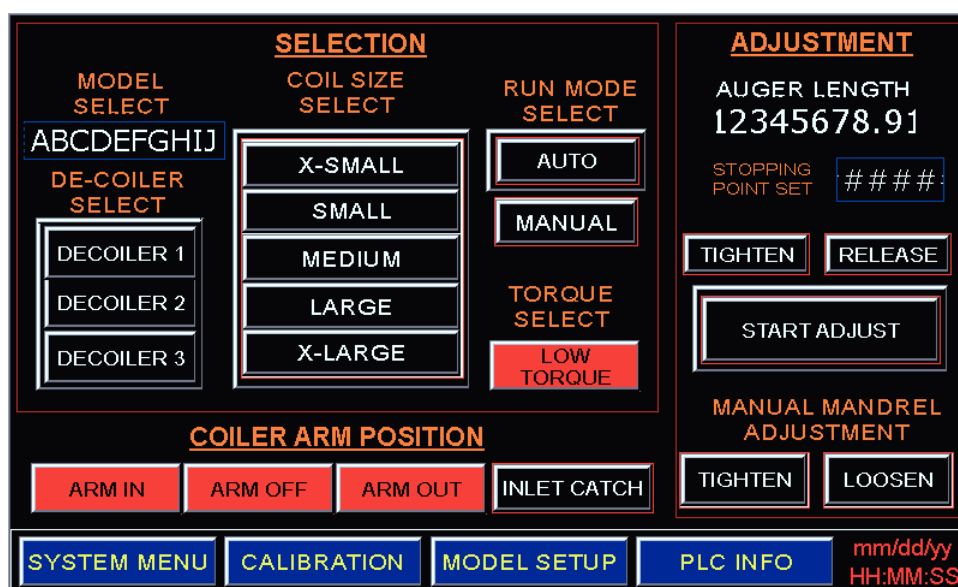


Figure 22: Home screen on HMI



Figure 23: Series model select screen on HMI

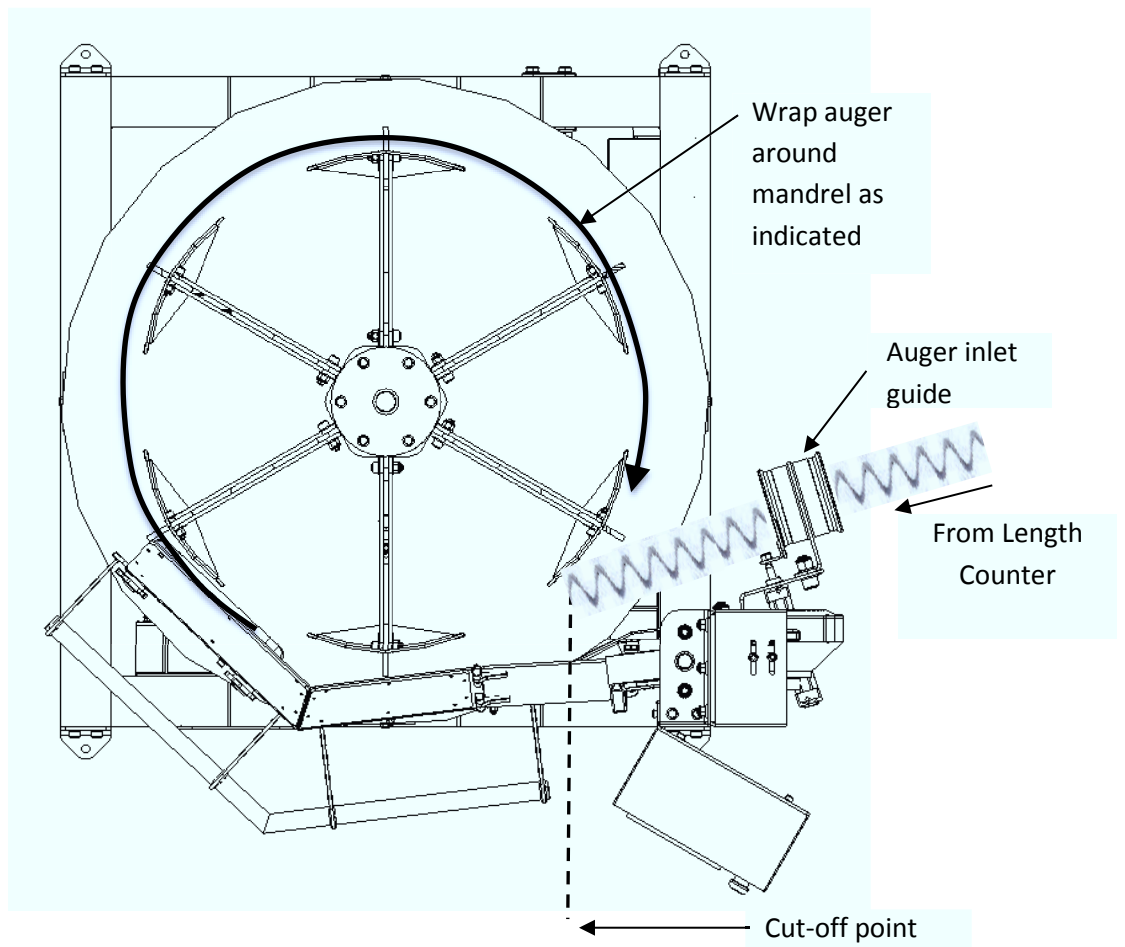


Figure 24: Setting up the coiler

SETTING DESIRED LENGTH AND SLOW DOWN POINT

The length counter is programmed to stop the coiler once a certain length has been reached. It is also programmed to slow down the coiler before stopping to reduce the risk of an overrun.

To enter a desired length of auger to coil, a length in METERS must be set on the HOME SCREEN of the HMI in the top right corner where STOPPING POINT SET is displayed. (See Figure 22).

The system is programmed to slow down before the desired length is reached to avoid overrun. The slow down point is set to a default of 2 meters before the final set length. The default slow down point can be altered on the calibration screen (Figure 21) by entering a value in the COILER SLOW DOWN block.

Since there is a 0.5% accuracy on the length counter, it is advised to accommodate for this error when coiling the auger to a required minimum length. For example: If the minimum length of the auger should be 100m, set the desired length 100.5m (100m + 0.5%).

ADJUSTING THE MANDREL

The mandrel adjustment process is fully automatic and is adjusted according to the input fed into the HMI. The mandrel size for each auger model is pre-programmed according to the stacking sizes as explained on page 7. If the correct auger model is selected on the HMI along with the desired coil size (small, medium, large, etc.), the mandrel will adjust to the correct diameter resulting in a snug fit with auger coil and allowing the loose end of the auger to be fixed to itself.

The mandrel will only start to adjust to the selected size once the START ADJUST button is pressed. During adjustment the mandrel diameter will increase or decrease until it has reached the chosen setpoint. Once the auger is fixed correctly according to the steps explained on page 25, the tighten function is used to tighten the auger around the mandrel for coiling. The release button will adjust the mandrel to a suitable smaller size to be able to remove the coiled auger from the coiler. **The TIGHTEN and RELEASE buttons both only activate once the START ADJUST button is pressed.**

The MANUAL MANDREL ADJUSTMENT buttons (TIGHTEN and LOOSEN) are activated directly by pressing and holding the buttons and do not function on the START ADJUST manner as with the other mandrel adjustments.



These buttons must be used with caution as they serve as a manual override function and can cause serious damage to the coiler if over tightening occurs.



Always ensure the mandrel is calibrated correctly as explained on page 24.

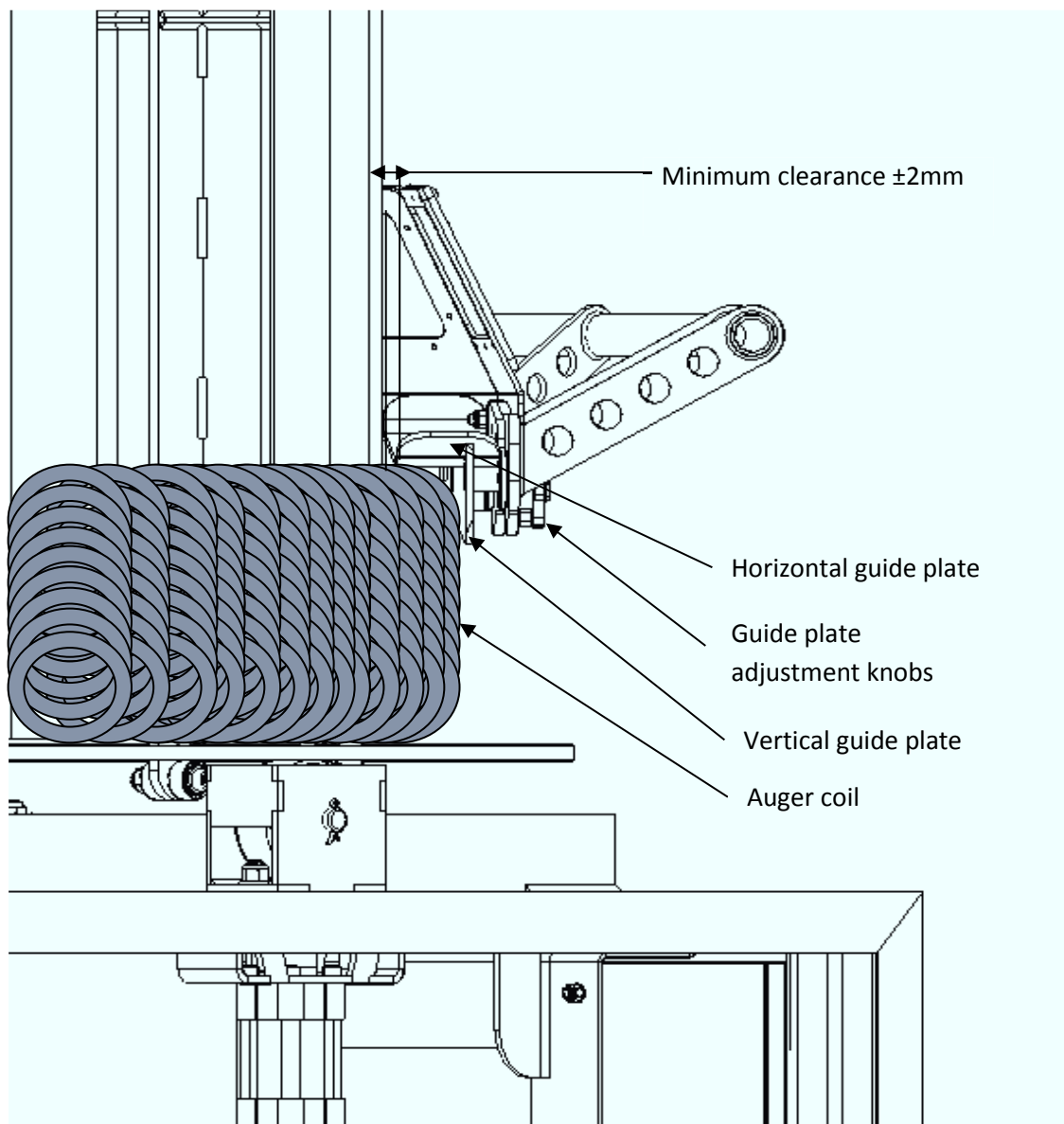


Figure 25: Coiler arm operation

OPERATING THE COILER ARM

The coiler arm is used to wrap the auger tightly and neatly around the mandrel while the mandrel is turning. Before coiling commences, the coiler arm should be adjusted to fit correctly over the auger being coiled. When smaller augers are being coiled, the vertical guide plate should be adjusted to allow a ± 2 mm clearance between the edge of the coiling arm and the mandrel (see Figure 25). It can be adjusted by turning the two knobs on the arm. **Always ensure that the side guide plate is adjusted evenly and that it remains parallel with the coiler arm. An uneven guide plate will impair the coiling performance.**

The arm is operated by the HMI screen input and is controlled through a pneumatic cylinder. The arm has 3 positions namely ARM IN (arm in coiling position), ARM OUT (arm completely free of the mandrel position) and ARM OFF (arm completely disabled). When the auger is wrapped around the mandrel and the operator is ready to commence with coiling, place the arm onto the auger as shown in Figure 25 by activating the ARM IN button and guiding the arm to the correct position. If the arm is set up correctly as shown in Figure 25 and in the ARM IN position, coiling can take place without any human support needed. This allows for full automatic coiling.

The pressure with which the arm presses against the auger that is wrapped around the mandrel is controlled by the pneumatic regulator situated in the pneumatic panel. The regulator is set to a default setting of 3 bar (43.5 Psi) (0.3 MPa).

Once the coiling is complete and the system has stopped the arm can be removed from the coil by activating the ARM OUT or ARM OFF button. The arm will move towards the operator. The arm should be removed by pulling it towards the operator and then steadily lowering it downwards.



Take caution when removing the arm. Assist the arm in an outward and downward movement to avoid it falling off the coil. Injury may occur if any body part is placed under the unsupported arm while it's in the ARM OUT or ARM OFF position.

COILER MAINTENANCE

- Lubrication
 - The main bearing under the turntable should be greased every 6 months through the grease nipple (Figure 27).
 - The drive chain should be lubricated with a suitable chain lubricant (Figure 27).
 - The scroll shaft (see Figure 26) in the centre of the mandrel should be lubricated with a moly grease approximately every 6 months.
 - The slide shafts (see Figure 26) should be lubricated with grease.
- Check the following for excessive wear and tear and replace if necessary:
 - Main bearing (Figure 27) – Every 6 to 12 months, depending on usage
 - Castor wheels under turntable (Figure 27)
 - Guide plates on coiling arm (Figure 25)
 - Auger inlet guide (Figure 24)
- Check drive chain tension.
 - To adjust chain tension, loosen (do not remove completely) the four chain tension adjustment bolts (Figure 27).
 - Slide the gearmotor in the direction of the big arrow shown in the figure.
 - Now tighten the four chain adjustment bolts again.
- All bolts should be checked for tightness.

NOTE that the linkage bolts on the mandrel (Figure 27) should not be overtightened as this will impair the operation of the mandrel.
- Proxy positions
 - Check proxy positions regularly to ensure they are adequately fixed in the correct positions below the coiler.
- Encoder
 - Check that the encoder cable is free of damage and defects and securely connected.
 - Ensure the encoder data is being received by the control panel and displayed on the HMI.
- Pneumatics
 - Check that the supplied pressure does not exceed 3 bar (43.5 Psi) (0.3 MPa).
 - All pneumatic connections must be checked regularly for leaks.
 - Valves should be tested to ensure adequate sealing
- Setting the spring balancer
 - Ensure the spring balancer is securely fixed in position (Figure 18).
 - Ensure the spring balancer is set to 15 kg.
- Pneumatic brake
 - Check that the supplied pressure does not exceed 3 bar (43.5 Psi) (0.3 MPa).
 - All pneumatic connections must be checked for leaks.
 - Valves should be tested to ensure adequate sealing.

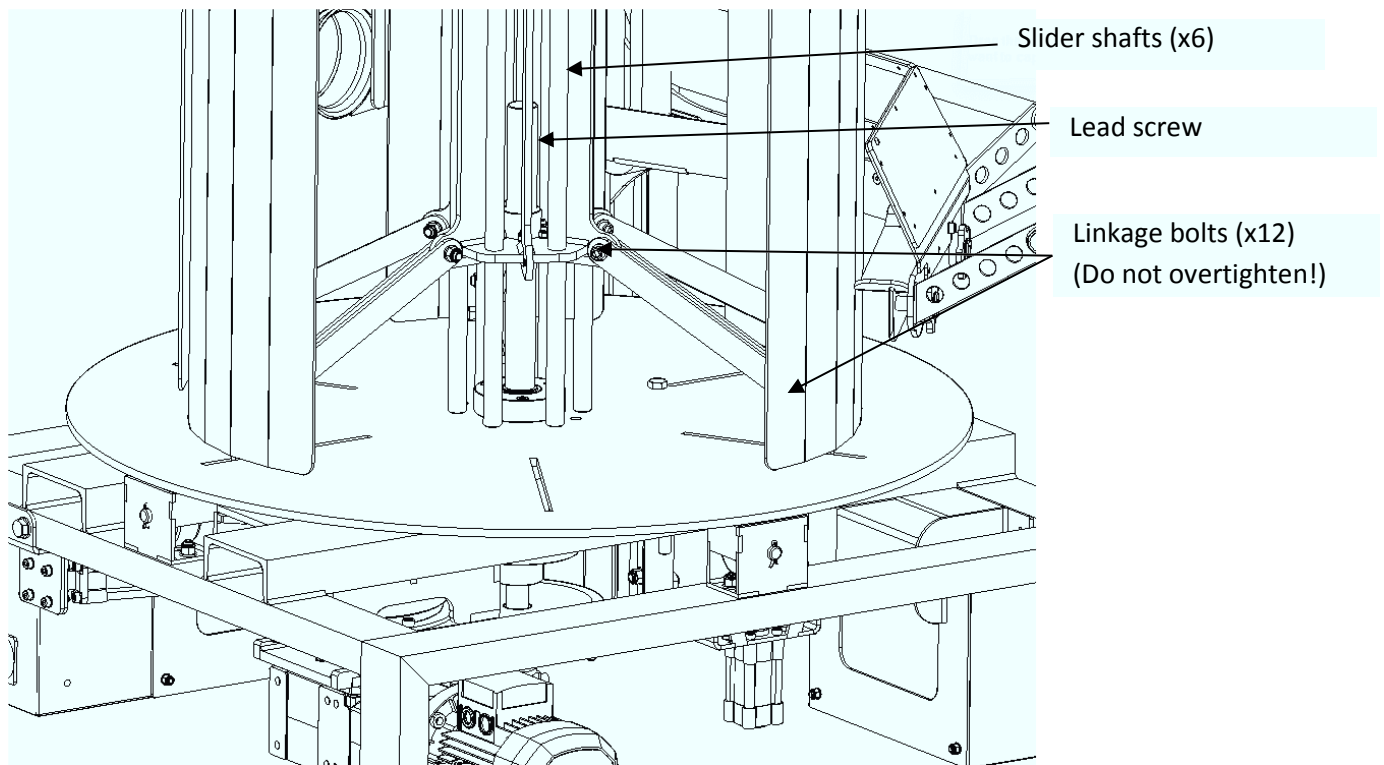


Figure 26: Sliders, Link bolts & Lead screw

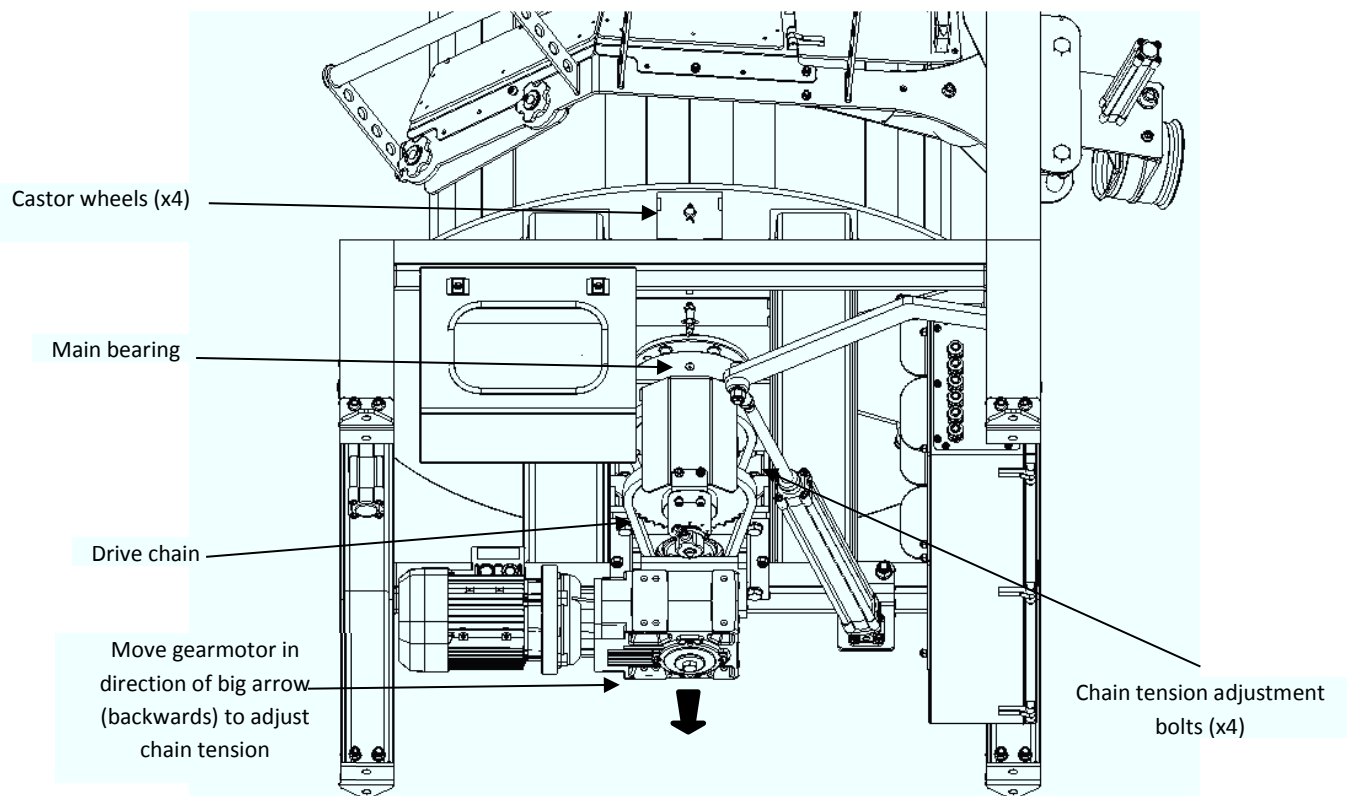


Figure 27: Coiler bottom end

COIL LIFTER

The coil lifter is used to securely remove an auger coil from the coiler without damaging the coil. The coil lifter can either be used with a forklift or with an overhead crane with different mounting holes on the coil lifter depending on the application as shown in Figure 29.

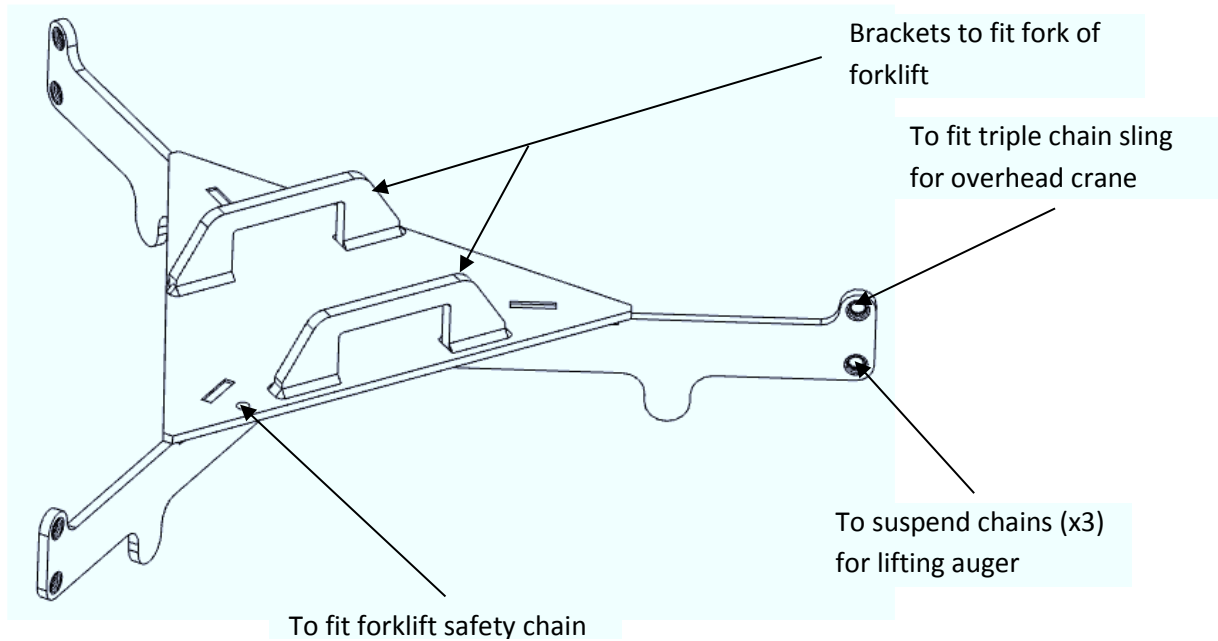


Figure 28: Coil lifter

ATTACHING COIL LIFTER TO AN OVERHEAD CRANE

To attach the coil lifter to an overhead crane, a triple chain sling with the required load rating should be attached as shown in Figure 30.

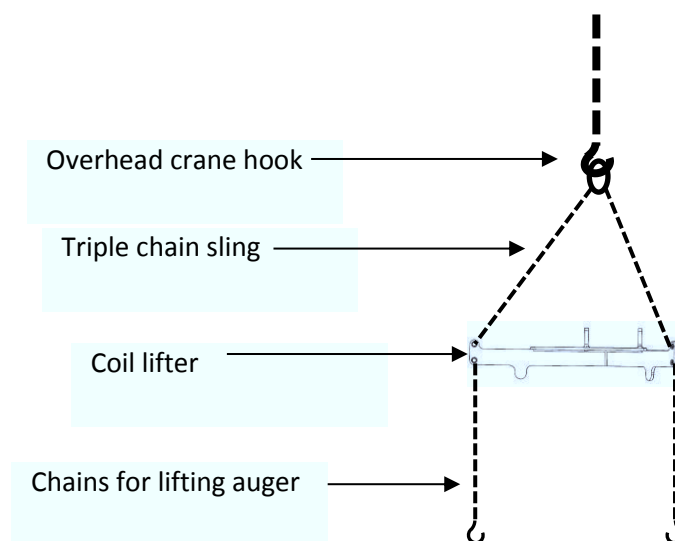


Figure 29: Attaching to an overhead crane

ATTACHING COIL LIFTER TO A FORKLIFT

The coil lifter can also be used with a forklift. The lifting point is designed to fit a single fork of the forklift. To prevent the coil lifter from sliding off the fork, it is imperative that the safety chain is securely attached to the backrest of the forklift as shown in Figure 31.

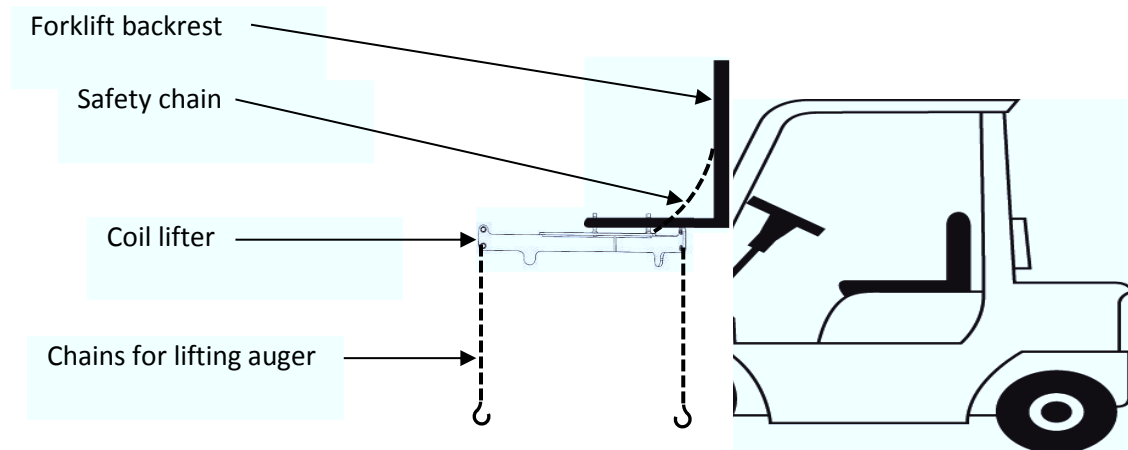


Figure 30: Attaching the coil lifter to a forklift

USING THE COIL LIFTER

Before a coil is removed from the coiler ensure that the ends of the auger are fastened to the coil using wire. The coil itself should also be securely fastened with wire as described on page 9 (Wiring of a coil).

Next, reduce the diameter of the coiler mandrel just enough so that the coil can be easily pulled off the mandrel. Position the coil lifter over the coil with the three chains hanging over the outside of the coil. Hook the chains to the underside of the coil, then lift the coil lifter slightly to put tension on the chains. Now check that all three hooks have hooked onto the coil securely before proceeding with lifting the coil off the mandrel. Take special care to try and keep the coil lifter over the centre of the mandrel. If the coil lifter is off-centre, the coil will start swaying as it leaves the top of the mandrel.

Always ensure that the chains are the same length and that the coil is lifted evenly. Failure to do so could result in the coil falling from the coil lifter and possibly causing serious harm.

SYSTEM INSTALLATION

FLOOR PLAN LAYOUT AND FIXING POINTS

Shown in Figure 32 is the floor plan of the system once installed. Note that the auger should ideally run in a straight line from the decoiler, through the length counter and then through the coiler inlet. The system will still function even if these three elements are not completely aligned, but the layout shown Figure 31 would yield optimum results.

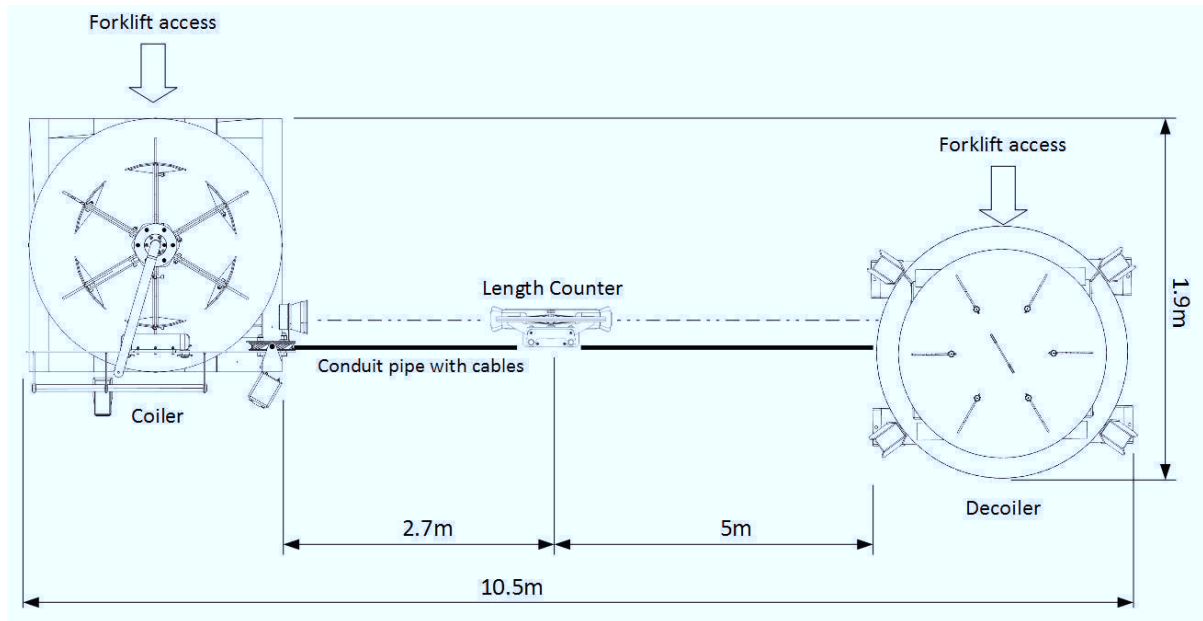


Figure 31: Floor plan

Please note the following when allocating an area for installing the recoiling line:

- The floor layout in Figure 32 does not account for space for the operator to move around the units. It is advised that there should be at least 800mm space around the units for ease of access and maintenance.
- Take note of the orientation of the decoiler when doing the floor layout since the decoiler can be accessed by forklift from two opposing sides only.
- To be able to remove the auger coils from the coiler, the height of the ceiling above the coiler should be a minimum of 6 m.
- The system is designed to be installed on a concrete floor. All three units must be securely bolted to the floor using the anchor bolts supplied with the machines.
- The conduit pipes should also be fixed to the floor using the saddles provided to protect the cables and to prevent the risk of somebody tripping over the loose cables.
- It is recommended to erect a cage around the Decoiler in the event of it falling over

ELECTRICAL CONNECTIONS



NOTE: All electrical connections and commissioning should be done by a qualified electrician as per the regulations of the country concerned.

The machine is shipped with all the internal wiring in place. The only remaining connections that need to be done on-site is for the power supply, the length counter and the decoiler motor. On the coiler there are two electrical boxes. The box on the left contains all the terminal blocks and all electrical connections need only be

done in this box. The box on the right contains the drives and other electrical equipment. No wiring need to be changed/connected in the right box.

CONNECTING THE POWER SUPPLY

The system has to be connected to the power supply inside the electrical panel box which is situated underneath the coiler. On the side of the panel there is an unused compressions lug which can be used to feed the power supply cable into the box where it can be connected. Please refer to the wiring diagrams in Appendix A when connecting the power cable.

CONNECTING THE LENGTH COUNTER

The cable that should be connected to the length counter is rolled up and tied to the coiler during shipping. During installation this cable should be threaded through the conduit pipe that leads to the length counter and then connected to the encoder on the wheel shaft.

When routing the cable, remember to leave sufficient slack (see Figure 33) where it connects to the encoder to allow the wheel to move up and down without putting tension on the cable.

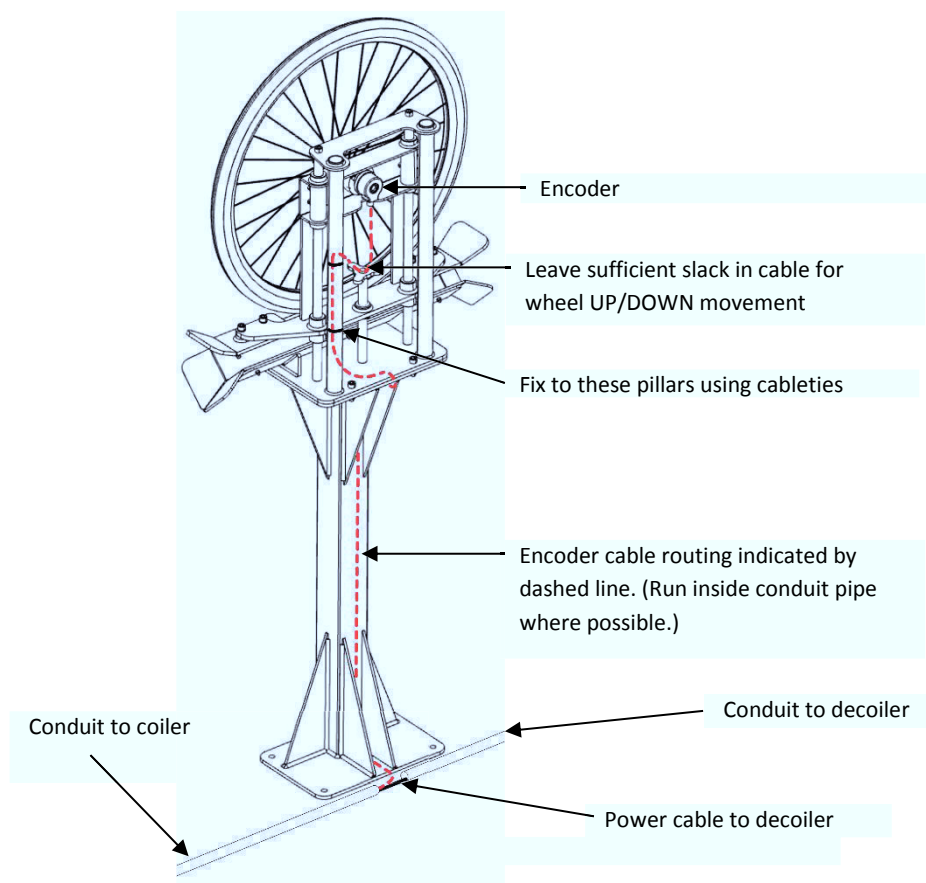
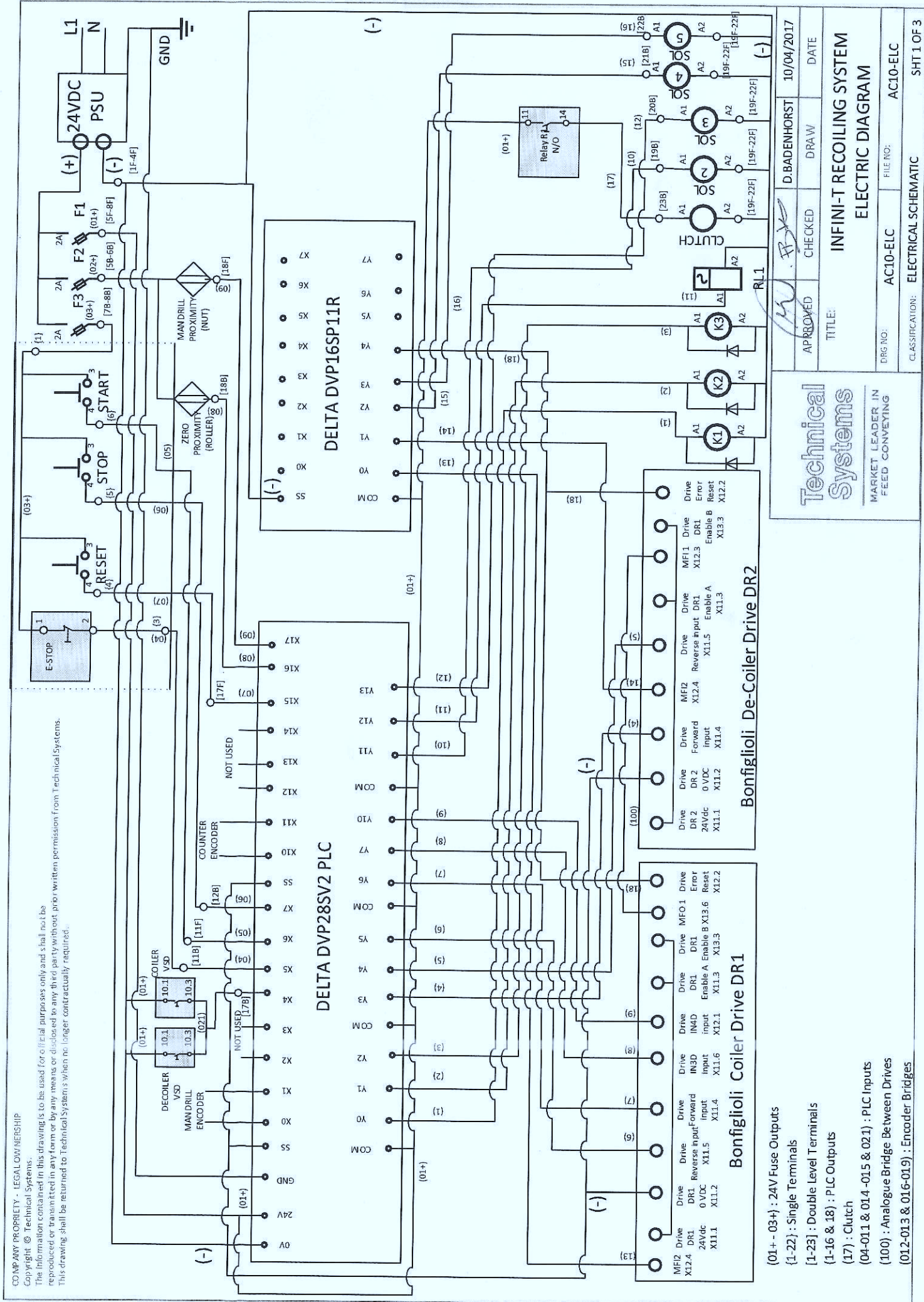


Figure 32: Encoder cable installation

CONNECTING THE DECOILER CABLE

The decoiler's power cable will ship already connected to the decoiler-motor, leaving only the connection to the coiler to be completed at installation. This power cable must be fed through the conduit tube to the coiler and connected in to the terminal blocks as shown in the wiring diagrams in Appendix A.



Technical Systems

MARKET LEADER IN
FEED CONVEYING

INFINITI RECOILING SYSTEM ELECTRIC DIAGRAM

TITLE:

APPROVED

CHECKED

DRAWN

DATE

10/04/2017

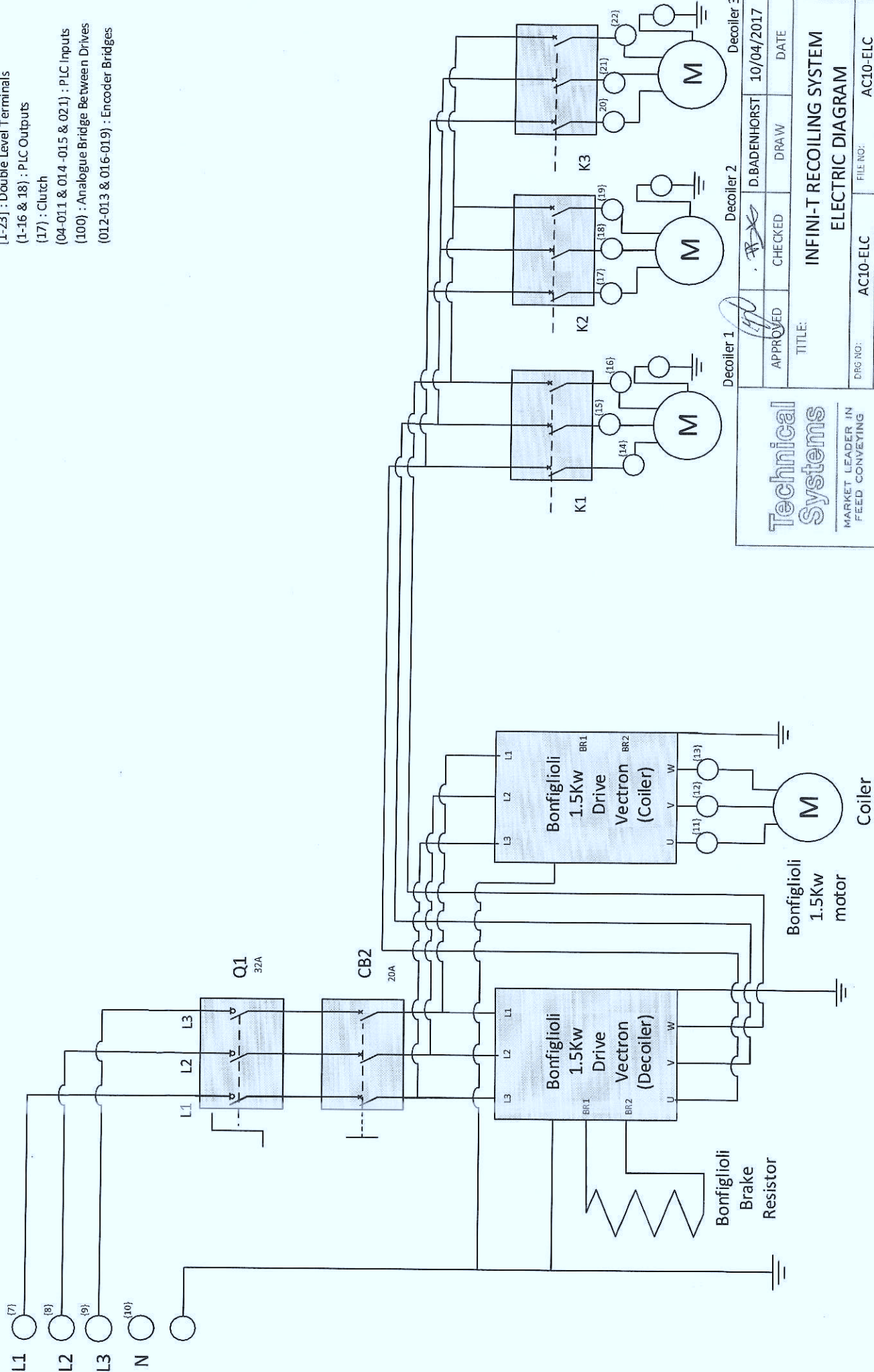
D. BADENHORST

FILE NO: AC10-ELC

ELECTRICAL SCHEMATIC

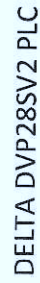
SHT 1 OF 3

(01+ - 03+) : 24V Fuse Outputs
(1-22) : Single Terminals
(1-23) : Double Level Terminals
(1-16 & 18) : PLC Outputs
(17) : Clutch
(04-011 & 014 -015 & 021) : PLC Inputs
(100) : Analogue Bridge Between Drives
(012-013 & 016-019) : Encoder Bridges



Technical Systems
MARKET LEADER IN
FEED CONVEYING

Decoiler 1		Decoiler 2		Decoiler 3	
APPROVED	CHECKED	DRAWN	DATE		
		D. BADENHORST	10/04/2017		
TITLE: INFINI-T RECOILING SYSTEM ELECTRIC DIAGRAM					
DRG NO: AC10-ELC		FILE NO: AC10-ELC		SHT 2 OF 3	
CLASSIFICATION: ELECTRICAL SCHEMATIC					



(012-013 & 016-019) : Encoder Bridges

Technical Systems

TITLE: INFINITI-T RECOILING SYSTEM
ELECTRIC DIAGRAM

FEEED CONVEYING

FILE NO: AC10-ELC

CLASSIFICATION: ELECTRICAL SCHEMATIC

SHT 3 OF 3

Passwords:

1. Calibration: A2016

Used when mandrel is calibrated to its true zero position. (Page 24)

2. System Menu: ABCD2016

Used to alter the HMI system settings. This should not be attempted without consulting a professional technician or engineer from Technical Systems. (Not discussed in this manual).

3. Model Setup: ABEF

Used to change the values for the automatic adjustment of the mandrel as well as the auger models description. This should not be attempted without consulting a professional technician or engineer from Technical Systems. (Not discussed in this manual).

Please note: Technical Systems will not be held liable for any damage or malfunctioning of the recoiling system machinery should it be attempted to alter these settings without consulting a professional technician or engineer from Technical Systems prior to the changing of these settings.

NOTICE:

Caution when handling Infini-T™ Auger pallets

Date:

15 June 2016

Notification class:

Safety notification with high priority.

Objectives

1. How to de-coil Infini-T™ coils.
2. Corrective action to packing of Infini-T™ pallets.
3. Safety cautionary note when handling Infini-T™ pallets.

How to de-coil Infini-T™ coils

For de-coiling Infini-T™ coils on the customer coiler the following must be noted. The Figure below shows a section view of **THE LAST LAYER OF AUGER** on the mother coil.

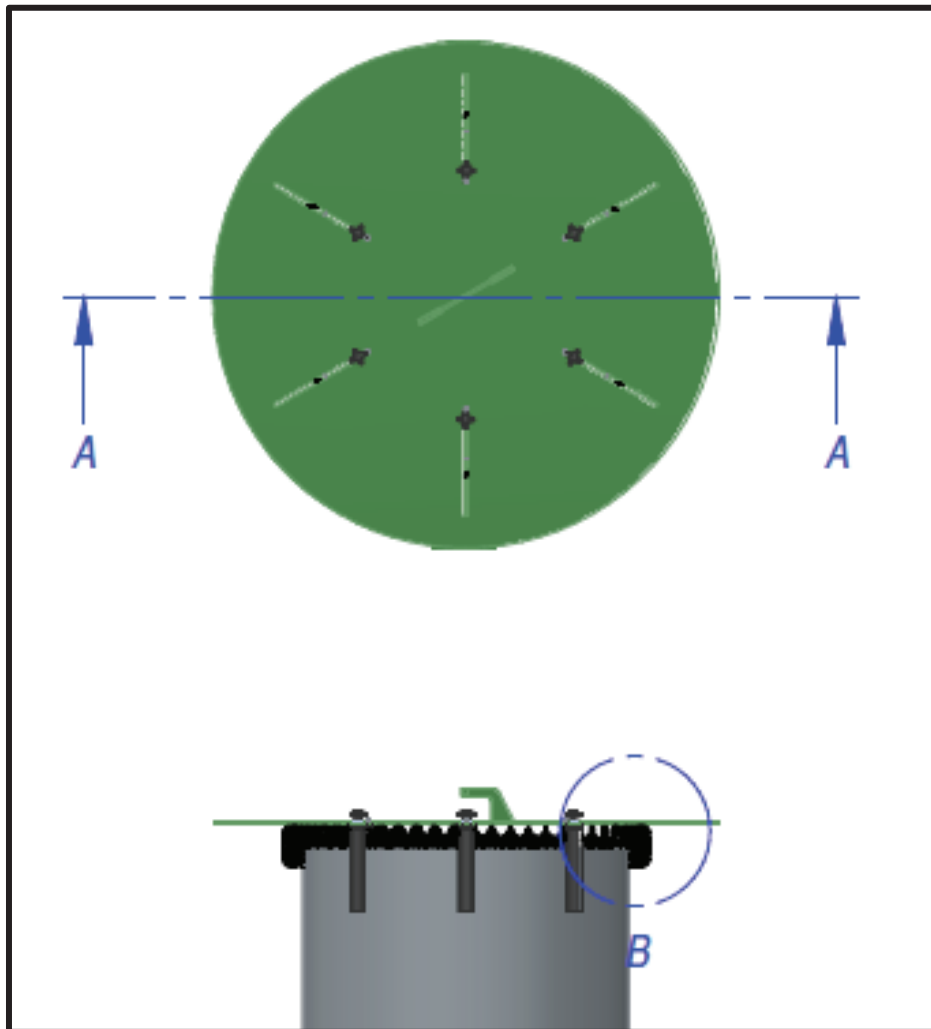


Figure 33 : Last layer of auger on the mother coiler

The detail [Section B](#) shown in the Figure above, must be inspected for improved operational understanding.

The first thing to take note of is the wire used in the packaging of the auger. Operators must make sure to remove the wire between the second last and last layer of auger, before uncoiling the last layer. The Figure below shows an exaggerated example of the wire and its position. Detail of [Section B](#) can be seen in the Figure below.

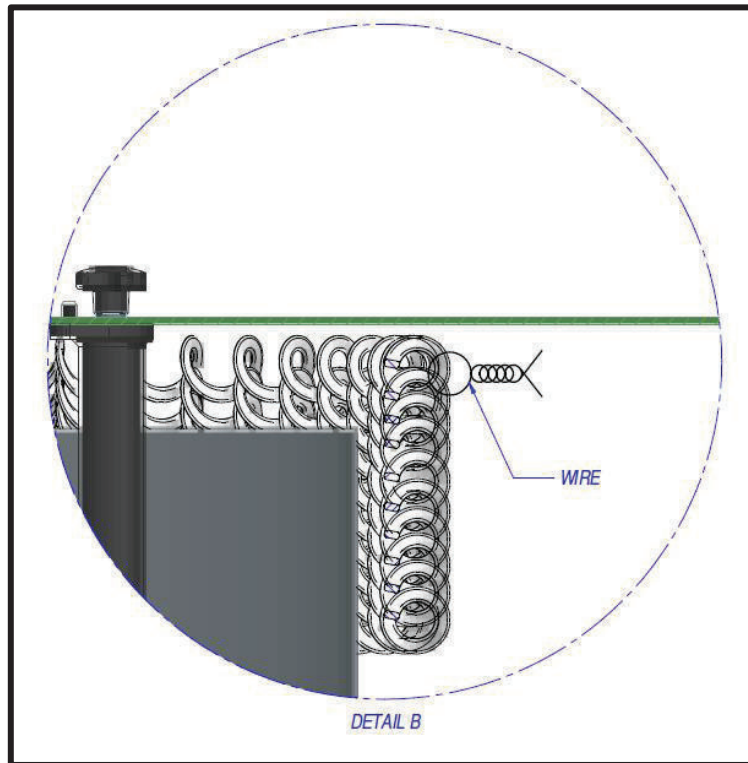


Figure 34 : Example of the wire and its position

The second thing to note is that the inner plate is shorter than the auger coil, resulting in the **Gap C**, as shown in the Figure below.

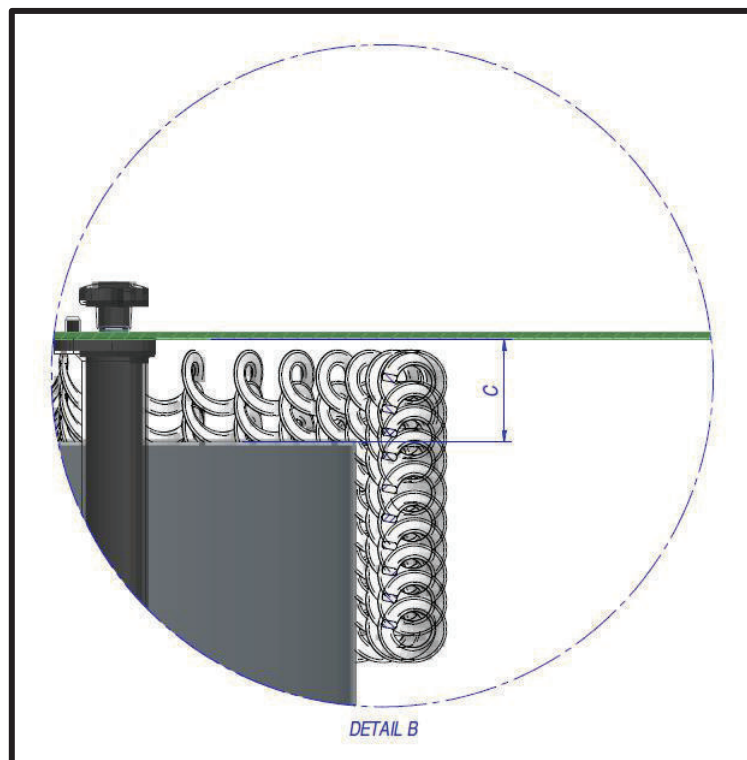


Figure 35 : Illustrating the gap

During de-coiling on this last layer, the auger coil can slip into this gap and wedge as shown in the Figure below.

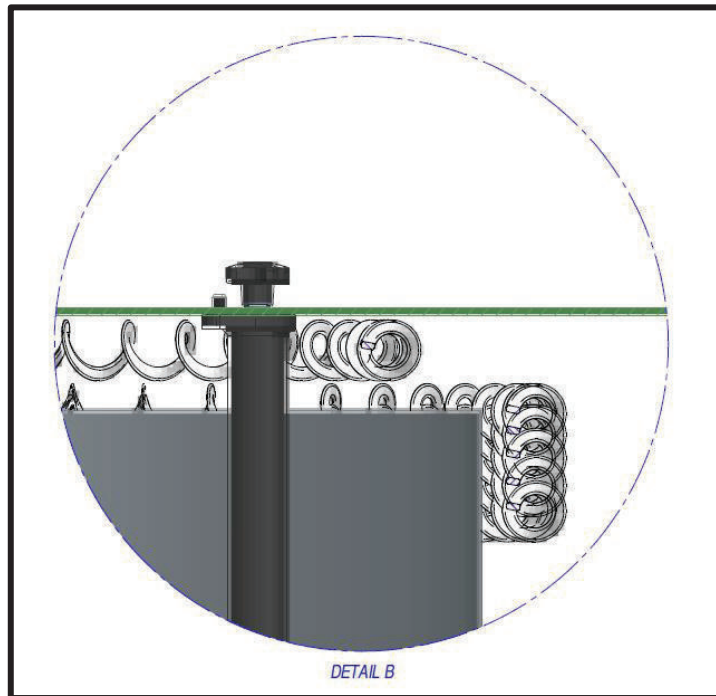


Figure 36 : Illustrating the wedge

To prevent this, the auger tension must be released so that all the coils that are above the Inner core can be dropped to below the Inner core as shown in Figure below.

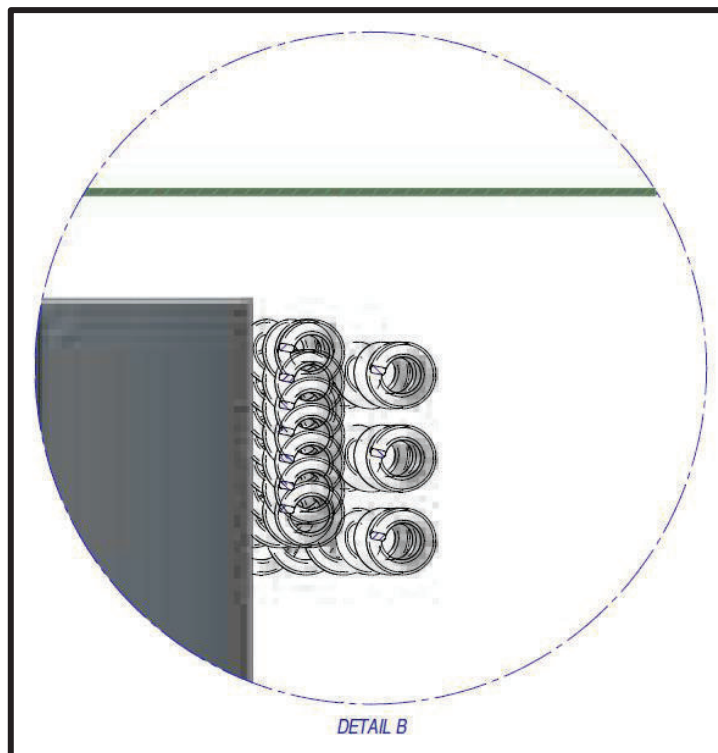


Figure 37 : Dropping inner core

On doing this the auger will not slip into Gap C and will not pull the coil over.

Corrective Action

The following changes have been made to prevent the incident of auger getting stuck.

- The inner core has been made higher, so that it is always higher than the auger coils.
- We provide a new top plate, which is safer and standard for every ILAC coil.
- We've included a rod in the middle of the Inner Core to improve the strength and stability.

These improvements are shown in the new design in the Figure below.

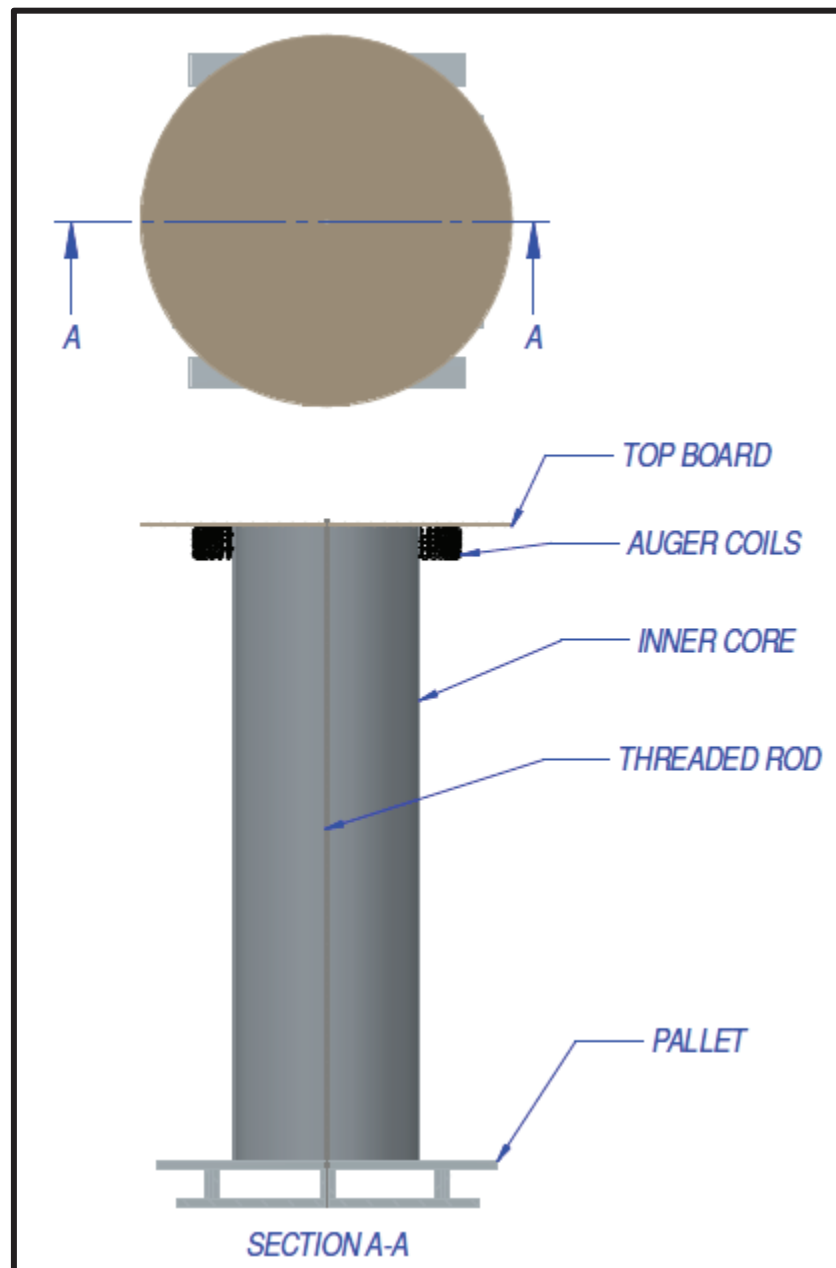


Figure 38 : Improvements

Conclusion:

- Process improvements has been made as we continuously improve our processes.
- Clear guidance is given in content of this report as to ensure proper and correct de-coiling of Infini-T™ coils.

Recommendation:

- Coils to be used as is.
- Instructions and procedures to be followed.

Please Note:

- Each pallet will be marked by the following Danger & caution label

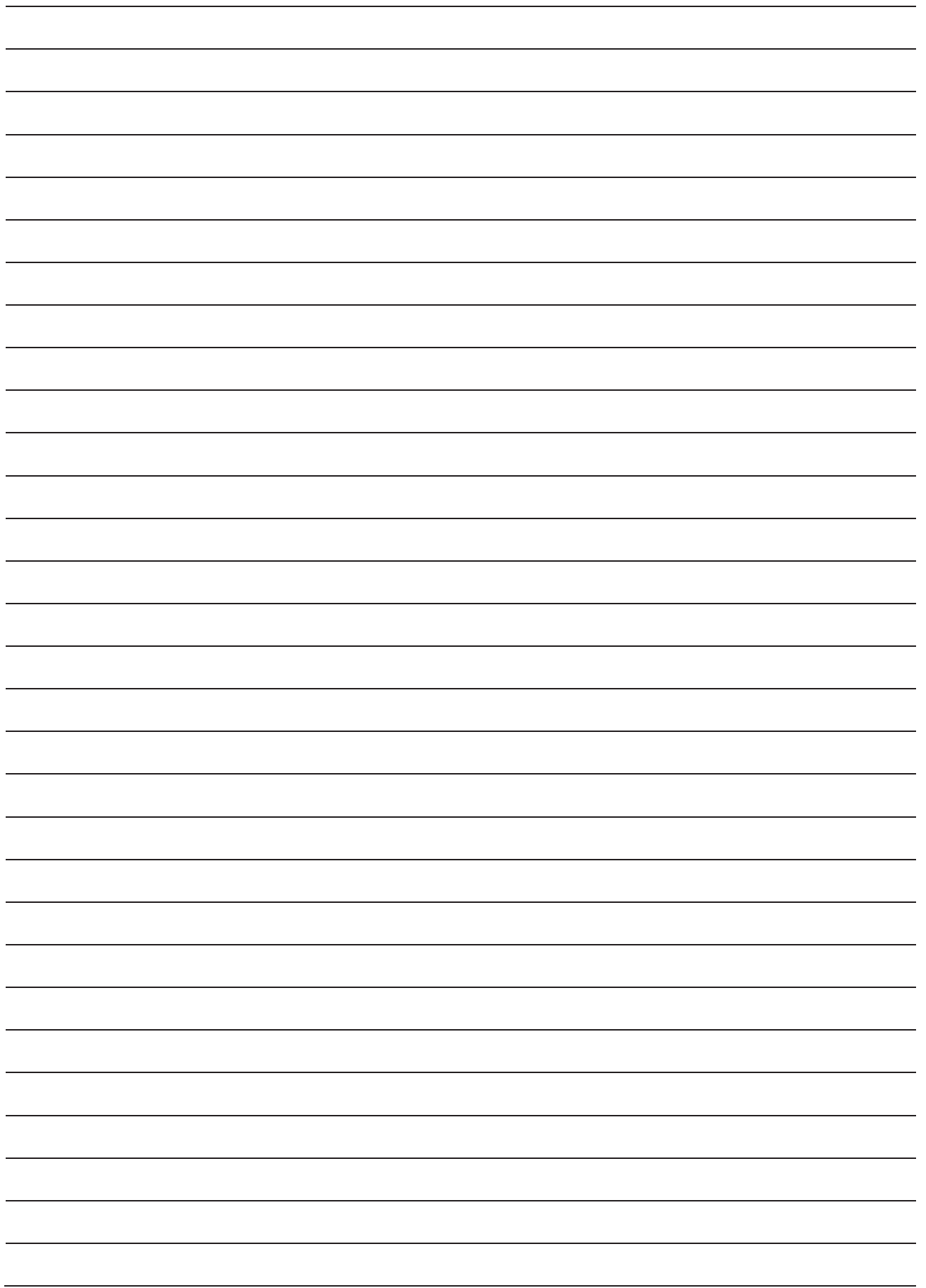


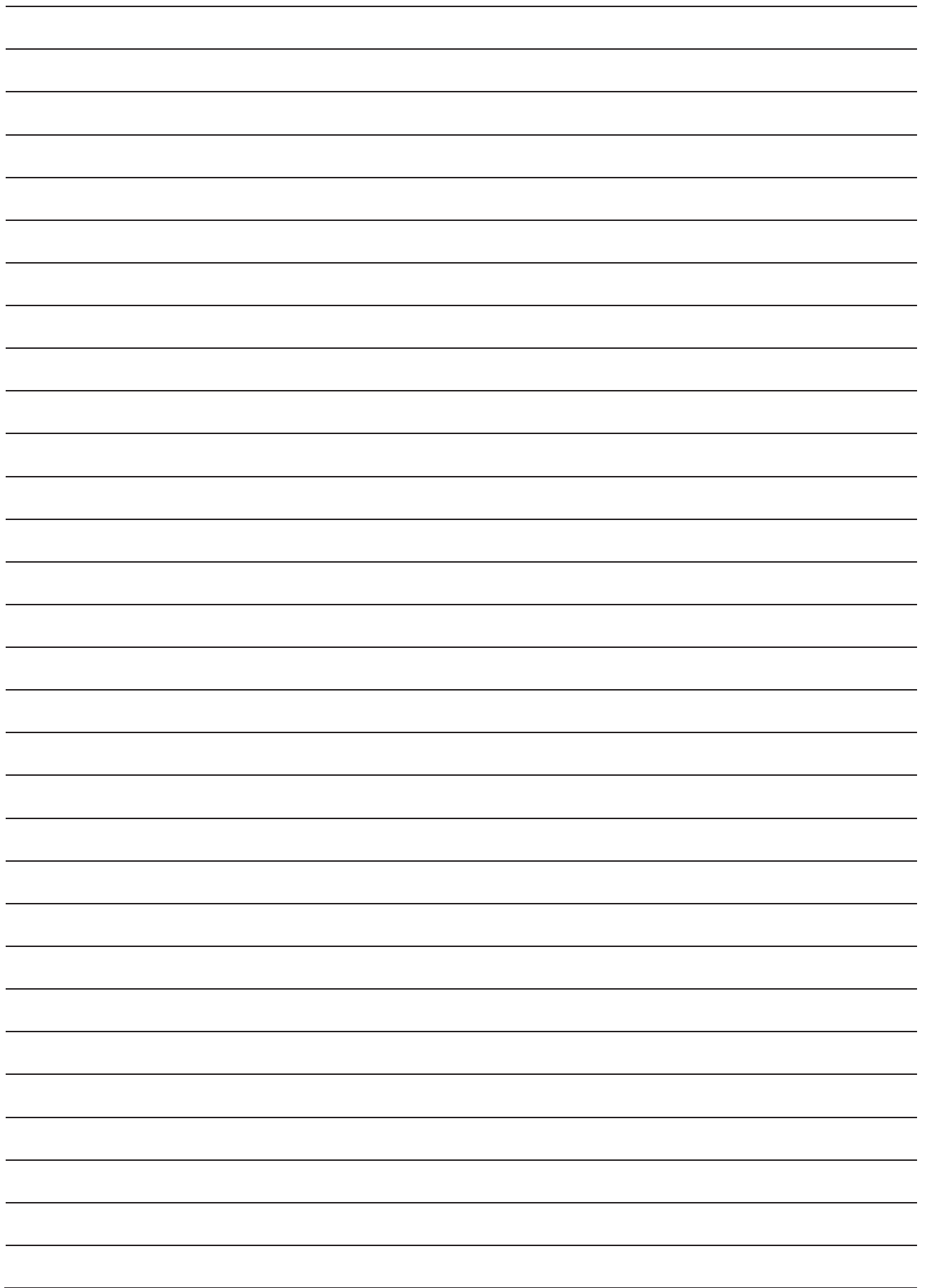
CAUTION WHEN HANDLING THIS PALLET

Please note the following pre-cautionary notice for all Infini-T™ Auger pallets for Safety purposes.

- Please ensure an exclusion zone around the mother coil whilst the machine is in operation, in the unforeseen event of the coil falling over.
- Please ensure that your internal Safety regulations and measures are adhered to in order to prevent such incidents.

[illegible]





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