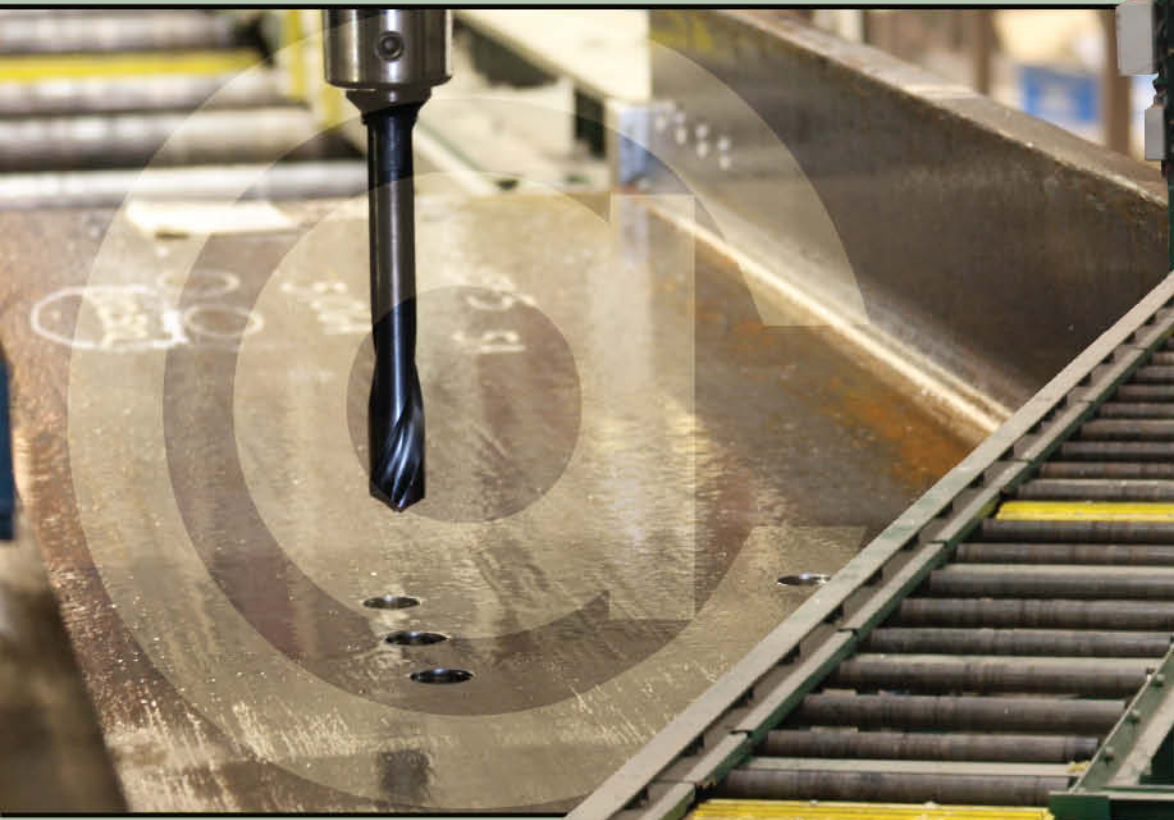
Controlled Automation DRL-344

BEAM DRILLING LINE



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DRL-344

The DRL-344 is a high speed structural steel drill designed to be rugged, reliable, easy to maintain, and simple to operate. Its unique ability to move the spindles along the material's length axis combined with the ability to run carbide tooling at high feed rates greatly reduces the total drilling times per structural section.

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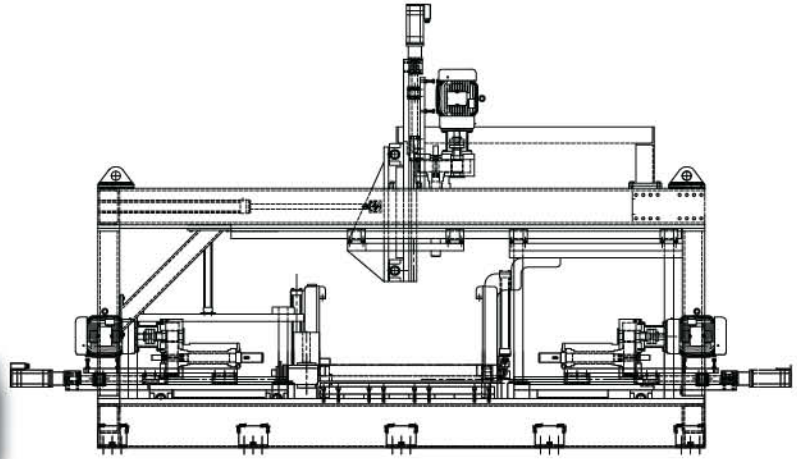
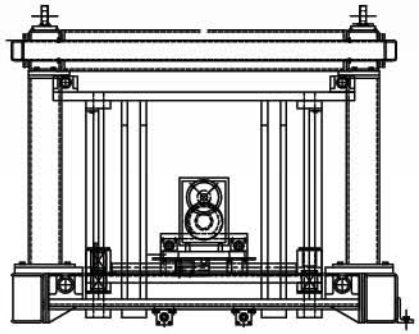


Drill Frame

The base structure of the drill is made from a framework of structural steel tubing. This frame was designed from the ground up to provide a structure rigid enough to run high speed carbide tooling.



OPERATOR'S END VIEW

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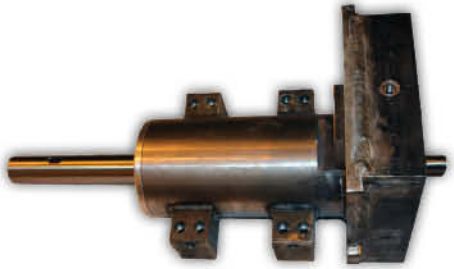

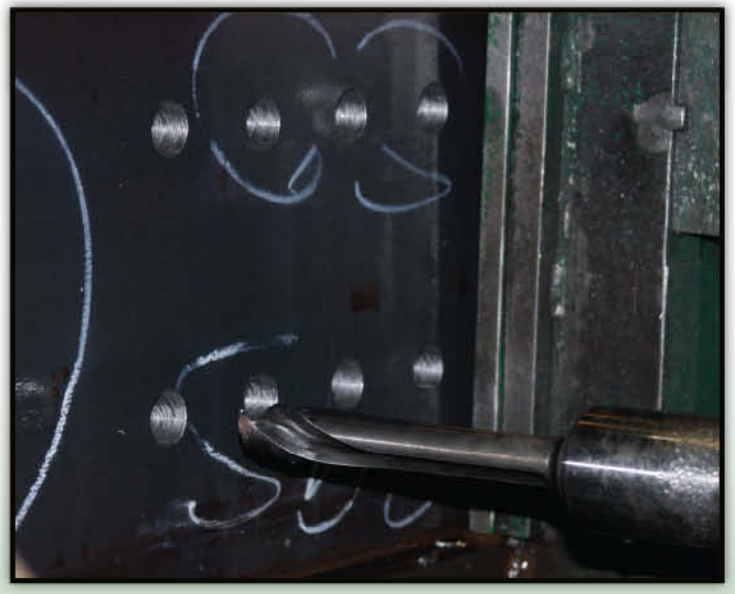

Drill Spindles

Each drill spindle has the ability to move approximately 24” down the length of the material. When the material stops, all holes within this window can be drilled without moving the material again. This allows for highly accurate holes and for lower total drilling times per structural section.

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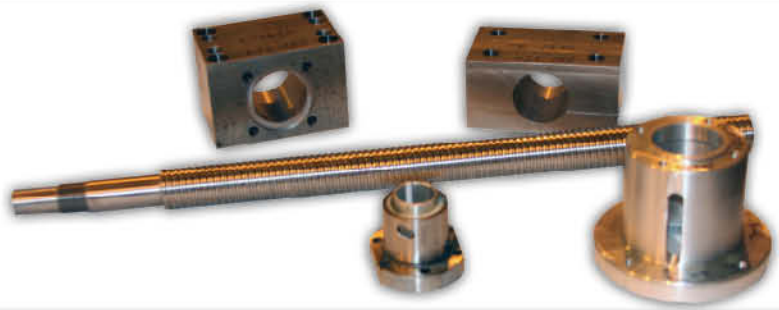

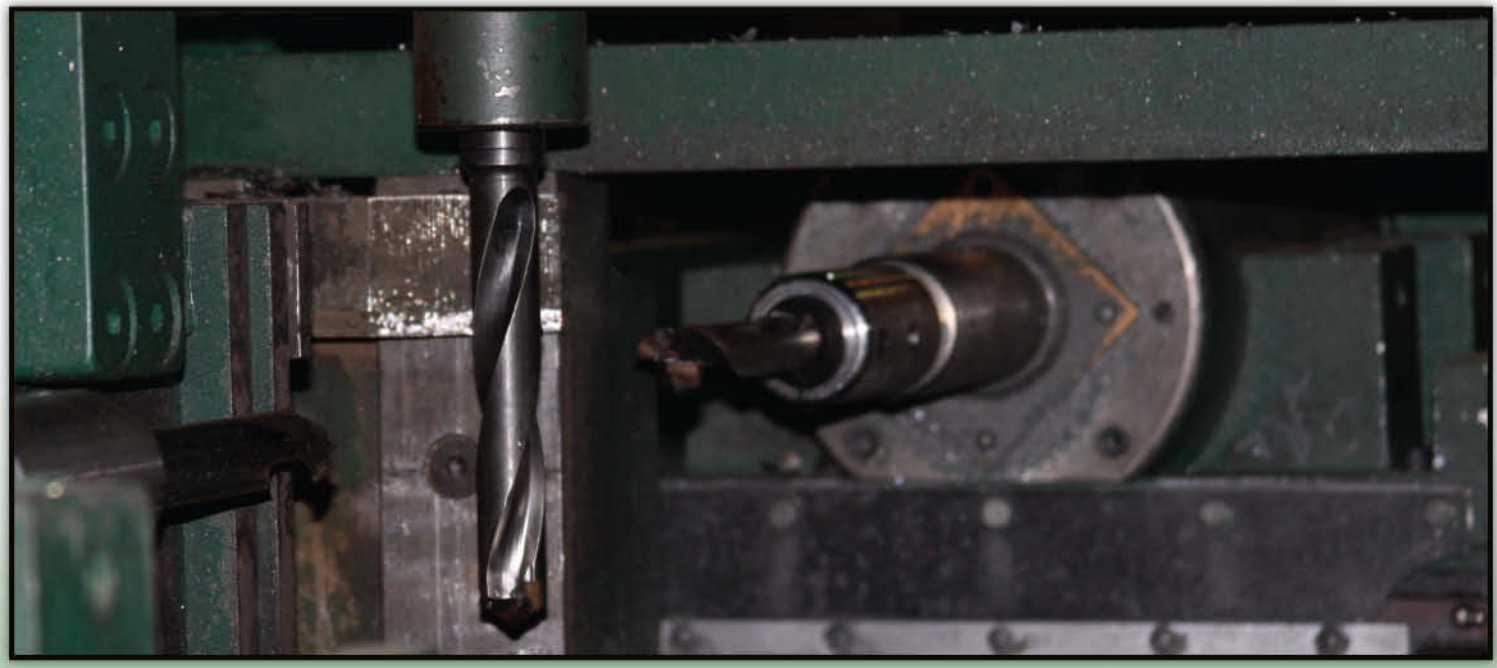

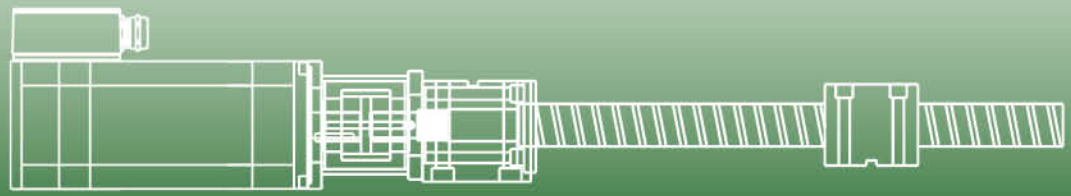

Spindle Feeds

The tool feeding system uses a closed loop servo control through a precision ball screw assembly. Velocity, torque, and position are all controlled at a 1 KHz sample rate for each axis. During the feeding cycle the tool location is constantly monitored and updated by a series of complex algorithms sampling torque and change in position. This ensures that the tool is always drilling material and the tool is always protected.

The entire drill spindle is moved in a block-style arrangement supported by precision preloaded linear guides and bearings. This helps with rigidity and accuracy of the tool as well as giving maximum usable horsepower at the tool.

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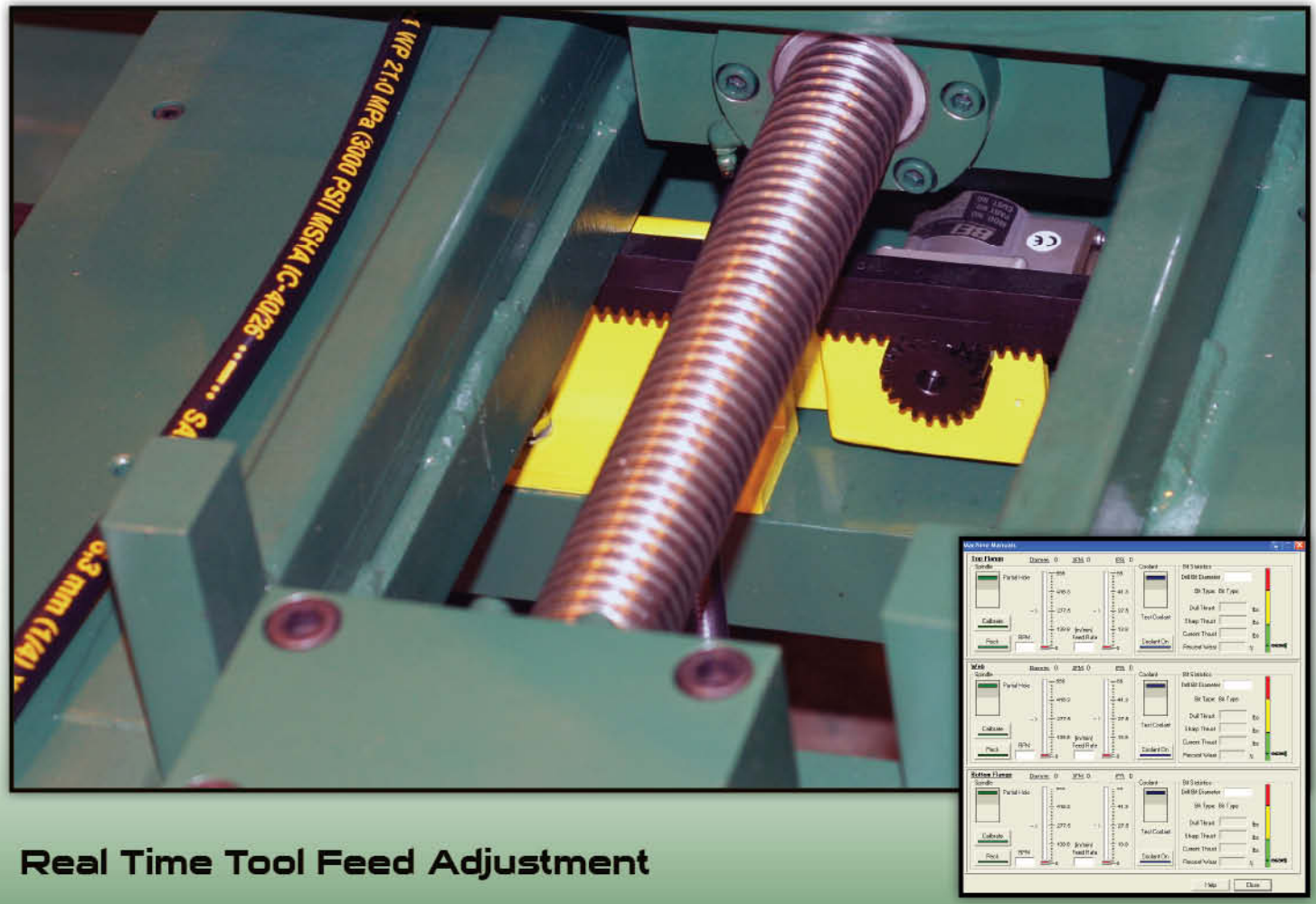

Real Time Tool Feed Adjustment

At anytime while the machine is running the drilling parameters can be fine tuned from the drill bit data table settings. This user screen can also be used to turn on coolant, activate peck feed, or just to monitor drilling thrust.

Spindle RPM

The spindle rotation is produced by an AC Inverter Drive and matched motor drive through a 3:1 reduction. This allows the rpm to remain constant during feeding of the tool. This also helps achieve precise chip load when combined with the spindle feeding system. Keeping a steady chip load preserves the life of the tooling.

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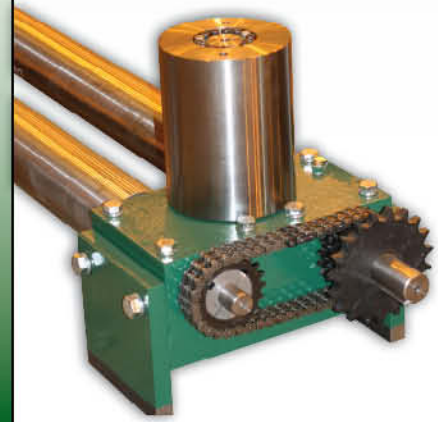
Pinch Wheels

The drill has powered pinch wheels on the in-feed and the out-feed of the machine that work in unison to pull the material through the machine but may be operated independently by the operator when needed. The pinch wheels keep the material tightly held throughout the processing of the holes. The pinch wheels are also geared to solid conveyor rolls which assist in pulling the material through the machine and support the material on the horizontal datum line. These solid rolls are further chained to the conveyors to give even more surface area to assist in accelerating the material during length positioning. Since the conveyors help power the material through the machine, the DRL-344 can be installed in your shop without a special foundation.



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Material Horizontal & Vertical Clamps

The material clamps hold the material tight against the vertical and horizontal datum planes during high speed drilling to minimize vibration, maintain hole accuracy, and help preserve tool life. The material clamps completely release the material when the material is positioned in length but remain clamped when the drill spindles move in length from hole to hole. This way the spindles spend more time drilling and not waiting for material to be positioned and clamped.

LENGTH MEASURING OPTIONS

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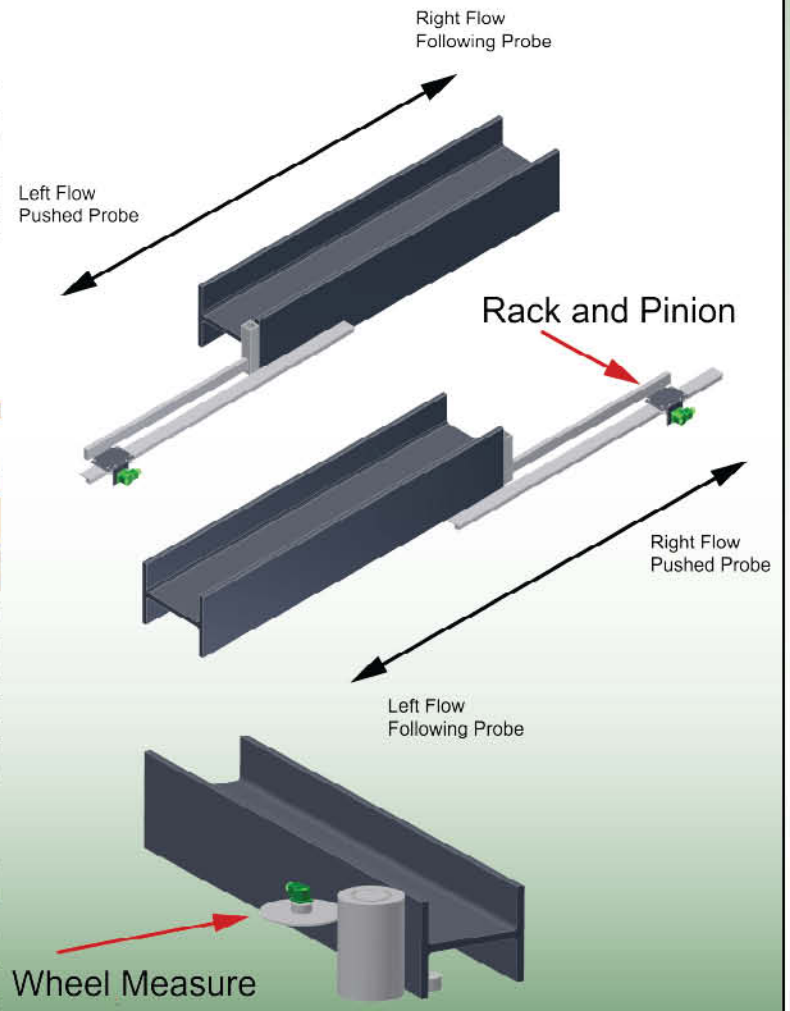
Pushed Measuring Probe Carriage

The pushed probe is mounted on the out-feed side of the machine and the material pushes the probe as the material is processed. This option works well with a tandem saw configuration with the saw located on the in-feed side of the machine. This configuration allows the material to be transferred onto the in-feed conveyor from either side. The material can only be transferred off the out-feed conveyor on the non-probe carriage side.

Following Measuring Probe Carriage

The following probe is mounted on the in-feed side of the machine and rides against the trailing end of the material as the material is being processed through the machine. An electric eye senses the leading end of the material as the material enters the machine. This option works exceptionally well with a tandem saw configuration with the saw located on the out-feed of the machine. This configuration allows the material to be transferred to either side of the out-feed conveyor. The material can only be transferred onto the in-feed conveyor from the non-probe carriage side.

Both the pushed probe and the following probe use a measuring carriage with a cable festooning system. A measuring rack and matched pinion turn a counting device as the carriage is moved. The rack is mounted to the carriage guide bar and the carriage guide bar is mounted to the conveyor. The measuring rack is calibrated to the machine during on site installation to ensure accuracy. The measuring probe carriage provides an accurate, repeatable, and predictable method for the length measurement of the material.



Dual Wheel Measuring

Controlled Automation can supply the drill with a dual wheel measuring system. This system uses two measuring wheels (one in-feed and one out-feed) that ride against the material and turn counting devices as the material moves. The measuring wheels are calibrated during on-site installation of the machine. This system can be used with any transfer conveyor configuration. The measuring wheel is not as repeatable or predictable as the measuring probe carriage type. A debris brush cleans the material as it enters the measuring wheels to help minimize inaccuracies. The wheel measuring software allows the operator to measure the length position of a layout mark placed on the material at the operator's discretion, and then enter the layout marks "true length position" back into the controller to correct any wheel measuring inaccuracies during a part run.

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Carbide Drilling

The DRL-344 is capable of drilling with almost any type of drill bit. One of the most desirable types used is carbide. Carbide bits are extremely brittle and will shatter if not controlled properly. With our AC servo feed and closed loop control, we can precisely remove the desired amount of material for each revolution of the bit. Industrial motors coupled to industrial gearing ensure we have all the torque required. Due to the amazing sensitivity of our ***Soft Touch Material Sensing***, we can find the material location for every position with even the smallest of carbide tooling.

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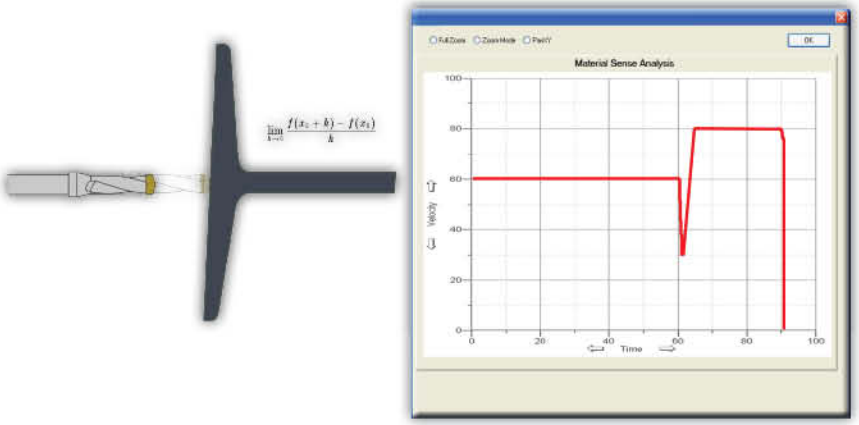


Soft Touch Material Sensing

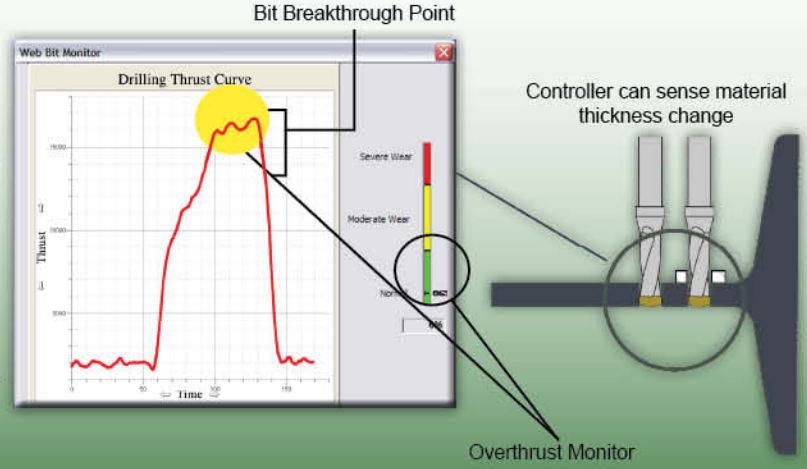
The DRL-344 spindle feeds have the ability to touch sense the material with the tool by rapidly advancing the tool towards the material, sensing the tool touching the material, and stopping the motor feed within .005 sec of the tool touching the material. This eliminates having to know the tool length and having to use additional troublesome mechanical or electrical devices to locate the material surface. Tests have proven the machine can feed at 5" per sec with 1/4" drill bit, sense the material and stop without damaging the bit.

Bit Breakthrough Technology

The DRL-344 software, using ***Bit Breakthrough Technology***, is able to determine when the drill bit has made it completely through the material. This can be performed for each hole making it possible to drill varying thicknesses on the same material. During this breakthrough event, the software adjusts the drilling parameters to protect the tooling from damage as the material stress is induced back into the bit. Users may drill beams with welded plates or other components in place to ensure exact hole alignment between the member and connection plate in the field.

Over Thrust Protection

With ***Over Thrust Protection*** technology the control system limits and continuously monitors drilling thrust. A real-time feedback screen can be used to see drilling thrust and bit wear. If the tool has reached max thrust the control system will retract the tool and the user will be prompted to replace the tooling. This technology ensures the tool and tool holder will always be protected by limiting the thrust to the value specified by the tool database.



Drilling Technology

Controlled Automation's unique drilling software is the product of years of research, development, testing, and experience in the structural steel fabrication market. Advanced mathematical algorithms combined with high speed AC servo drives allow the software to use the drill bit as a sensing and cutting tool simultaneously. At any point in time the software knows the material surface location, bit depth, and drilling thrust. This allows us to protect the drill bit from over thrust, and dynamically control the feed for varying material properties (hardness, chip load, chip evacuation).

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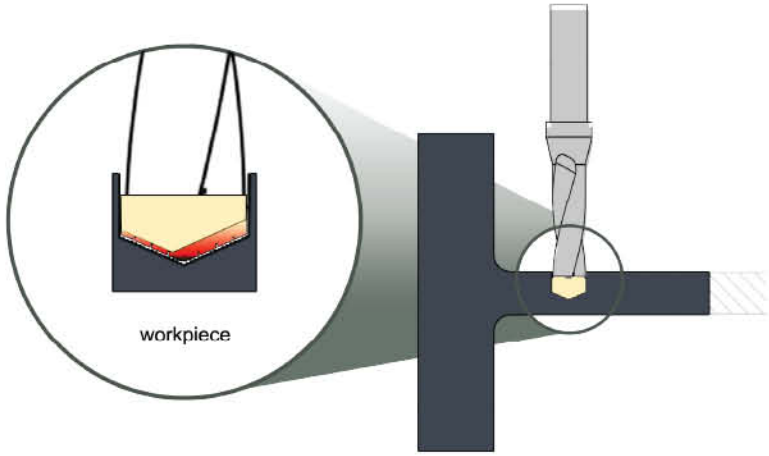
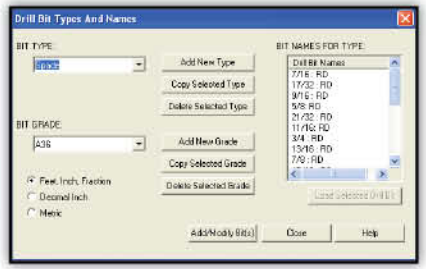


Partial Hole Feed Correction

With the ***Partial Hole Feed Correction***, the control system will drill a previously unfinished hole with a special drill cycle that first senses the bottom of the hole with ***Soft Touch Material Sensing*** using a decreased thrust, then increases the rpm to clean out the hole. The drill cycle then returns to the normal drill cycle and finishes the hole at the proper feed and rpm. This protects the bit from an abrupt hit at the bottom of an unfinished hole and preserves tool life.

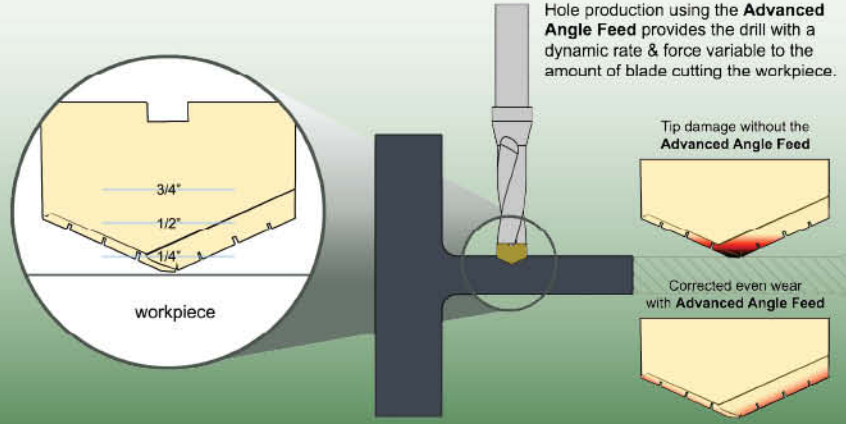
Drill Tool Database

Our extensive ***Drill Tool Database*** provides users with a full list of bit types to choose from in conjunction with the material grade to ensure the most accurate usage and the longest possible tool life. All entries for drill tools are editable by the user in order to meet a higher demand of performance from the operation or to fine tune any new or existing tool product. The design of the machine allows for widest selection of drill bit types including twist bits, spade bits, and carbide tooling.



Tip Angle Compensator

The rpm and feed rate controlled by the ***Tip Angle Compensator*** system allows for a more accurate start of the drill tip and maintains the chip load for the varying size tips of all drill tools. This provides an even distribution of the force and spin throughout the entire angle of the tip. The last part of the tool entering the surface of the work piece has the same wear as the starting point, saving the tools cutting edge quality throughout the initial feed of the tip angle.



MATERIAL PROBING TECHNOLOGY

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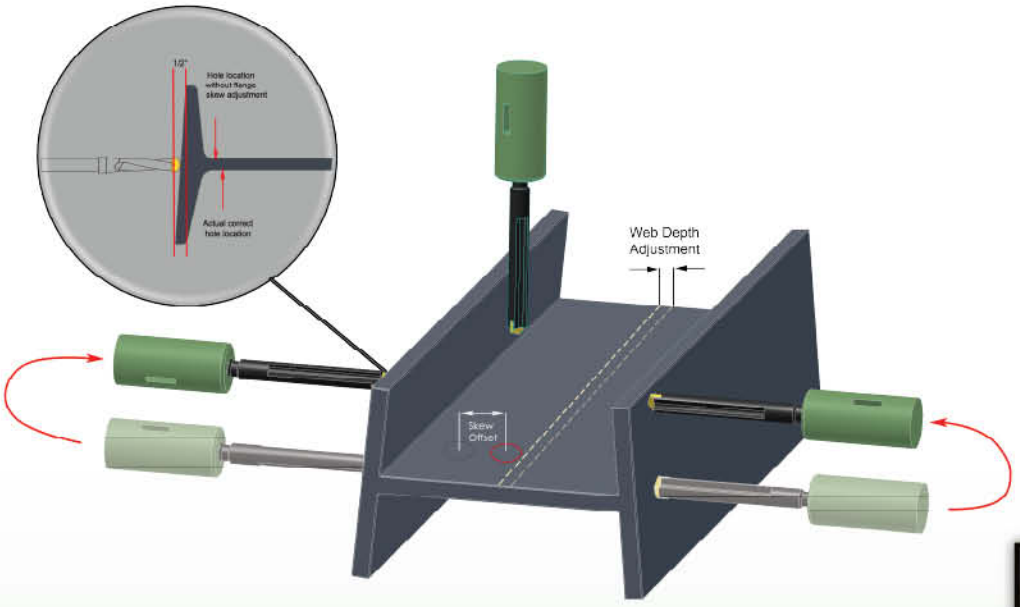


Material Flange Probing for Web Holes

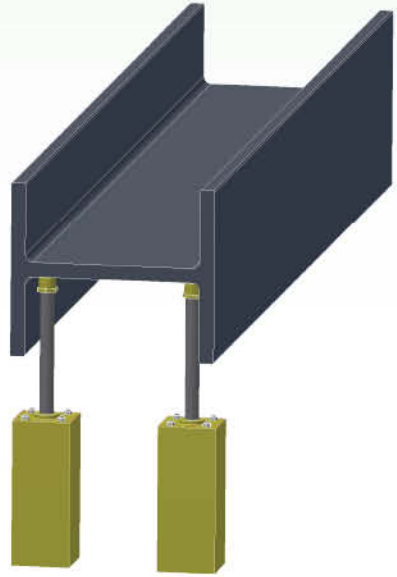
With Controlled Automation's unique ability using the ***Soft Touch Material Sensing*** the flanges can be probed near their top and near their bottom, and the true location of the web determined with respect to the datum line. This allows the software to offset the web holes correctly from the top flange, from the center of the web, and from the bottom flange as needed depending on the holes' programmed reference.

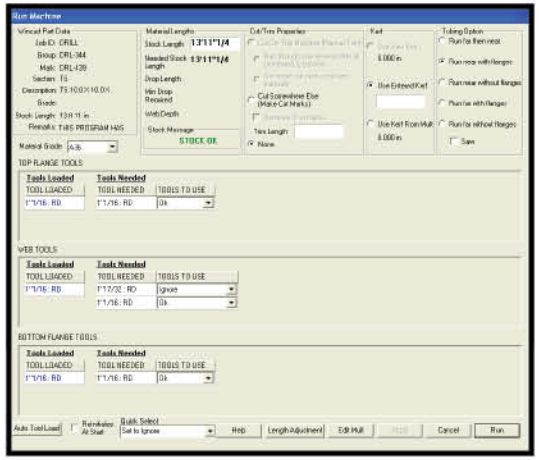
Simultaneous Web Holes

The DRL-344 has the ability to drill the top and bottom surfaces on some tubing using the web drill on the same drill cycle. Once the drill has finished the top surface, the feed drive will perform a high speed feed to the bottom surface. The instance the bottom surface is detected using our ***Soft Touch Material Sensing*** the drill feed will instantly switch to drilling feeds.

Material Web Probing for Flange Holes

The web location is determined with respect to the flanges by probing the underneath side of the web. There are two underneath web probes that are used to probe the web close to each flange. This helps ensure accurate holes on the flanges centered on the true web location not the theoretical web location. The web probes use an air cylinder with an encapsulated counting device to protect the system from drill shavings and coolant. The probes are located underneath the web, so that errors caused by the probes contacting debris on top of the web are eliminated.





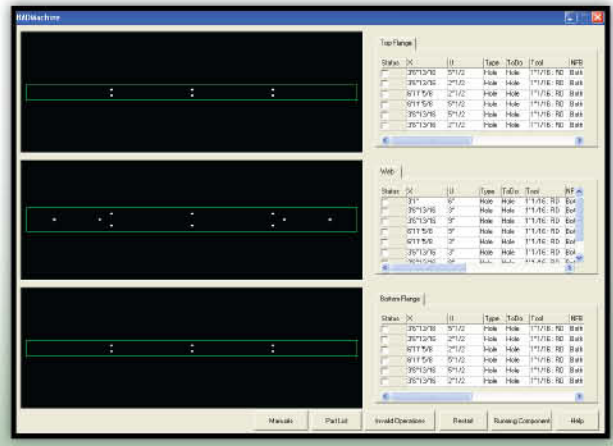
Pre-Run Screen

When the operator runs a single part or a multed stock a pre-run dialog is displayed that helps the operator make sure the machine is setup properly. This screen shows the tools needed for each surface and it shows the tools that are currently loaded for each surface. It has a field for the operator to enter the stock material length. This length is necessary for the operation of the clamps and to calculate the material weight for speed and acceleration settings. There is a field to enter a saw kerf if different from the default saw kerf. There is a place to enter a trim length if desired or different from the default trim length.

The operator can also edit the mult being run by changing quantities of parts in the mult, adding parts to the mult, removing parts from the mult, or rearranging the order of the parts in the mult. Once all settings on the screen are set as needed the operator hits the run button and the material processing begins.

Run Screen

During the processing of the material the operations for all three axis are shown with a graphical view and with a spreadsheet view. These views show the holes, layout marks, stencils, and saw cuts. As the operations are processed the views are updated with the status of each operation.



Halting Screen

During the processing of the material the machine can be halted at any time. After halting the operator regains all manual control of the machine. The operator can use the ***Run Screen*** view and go to each operation and toggle its status between 'complete' or 'not complete'. This lets the operator selectively redo an operation if needed or remove one that is problematic.

Tool Changing

The software has been developed to help the operator accommodate tool changes. The software will prompt the operator when a tool change is needed during the run or allow the operator to change the tool at the end of one pass and then run the material for another pass.

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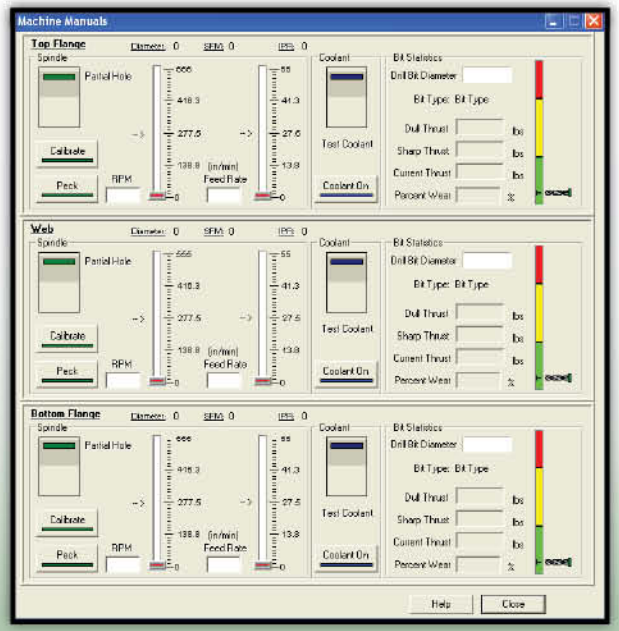
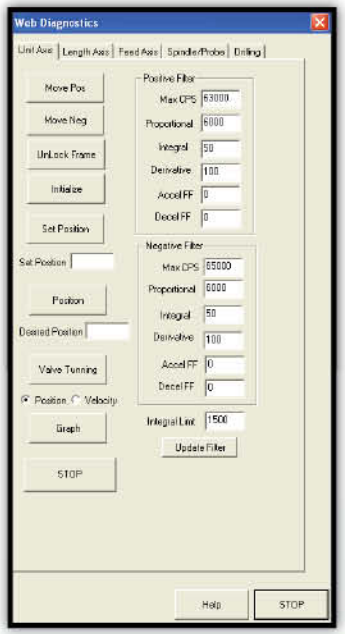
Manual Screens

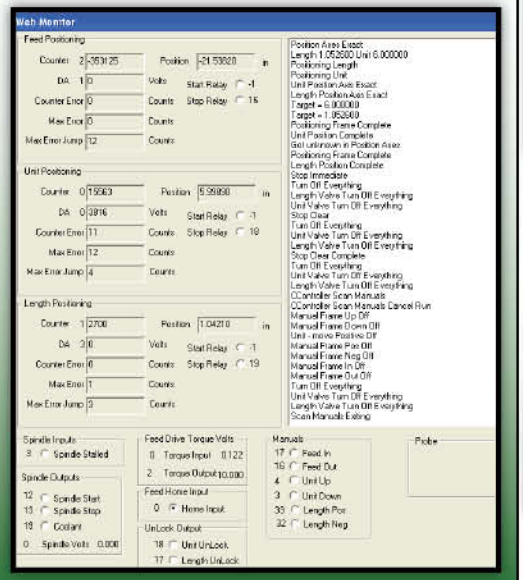
There are ***Manual Screens*** that let the operator have some control during runtime. The operator can control feed rate and rpm of each tool, the coolant for each tool, and whether to peck with a tool.





Diagnostic Screen

Every DRL-344 model comes with a simple to use diagnostic control for each machine component. In diagnostic mode each output and input for that particular component can be checked for correct operation. Different machine functions can be performed to test for faults and quickly pin point and fix problems.

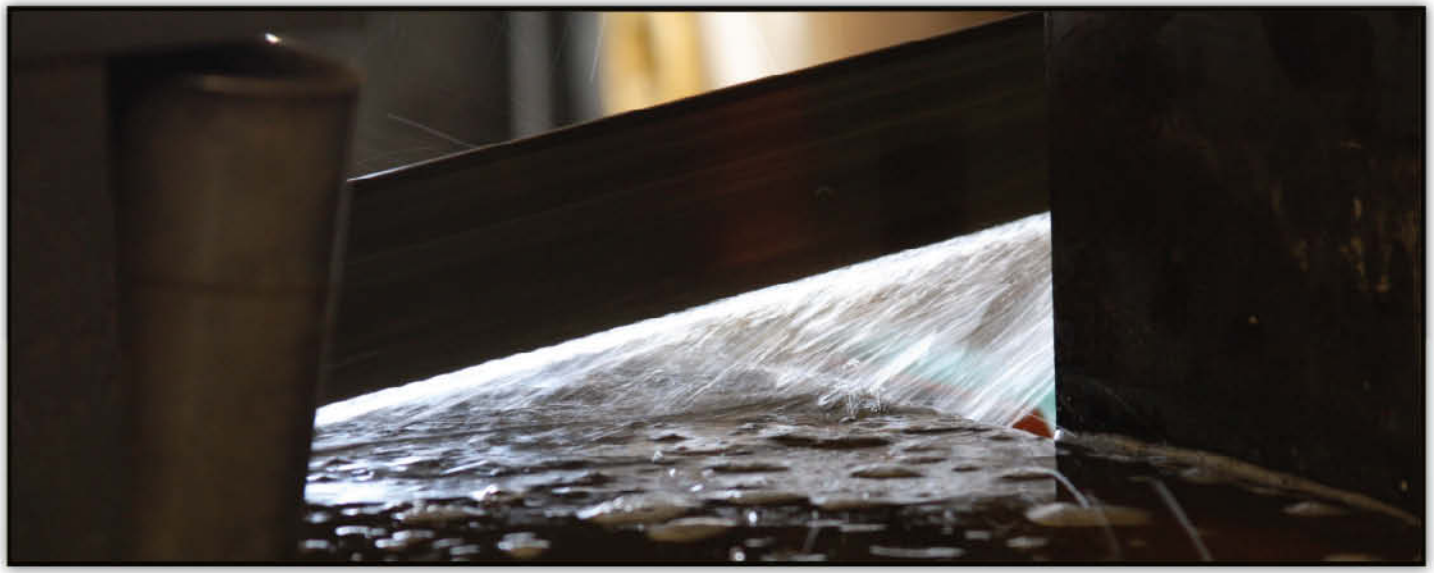


Monitoring Screens

During runtime, ***Monitoring Screens*** for each component can be displayed to show real-time feedback and to show processes being performed by the control system. This helps the operator learn the machine sequence and verify the machine is performing as expected.

Manual Controls

The machine controller console is equipped with the necessary switches which allow the operator to move and control most parts of the machine. These controls include features such as the ability to move the drill axes, operate the clamps, move the conveyor, move the measuring probe carriage, etc…



Saw On the In-feed

A saw on the in-feed has to be used in conjunction with either a pushed probe measuring carriage or dual wheel measuring. With this option a trim cut can be taken from the material manually by the operator if desired. Only one part can be cut from a stock at a time if processed in the forward direction, but multiple parts can be automatically cut from a stock if the material is allowed to reverse through the machine after the holes have been drilled.

Saw On the Out-feed

A saw on the out-feed has to be used in conjunction with either a following probe measuring carriage or dual wheel measuring. With this option a trim cut can be taken automatically during the processing of the stock material. Multiple parts can be sawn from the same piece of stock in the forward direction.

With the tandem saw option, an extra conveyor drive is added to the conveyor on the opposite side of the saw from the drill to allow the conveyor to be operated independently from the drill connected conveyor. The small conveyor between the drill and the saw will be driven by a chain connected to the drill pinch wheel solid roll.

Saw Options

The DRL-344 can be placed in tandem with a saw on the infeed side or on the outfeed side of the drill. Straight cut saws or miter cut saws may be used. A miter saw may only be used on the outfeed side of the drill.

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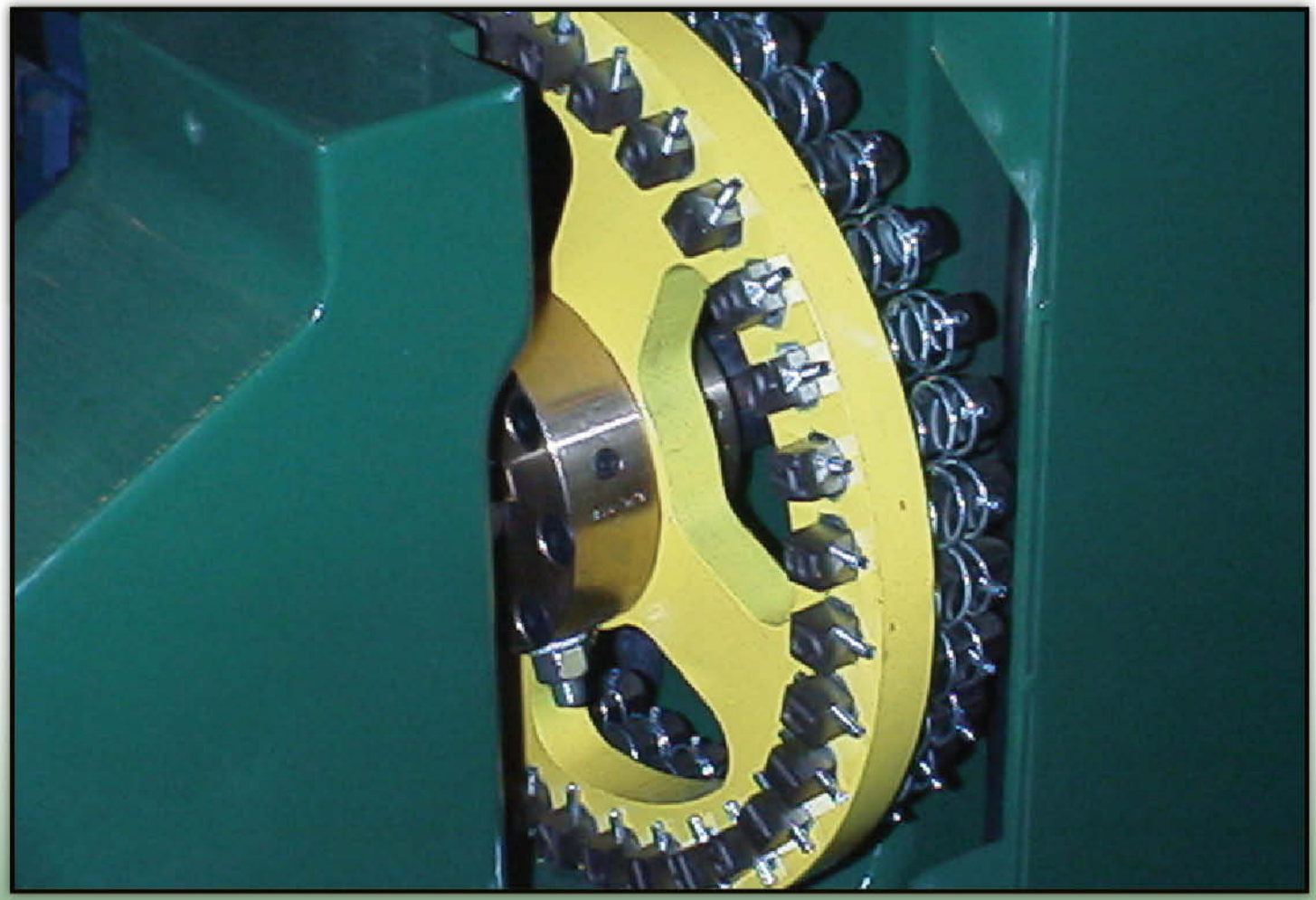
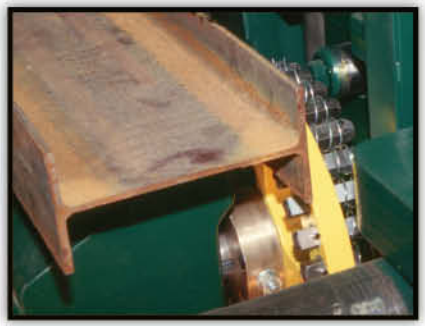


Part Stenciling Unit

Thirty Four Position Wheel Stencil

The Controlled Automation Automated Part Stenciling Unit is specifically designed to imprint alpha and numeric characters on the flange of structural beams. The marking unit is built from a C style steel frame hydraulic press with a character indexing wheel turned by a servo motor. The marking press is mounted on its own base with all necessary valves, cylinders, and hoses included.



DRL-344 Specifications

Frame Structure	Tubular Steel
Approximate machine weight	38,000 lbs
Machine size specifications	
Machine width	102-1/4”
Machine depth	122”
Machine height – to top of frame	63-7/8”
Machine height – crane clearance	130”
Roller height minimum	24”
Roller height maximum	44"

Spindle specifications and features	**web**	**top flange**	**bottom flange**
Length travel	24"	24"	24"
Length maximum speed	16"/sec	14"/sec	14"/sec
Length movement type	hydraulic servo	hydraulic servo	hydraulic servo
Axis travel	44"	18"	18"
Axis speed	10"/sec	10"/sec	10"/sec
Axis movement type	hydraulic servo	hydraulic servo	hydraulic servo
Feed travel	14"	14"	14"
Feed maximum speed	5"/sec	5"/sec	5"/sec
Feed type	ball screw AC servo	ball screw AC servo	ball screw AC servo
Maximum drilling feed rate	bit dependent	bit dependent	bit dependent
Spindle rpm	200-1200 variable	200-1200 variable	200-1200 variable
RPM type	AC inverter 20 hp	AC inverter 20 hp	AC inverter 20 hp
Maximum material thickness	7”	7"	7"
Minimum material thickness	1/4"	1/4"	1/4"
Spindle hp	20	20	20
Maximum thrust	4000 lbs	4000 lbs	4000 lbs
Tool Holder	#4 morse taper	#4 morse taper	#4 morse taper
Maximum hole diameter	2-1/8”	2-1/8”	2-1/8”
Coolant	thru spindle mist	thru spindle mist	thru spindle mist
Number of tools	1	1	1
Soft touch material sensing	yes	yes	yes
Over thrust protection	yes	yes	yes
Bit breakthrough technology	yes	yes	yes
Partial hole feed correction	yes	yes	yes
Tip angle compensator	yes	yes	yes
Material Probing	TF soft touch material sensing BF soft touch material sensing	under web air probe	under web air probe

(All specifications are subject to change without notice)

Material layout	yes	yes	yes
Layout for saw cuts	operator selectable	operator selectable	operator selectable
Layout for part center in length	operator selectable	operator selectable	operator selectable

Material size specifications

Maximum material lbs/ft	1000 lbs/ft
Maximum material thickness	6”

Machine envelope

Maximum material height	18”
Maximum material width	44”
Minimum material height	1/4”
Minimum material width	4”
Minimum material length	9’
Minimum angle size	4” X 3” X 1/4 short leg vertical
Material types	W, HP, C, MC, L, HSS (tubing), PL, FB

Coolant

Coolant	through spindle mist
Pressure	100 psi
Flow	40 cfm (all 3 spindles)
Additive	synthetic water soluble

Length measuring configurations
Following probe
Pushed probe measuring carriage
Dual wheel measuring

Length measuring configurations with tandem saws

Following probe measuring carriage with saw on the out feed
Dual wheel measuring with saw on the out feed
Pushed probe measuring carriage with saw on the in feed
Dual wheel measuring carriage with saw on the In feed

Saw	Automatic position to saw

Stenciler (top flange far side)

Stencil depth	1/32” deep
Character height	1/2”
Number of total characters	34
Characters	A thru Z excluding O and I
Numerals	0 thru 9
Max flange thickness	4”
Material channel legs down.	channel legs down
Material types	W, HP, C, MC
Stenciler approximate cycle time	2-3 sec/character

Hydraulic power unit

40 hp / 1,750 rpm electric motor
60 gpm @ 1,500 psi
25 gpm @ 2,000 psi

Tank capacity	150 gallon
Filtration	10 micron

Oil cooler, case drain type
Thermostat controlled oil heater

For more complete information on this or any of our machines, contact our sales department at 501-557-5109 or sales@controlledautomation.com

Controlled Automation specializes in the manufacture of automated structural steel drilling, punching, and shape cutting machinery. We also build material handling systems to complement each type of machine we offer. As well as new machinery, we are the industry leader in retrofitting control systems and remanufacturing existing structural steel fabricating machinery. All machines and controls are designed and manufactured entirely in the United States of America. All software is developed and supported in the United States of America.

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