Engel Model DH-800 CEF
Cleat Edge Former

Features state-of-the-art precision rollforming.

- Produces "L" Shaped Duct Standard
- Full Wrapper Optional
- Features the Engel Design Roll
- Forms Unlimited Length Cleats
- Capable of Forming Continuous Cleats

ENGEL INDUSTRIES
INTRODUCTION

This manual has been prepared to provide owners of the Engel Model DH-800CEF Cleat Edge Former with important operating and service information. For convenience of operation and service personnel in using the manual as a ready-reference illustrated data source, it has been divided into sections with appropriate headings and each main paragraph referenced by a table of contents near the front of the manual.

References are to paragraphs rather than headings.

Manual Divisions

Main sections within the manual are arranged as follows:

1. Set-up instructions (Section I) - consisting of information needed to install and prepare the Cleat Edge Former so that it can successfully perform the job for which it was designed.

2. Operation (Section II) - an explanation of the operating controls and step-by-step operating routine.

3. Maintenance (Section III) - how to perform any adjustment that might be needed to keep the cleat former performing properly.

4. Parts List (Section IV) - list of parts referenced to drawings which show parts in proper relationship with other items.

General Description

The Cleat Edge Former (Model DH-800CEF) will receive pre-cut metal sheets from an Engel "Unitized Compact Colline" system, functioning as a component of the "Compact Colline" system or from any comparable sheet-metal transfer conveyor, as a freestanding unit. It will form drive cleats as shown in the accompanying application table, at a rate of 50 feet per minute.

The Model DH-800CEF is set up to roll a 7/16" drive cleat on the end of the sheet up to the first notch and allow the remainder of the sheet to pass through without being formed.

The cleat former is available with either a power-driven or manually operated movable head. The power-driven head is covered in this manual. If a machine with a manual-driven head is purchased, the operator should have no trouble in translating the instructions from one to the other.

Specifications

- Sheet width: 5' model 60 to 48 inches, 6' model 72 to 48 inches
- Metal gauge capacity: 18 to 26 gauge
- Maximum cleat length: 60 inches
- Minimum cleat length: 4 inches
- Standard production rates: 50 feet/min
- Drive motor: 3 Horsepower
- Gear reducer (coupled to motor): 20 to 1 ratio (worm gear, oil bath)
- Motor power requirements: 220-440 V, 60Hz, 3 Phase
- Floor requirements: 60" x 91" for 5'/60" x 109" for 6'
- Overall height: 40 inches
- Working height: 36 inches (adjustable)
- Shipping weight: 3400 pounds
- Air requirements: PSI 5 CFM
Optional Features

1. A control system to form a cleat on the two short legs of a full wrap-around duct. The control switch for this feature is on the main console. For "L" duct capable machines a simple micro switch triggers station 2 to lift upward and stop the cleating process for their "S" portion of the duct. For wrapper style duct, a sensor, notch detector trigger, and alternating control circuit causes the cleat former to cleat every other leg of the duct.

2. Motor and drive for positioning the movable head of dual head roll form unit (covered in this manual).

**NOTE:** The cleat former is available in right-hand or left-hand configurations, as determined by the equipment ahead of the cleat former.

This machine has been designed and built for long life. When properly installed, operated, and lubricated, many years of uninterrupted service can be expected.

By pass guides are provided for passing metal sheets through the cleat former and are air operated from control toggle switches mounted on the machine.
Warning

Never put your hands in the point of operation of any mechanical or electrical device.

If a machine is jammed, needs adjustment, needs die changes, etc., always do a lock-out/tag-out procedure which means the power must be off and locked out and any rams or beams will be blocked to ensure safety. This is a federal OSHA requirement and must be a written and training type of program.
SECTION I

SET-UP INSTRUCTIONS

Every Engel Automatic Sheet Edge Former is set up, adjusted, lubricated and tested at the factory prior to being shipped to the customer. As a result, the unit is ready for operation, requiring electrical connections to the power line and positioning with respect to the conveyor system that feeds it. In rare instances, however, rough handling during shipment might impose, severe strains on some part of the machine making some minor adjustments necessary.

All adjustments that the customer should ever be required to perform are outlined in these instructions.

**CAUTION:** Do not attempt any adjustments until it has been fully established that the machine is correctly aligned with the transfer conveyor system.

1-1 Wiring Connections

**CAUTION:** All wiring should be done by a qualified electrician in conformity with local electrical codes applicable to the particular plant in which the Cleat Former is to be used.

1. Locate the cleat former within a few inches of its permanent location if supply wiring is to be routed through steel conduit and make sure the conduit is routed to permit the machine to be moved enough for final positioning. Where codes allow for flexible lines, allow enough cable slack for final positioning without stressing the cable.

2. Electrical requirements for the cleat former are as follows:

   A. 220/440 volts for operating the main drive motor and movable roll form head motor, as shown in the wiring diagram furnished.

   **NOTE:** Except when specified on order, the cleat former is shipped ready for connecting to a 240-volt, AC, 60 Hz line. Switch two (2) of the supply wires if the unit initially runs backward.

   A wiring diagram is included showing the circuitry for your specific machine.

B. A 110 volt take off from the main line supplies power for operating all controls and automatic switching functions.

C. Make sure the cleat former is properly bonded.

1-2 Aligning the Cleat Former with Transfer Conveyor.

1. In feed table height

   A. Move the cleat former into operating position, as close as can be estimated, in preparation for final measurements. Sight along the material guide and align them for a “touch-up” position.

   B. Move the cleat former in toward the transfer conveyor until the diamond-grip belt is clear the edge of conveyor approximately 3/4”. (See figure 1-1)

   C. Place a sheet of 22-24 gauge metal, 8 to 10 feet long, on the transfer conveyor and slide it along the guide until it contacts the cleat former. (See figure 1-1)
D Locate the straight edge of the sheet against the material guide until it contacts the cleat former. (See figure 1-1)

E The lower forward edge of the sheet should just touch the horizontal surface of the diamond-grip belts at both sides of the cleat former. If the cleat former is too high the sheet will be forced upward as it moves onto the belts and if too low there will be a gap between the belts and underside of the sheet. Make sure the metal sheet is not deflected.

F Loosen the lock-out on the two in-feed cleat former leg-height adjusting screws (figure 1-2) and rotate each screw and floor plate assembly until the in-feed area height is correct (36 inches).

G Adjust the two out-feed legs to position the diamond-grip belt surfaces in line with the surface of the conveyor platform. Sighting over the belts and platform or using a straight edge can do this.

NOTE: Make sure each screw and floor plate assembly exerts approximately the same force against the floor. The machine should also be level.

H Tighten lock nuts on all four legs. (See figure 1-2.)

2. Lateral Positioning

A Hand feed two or more sheets through the cleat former to make sure the formed cleats are uniform and 7/16" long at both edges of the sheet.

NOTE: The sheet must be notched and rolled formed first.

B Secure a sheet between 8 and 10 feet long and 4 to 5 feet wide. Make sure the edges are straight and the sheet has uniform width for its full length. (See figure 1-3.)

C Run thin sheet into the cleat former at least half way and stop it.

D Move the cleat former laterally until the edge of the sheet is resting adjacent to, and parallel with the conveyor table guide. (See figure 1-3.)

NOTE: This should correctly align the cleat former with the conveyor in practically all cases. Fast moving material, however, brings into existence some unforeseen factors that might need to be offset by some very minor trial adjustments after the machine is in operation.

E Refer to "Operation" (Section II) and run a few sheets to check results. Only minor corrections should be required, if any.

3. Anchoring the Cleat Former

A After alignment has been determined satisfactory, the machine should be anchored to the floor to prevent any possibility of shifting during operation. (See figure 1-4.)

B Each floor plate has two holes for securing the legs to the floor and a convenient method of anchoring the unit is shown in figure 1-4.
C. Any method of anchoring may be used provided it is secure, as the machine should not move after having been properly aligned.

1.3 Connecting Air Supply Line

1. Check the air supply connector to make sure it is tight in the sediment bulb portion of the air pressure regulator unit. (See figure 1-5.) Tighten if necessary. (This fitting is tapered and should not require any sealant.) If air leakage is present, remove the fitting and apply a small amount of thread sealant on the external threads of the fitting only and re-install it.

NOTE: The air supply must be capable of providing a source of filtered air at a pressure exceeding 100 PSI. The air source should also have a shut-off valve in the line to facilitate connecting or disconnecting the airline.

2. Adjust the regulator to produce a reading of 100 PSI on the pressure gauge.

3. Make sure the sediment bulb is clean and the bevel head tight to prevent air leaks. Check for tightness of the bezel on the oil bulb (if full) which is the one located downstream from the regulator.

4. Check for a supply of oil in the oiler bulb. If oil level is low, remove the tiller plug and, with a long spout can, fill to near the top of the bulb. Filling can be done without shutting of the air supply.

1.4 Final Pre-Operating Inspection

1. Perform a visual inspection of the entire cleat former for loose nuts, and any form of damage that could have been caused during shipping. Make necessary corrections.

2. Recheck the wiring and air supply hoses to make certain that connections have been made correctly and that all screws, nuts and fittings are tight. Be sure the power is off and lock-out/tag-out is performed first.

3. Recheck the floor anchor nuts to make sure they are tight.
SECTION II

OPERATION

NOTE: In order to better understand why the machine responds to the electrical controls, refer to the wiring diagram included with this instruction manual, in conjunction with the instructions that follow.

2-1 Explanation of Controls (See figure 2-1)

1 “Start” switch — push to start the drive motor.
2 “Stop” switch — push to stop the drive motor.
3 Standard: Turn the hand cranks to position both heads
4 Optional Power Controls: “In-Jog-For” (in-jog-forward) — push to move the movable roll-form head in toward the fixed head, or the edge of the sheet (width) being run
   A Holding the switch button down moves the movable head continuously until the button is released, or until the “IN” limit switch stops the head at its inner limit of travel.
   B Pressing the switch button intermittently “jogs” the movable head (in) toward the fixed head.
5 Optional: “Out-Jog-Rev” (out-jog-reverse) — push to move the movable roll-form head out away from the fixed head, or the sheet being run.
   A Holding the switch button down moves the movable head continuously until the button is released, or until the OUT limit switch stops the head at its outer limit of travel
   B Pressing the switch button intermittently “jogs” the movable head (out) away from the fixed.

2-2 How the By-Pass Switches Operate

By-Pass:

1 Before setting any controls, the functions of the clast former that are effected by the switches should be understood. They are as follows:
   A The air toggle switches are flinned for the by-pass guides to go down. The hand cranks are then turned to move the fixed head to the out position stop. The movable head is lined up to the sheet edge. For Non-bypass operations, reverse this process.
   B When forming a clast, the six cylinders must position the station No. 2 rolls down — to bend the leading edges on the metal sheet so that it will enter the side rolls.
   C When using notched sheets for duct work, just prior to arriving at station No. 3, the forward edge of the sheet contacts the “Station No. 2 Rolls up” switch which causes the air cylinders to move the No. 2 outside rolls to the up position.
Consequently, the rear edge of the notch is not given an initial bend and the remainder of the sheet passes through the roll unaffected. Thus cleats are formed on the first position only.

**IMPORTANT:** The notch pattern (lock notches) for this machine must be ¼ - inch deeper than the length of the cleats. (5/8 inch for "V".) (1/4") min for locks

D If forming only one side of the sheet is required – use the by-pass guide provided. On the opposite side.

E The above actions are controlled as follows:

2-3 Full Cleat Switch Functions
1. With the Switch in “ON” position:
   A. Forms cleats the full length.
2. With switch in “OFF” Position – Runs Cleats. (Skipping occurs)

2-4 Operating Procedure
1. Have a sheet ready to enter the cleat former.
2. Press “START” button. (See figure 2-1)
3. Move sheet into area between in-feed guides, just short of slotted rolls.
4. Turn the hand crank until the in-feed guide on movable head is nearing edge of sheet.
5. Turn the handle intermittently until the in-feed guide on movable head is approximately 1/32” from edge of sheet (provided the opposite side against the in-feed guide).
6. If the movable head is engaged too far and the sheet starts to bulge, move it out until sheet clearance between in-feed guides is just enough to allow sheets to pass through without binding. (Usually 1/32” clearance will allow for sheet-out tolerances.)
7. Start the conveyor and start feeding material through the machine.
8. Check results to make sure the cleat former is forming cleats as intended.
9. Make ready to stop the machine, press “Stop” button.

**NOTE:** Check at frequent intervals to make sure everything is operating normally.

**DANGER/CAUTION:** Never put any part of you (Fingers, Hands, Etc.) In any moving part of the machine.
SECTION III

MAINTENANCE

NOTE: Prior to performing any adjustments and other maintenance operations on the cleat former, make sure the need and reason for making the corrections are clearly understood. Experimentation without proper knowledge of the immediate problem could result in getting the machine completely out of adjustment. If this happens it might take hours of work to correct, plus expensive downtime production losses should also be remembered since the cleat former is shipped completely adjusted and aligned and when making corrections of any type, always attempt to restore the component to its original condition. If innovations are made in one location, it will probably require unnecessary changes at many other locations.

IMPORTANT: The following paragraph sequence does not necessarily suggest a sequential order of operations.

3-1 Roll Adjustments

1. Rolls at stations 1 through 8 are mounted on their shafts with an end-cap washer, and a
   hex-head screw and necessary shims (see figure 3-1)

2. Shim as required (figure 3-1) until, with the screw tight, 0.05" clearance will exist
   between the bottoms of the roll and shaft spacers. This is measured with a 0.05" feeler
   gauge directly under the roll or between the spacers.

   NOTE: When correctly adjusted, the shaft spacers can be rotated by hand. (See figure
   3-1) If too tight, the roll will become hot, the material will drag and the drive motor will
   be overworked.

3. Make sure all rolls are adjusted in this manner. If correct, all rolls will be the same
   alignment within 0.010" which can be checked with a straight edge. Make corrections as
   required by shimming to bring any one or more rolls into correct alignment relationship.
   Shims are available in various thicknesses.

3-2 Adjusting In-Feed Roller Operating Clearance

1. Using a steel brush, remove all accumulations of "galvanized material" from the
   serration of the in-feed station 1 roll.

2. The rollers operate at 0.010" to 0.015" clearance. (See figure 3-10)(All Stations)

3. Adjust clearance to the same dimension on both sides of the machine.

3-4 Adjusting In-Feed Guide Positions

1. The in-feed guides should require adjusting only when a replacement is required, or when
   the machine has been dismantled for some reason. Each guide can be positioned as
   follows:

2. Lay a straight edge (figure 3-5) against three or more of the outside rolls, allowing the
   straight edge to extend out past the entrance end of the in-feed guide.

3. Loosen the in-feed guide attaching bolts and shift the guide until the distance (A, figure
   3-5) is 1/4" between the inner surface of guide and straight edge. The distance at B must
   be approximately 1/32" greater than at A (Figure 3-5)
Adjusting Rolls

1. Station No. 2. (See figure 3-11)
   A. Check the spring tension for \( \frac{3}{4} \) turn from dead tight.
   B. With the adjusting screws against their stops (figure 3-11), measure the gap between rolls which should be 0.010 - 0.015" as shown. Adjust by loosening the lock-nuts and rotating the adjusting screws at each side of the movable bearing cage. Make sure each screw is in contact with its stop and tighten lock-nuts.
   C. If the air cylinder (figure 3-11) has been removed, after re-installing it, loosen the lock-nut on the cylinder shaft and rotate the shaft into the clevis as far as it will go, then tighten the lock-nut. This will permit full stroking of the station No. 2 roll by the air cylinder.
   D. Operate the air cylinder a few times and check for any binding of bearing cage movement. If binding occurs, loosen the four bolts on the air cylinder-mounting pad and allow it to "float" to a freed position. Tighten the four bolts and recheck. Repeat if binding still occurs.

2. Check Roll Adjustment
   A. After completing adjustments on any or all of the rolls, run a few sheets to check results.
   B. If any minor problems exist, make sure some condition other than the roll adjustment is not causing the trouble before changing any of the adjustments.
   C. After properly adjusting the rolls as described in preceding instructions, no change should be required except for accommodating a special stock or achieving a particular result. (See preceding "Note 7").

3-6 Adjusting Movable Head Parallel to Fixed Head.

1. An adjusting screw is installed in each Saginaw ball nut bracket which is attached to each end of the mounting pad on the movable head assembly for adjusting parallelism.
2. Position the movable head to the approximate operating position (or mid-position) and measure the distance between inner edges of rolls at station No. 1 and station No. 8.
3. Compare readings and if not equal, loosen the bolts that attach the Saginaw ball nut bracket to the mounting pad, loosen the lock-nuts at one end of the mounting assembly and rotate the adjusting screw until the distances are equal. Tighten lock-nuts securely.
4. Tighten the bolts under the mounting head.
5. Operate the movable head in or out and recheck. Make corrections if necessary, since more than one trial might be required to effect an accurate adjustment.
3-8 Adjusting Diamond Grip Belt Tension

1. Diamond grip belt should be tight but not overly stressed. An adjustment is seldom required but if needed, adjust as follows.

2. Loosen the pillow block attaching bolts at either end of the machine and move the pillow blocks outward until desired belt tension is obtained and tighten the bolts just enough to allow the pillow blocks to stop when tapped with a soft faced hammer. Use a drift if there is not room to "tap" the pillow blocks directly.

3. If, after adjusting for correct belt tension, the belts should tend to run off center on their pulleys, it is an indication that the shafts are "stewed," or not square with the machine. This is easily corrected by squaring the shafts.

   NOTE: If one belt should be stretched longer than the other, it may be necessary to replace one or both belts.

3-9 Adjusting Stillson Rolls

All Stillson rolls must be adjusted for even force against the material and in-feed Stillsons must be tight enough to drive 18-gauge material with Pittsburgh lock into the rolls.

1. Very little chain wear has been experienced with the cleat former, however, after long use some wear must occur. It may be necessary to replace the chain.

2. Shields under the pillow block bearing may be added or removed.

3-10 Adjusting the Movable-Head Drive Chain

1. Loosen the set screw in the idler arm (figure 3-23) and lift the idler sprocket up against the chain until it is snug.

2. Tighten the set screw to secure the idler arm. This adjustment should remove the slack from the chain (not stress the chain).

3-11 Servicing the Watts Regulator

1. If the air supply is kept clean, the regulator should provide long periods of uninterrupted service. Excessive regulator operation or loss of regulation is usually due to dust in the disc area and the unit requires cleaning.

3-12 Cleaning the Sediment Bulb

1. The sediment bulb is located on the input side of the regulator. When a considerable amount of sediment is visible through the glass, it should be removed and cleaned.

2. Shut off the air supply and loosen the input fitting, or operate the air cylinders a few strokes to relieve the air pressure.
3-14 Servicing the "Perma-Fog" Lubricator

1. Keep air and oil clean.
   If air and oil are kept clean and the oil level never allowed to fall below end of intake tube, the lubricator will require very little attention. Cessation of oil dripping through the sight gage, irrespective of knob adjustment, is an indication that cleaning is necessary.

3-13 Filling the Lubricator

1. The lubricator can be filled without relieving the air pressure and without shutting down the equipment.
2. Slowly remove either fill plug and fill to within ½" of the top of bowl, using correct oil.
3. For best results, use a long spout oil can so that the tip can be inserted into the top of the bowl.

3-16 Lubrication

1. The cylinder is lubricated at the factory and should require no additional attention for several weeks of operation.
2. Occasionally add general purpose, automotive chassis type grease at each zerk fitting.
3. When parts appear to be dry, add a small amount of lubricant (common gear lubricant) with a spatula or putty knife. Place the grease where it will be distributed properly when the machine is operated.
4. Keep the air cylinder oil "bulb" filled with oil SAE No. 10 (S.U.V. 150-200 S.E.C at 100 degrees F) Other oils can be used if not heavier than SAE No. 40 (S.U.V. 800 S.E.C at 100 degrees F).

NOTE: If considerable dirt, or gritty material should collect on gears, or other exposed lubricated parts, clean off the old grease with its contamination's and apply fresh lubricant.

3-17 Using Parts Drawings for Reference

1. The views in the Parts list section are useful in case any repairs should be required that are not explained in this section, as these drawings show parts in their proper relationship to other items.
2. After installing such parts, refer to the applicable paragraphs in this section for proper adjustment procedures.
SECTION III

Figure 3.23