UNISIG
DEEP HOLE DRILLING SYSTEMS

Skiving and Roller Burnishing UNISIG SB100 machine

What is it used for?
Rapid stock removal
Impressive surface Finish
Close diameter tolerances
Very round bores

Alternative to honing
Reduced cycle time
Improved quality
Highly durable surface

Production ready
Quick setup of diameter
Easy adjustment for tool wear

Flexible process
Crossing port holes is possible

Typical Feeds/Speeds
(imperial units)

1000 feet/min cut speed
0.12 inch/rev chip load
80 – 240 inch/min feed rate
0.06 inch stock removed

diameter inch	length in	spindle speed rpm	feed in/rev	feed in/min	cycle seconds	transfer seconds	total cycle seconds	100% rate parts/hour	85% rate parts/hour
1.50	40	2000	0.12	240	20.0	30	50	72	61
2.00	40	1910	0.12	229	21.2	30	51	70	60
2.50	40	1528	0.12	183	25.0	30	55	65	56
3.00	40	1273	0.12	153	29.0	30	59	61	52
4.00	40	955	0.12	115	37.6	30	68	53	45
5.00	40	764	0.12	92	47.0	30	77	47	40
6.00	40	637	0.12	76	57.2	30	87	41	35

imperial units

Typical Feeds/Speeds
(metric units)

300 M/Min cut speed
3 mm/min chip load
2-6+ m/min feed rate
1.5 mm stock removed

diameter mm	length mm	spindle speed rpm	feed mm/rev	feed mm/min	cycle sec	transfer sec	total cycle sec	100% rate parts/hour	85% rate parts/hour
40	1000	2000	3.0	6000	19.6	30	50	73	62
50	1000	1910	3.0	5730	20.7	30	51	71	60
60	1000	1592	3.0	4775	23.7	30	54	67	57
70	1000	1364	3.0	4093	26.8	30	57	63	54
80	1000	1194	3.0	3581	30.1	30	60	60	51
100	1000	955	3.0	2865	37.0	30	67	54	46
125	1000	764	3.0	2292	46.3	30	76	47	40
150	1000	637	3.0	1910	56.4	30	86	42	35

metric units

Quality Achievable in Production

Dimensional Feature	Value	
Starting circular irregularity	0.020 in	
Finishing circular irregularity	0.0004 in	
Surface roughness	2 to 16 Ra µin	
Diameter (over - included)	Tolerance IT8 to IT9	
1.181 - 1.967 in	0.0015 in	0.0024 in
1.967 - 3.150 in	0.0018 in	0.0029 in
3.151 - 4.424 in	0.0021 in	0.0034 in
4.724 - 7.086 in	0.0025 in	0.0039 in
7.086 - 9.843 in	0.0028 in	0.0045 in

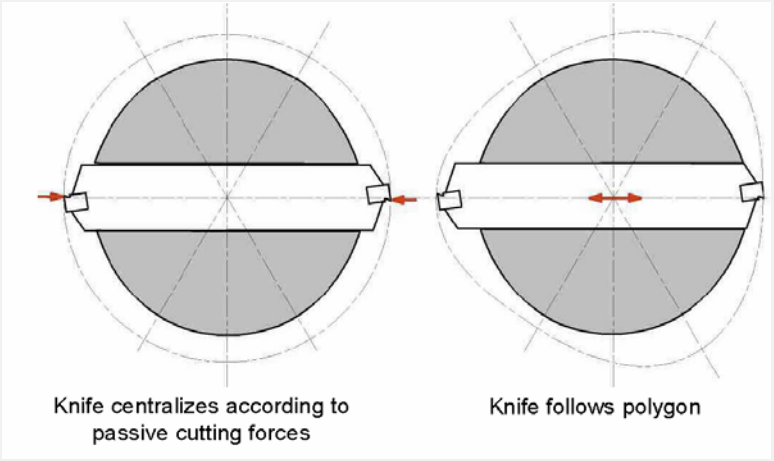
Imperial units

Dimensional Feature	Value	
Starting circular irregularity	0.50 mm	
Finishing circular irregularity	0.010 mm	
Surface roughness	0.05 to 0.4 Ra µm 0.5 to 2.0 Rz µm	
Diameter (over - included)	Tolerance IT8 to IT9	
30 - 50 mm	0.039 mm	0.062 mm
50 - 80 mm	0.046 mm	0.074 mm
80 - 120 mm	0.054 mm	0.087 mm
120 - 180 mm	0.063 mm	0.100 mm
180 - 250 mm	0.072 mm	0.115 mm

Metric Units

Exclusive technology from Ecoroll

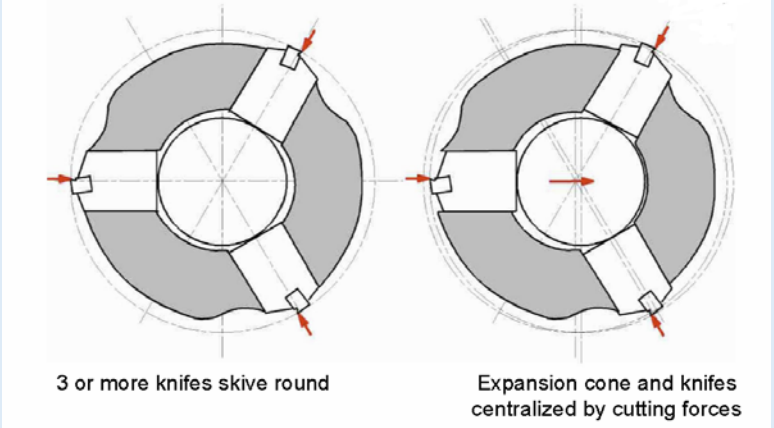
Typical two knife system from others



Knife centralizes according to passive cutting forces

Knife follows polygon

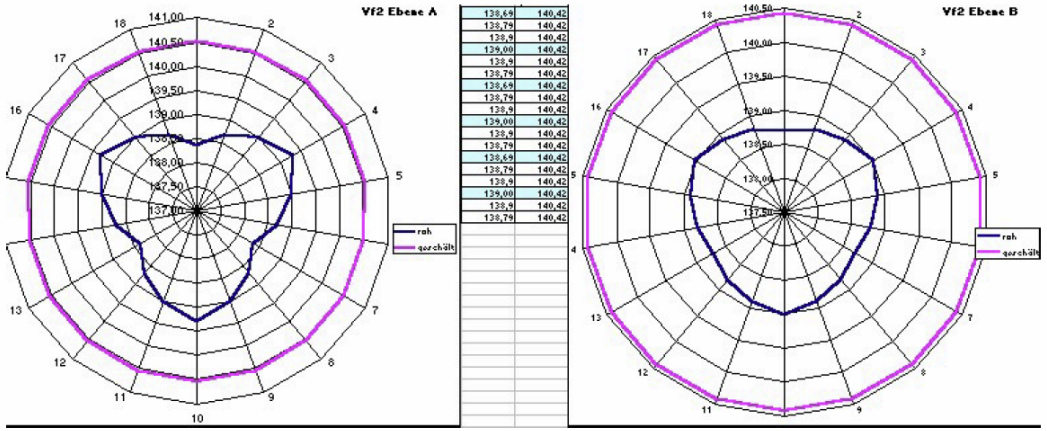
Ecoroll OMEGA three knife system



3 or more knifes skive round

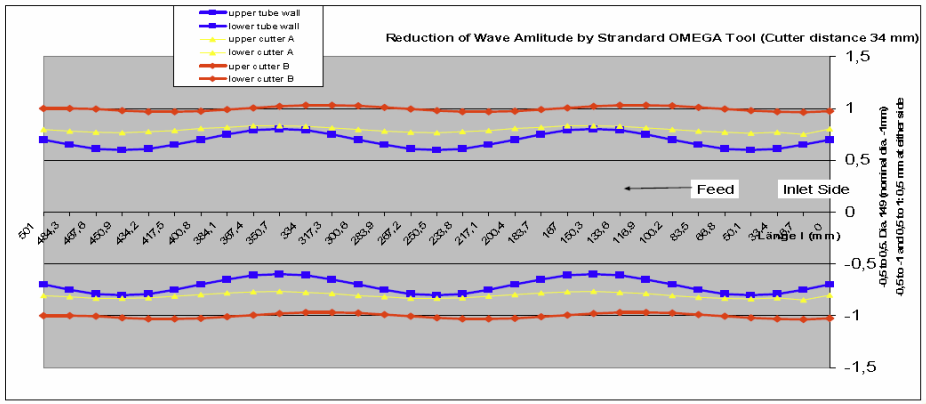
Expansion cone and knifes centralized by cutting forces

OMEGA System – Comparison Two-Cutter / Triple-Cutter

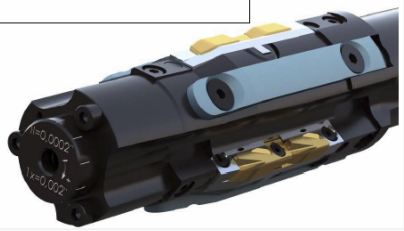


Circular form error reduced from **0,5**mm to **0,01**mm (radial)

OMEGA System – Use of 2 cutting inserts per knife

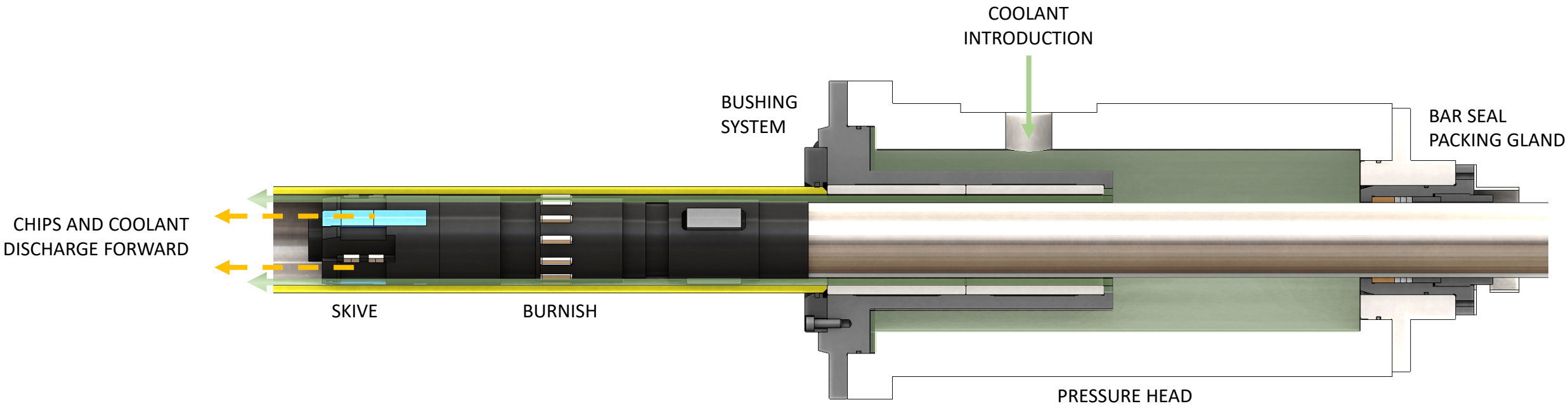


Wave amplitude of **0,2** at wavelength of 200, reduced to **0,06**



Ecoroll Combination Skive and Burnish Tool

- Single pass skive/burnish capability – high productivity
- Coolant floods entire tool during operation



Tooling Systems compared

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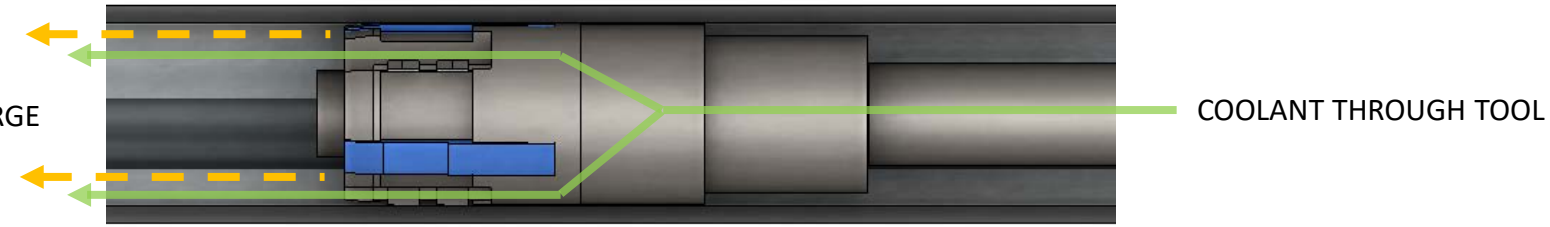
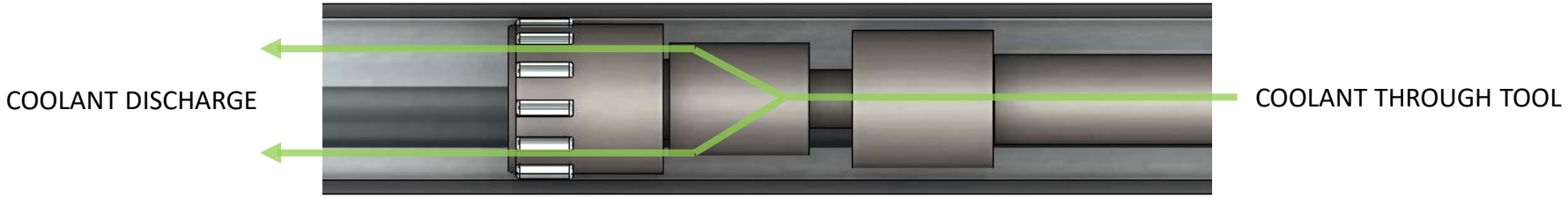
New Concept – Ecoroll Directed Coolant Tools

- Sequential skive + burnish application
- Coolant jets are directed at cutting inserts





Tooling Systems compared

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Combined Skiving and Roller Burnishing tools	
+	Ecoroll OMEGA System for highest bore quality
+	Unlimited diameter and length applications
+	Skive and Burnish operations are completed in single pass
	High volume, low pressure coolant is flooded around tool
	Coolant fills workpiece behind tool during process and must be expelled on tool return
	Long chipping materials may produce continuous chip
	Hydraulically actuated knives, bleeding required on exchange
	Requires starter bushing to align tool to workpiece
	Requires pressure head to introduce coolant to process

Directed Coolant Skiving and Roller Burnishing tools	
+	Ecoroll OMEGA System for highest bore quality
	Limited diameter and length applications
	Skive and Burnish operations are completed sequentially
+	Minimized volume, high pressure coolant is directed at skiving knife
+	Coolant is expelled during process
+	Long chipping materials are more broken from localized coolant pressure
+	Coolant actuated knives, no bleeding required
+	Starter bushing is not required
+	Pressure head is not required

Introducing the UNISIG SB100-2

A new concept machine for high productivity finishing of small hydraulic cylinders **made possible with Ecoroll's directed coolant tools**

1.50 to 4.00 in bore (high speed version)
2.36 to 5.51 in bore (high torque version)
10 to 40 inch length

38 to 102 mm bore (high speed version)
60 to 140 mm bore (high torque version)
250 to 1000 mm length

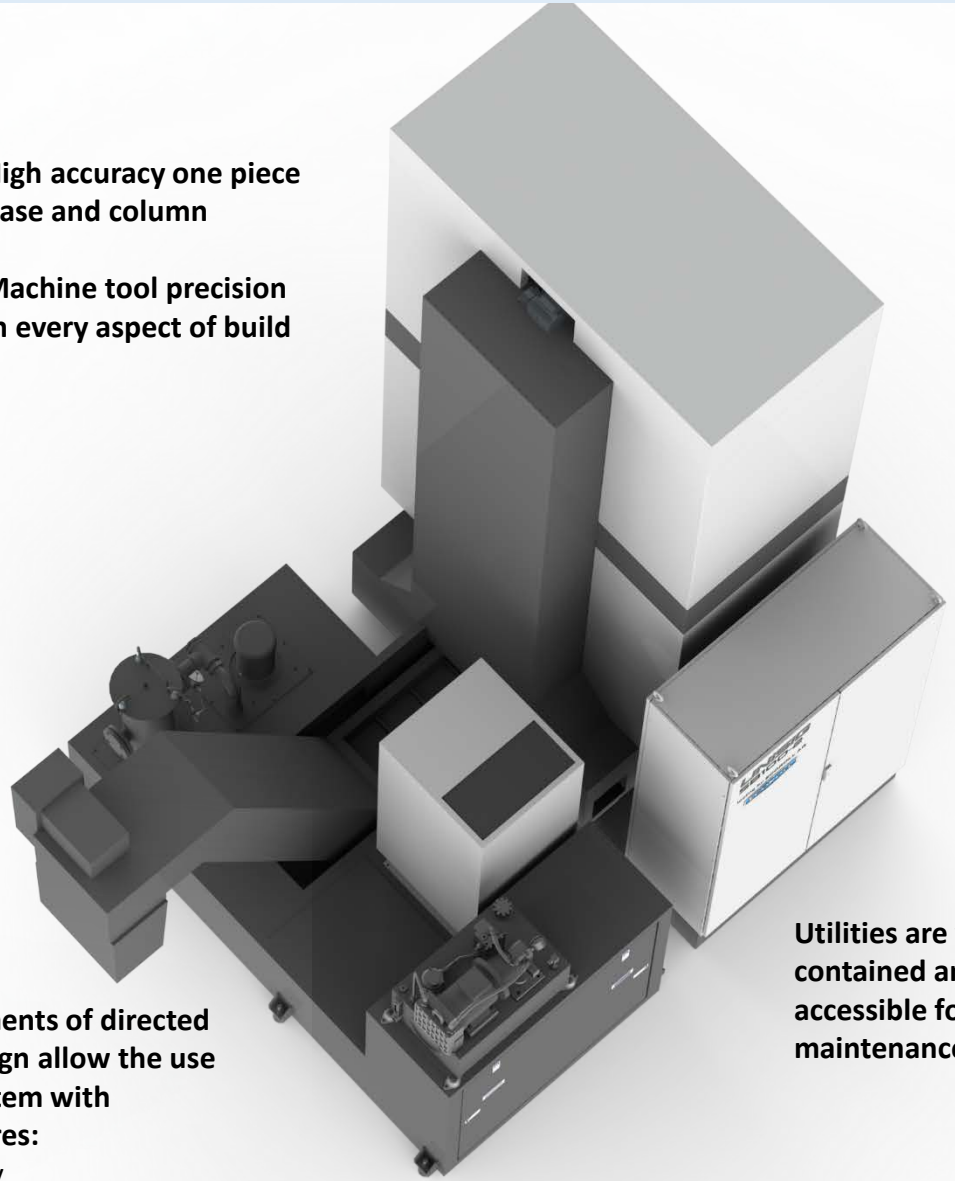
- Dual spindles allows each cycle to complete a part, matching the productivity of a combination tool
- **Ultra-compact footprint due to vertical design**
- **Quick changeover without pressure head or bushing**
- **Superior chip control**
- Reduced cutting fluid use
- Automation ready

Complete System in a compact package

Powerful control system for managing part families or running production

High accuracy one piece base and column

Machine tool precision In every aspect of build



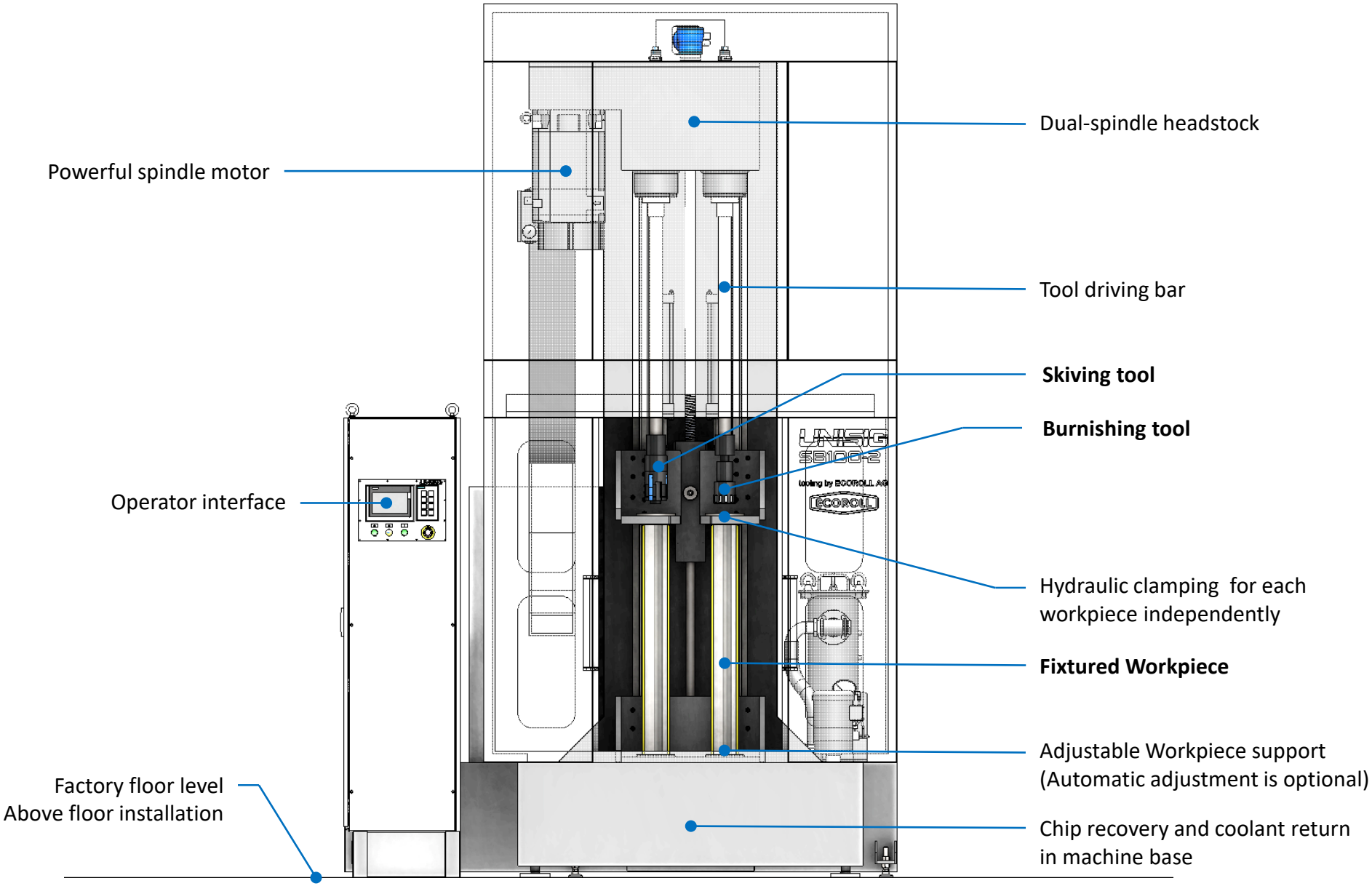
Full enclosure is standard
Automatic doors are optional

Utilities are well contained and accessible for maintenance

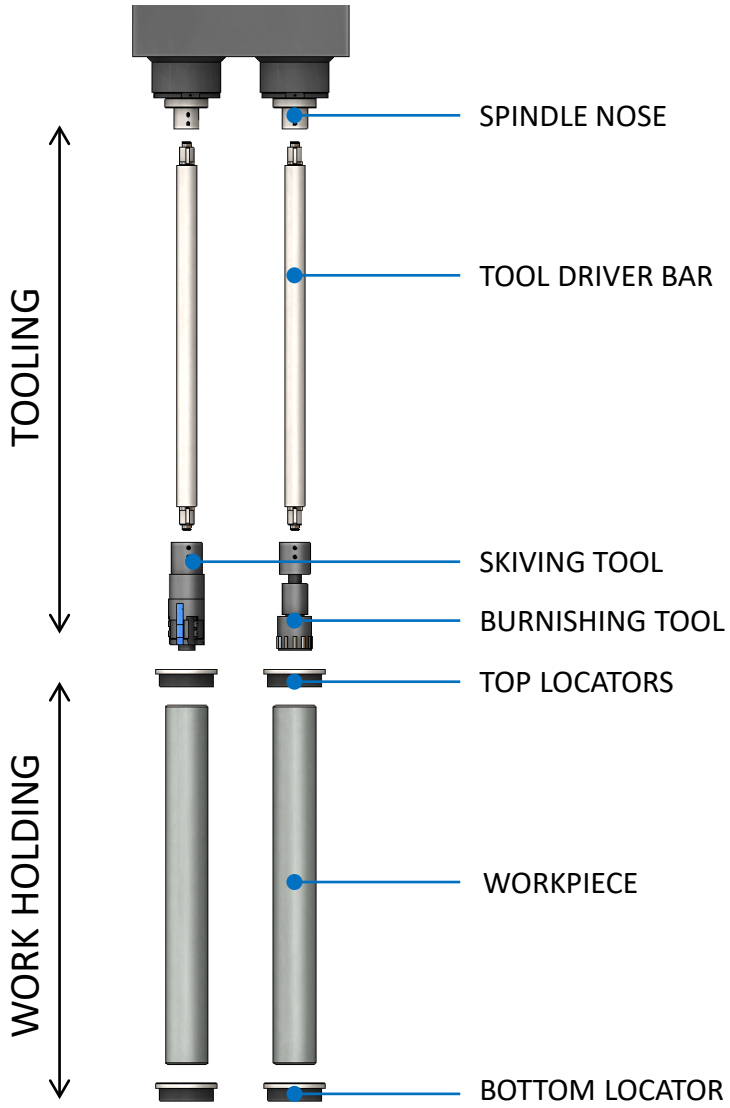
Reduce coolant flow requirements of directed coolant tools and vertical design allow the use of a very compact coolant system with important performance features:

- Programmable fluid delivery
- Control interlocked filtration system
- Temperature controlled fluid

Machine Working Area



Workpiece and Tooling Changeover



The UNISIG SB100-2 machine is designed to minimize the steps needed for workpiece and tool changeover:

- **No starter bushings** required dedicated to bore size
- **No tool driver seal** required (packing gland)
- **No hydraulic actuation** of tools that require air bleeding
- **Two bar sizes** cover entire range of machine
- **All process parameters** are stored in the part program

Workpiece length change

- Lower carriage moves, manually or automatically

Workpiece outside diameter change

- Exchange top and bottom locators
  (open-end wrench, 2x clamps per locator)

Bore diameter change

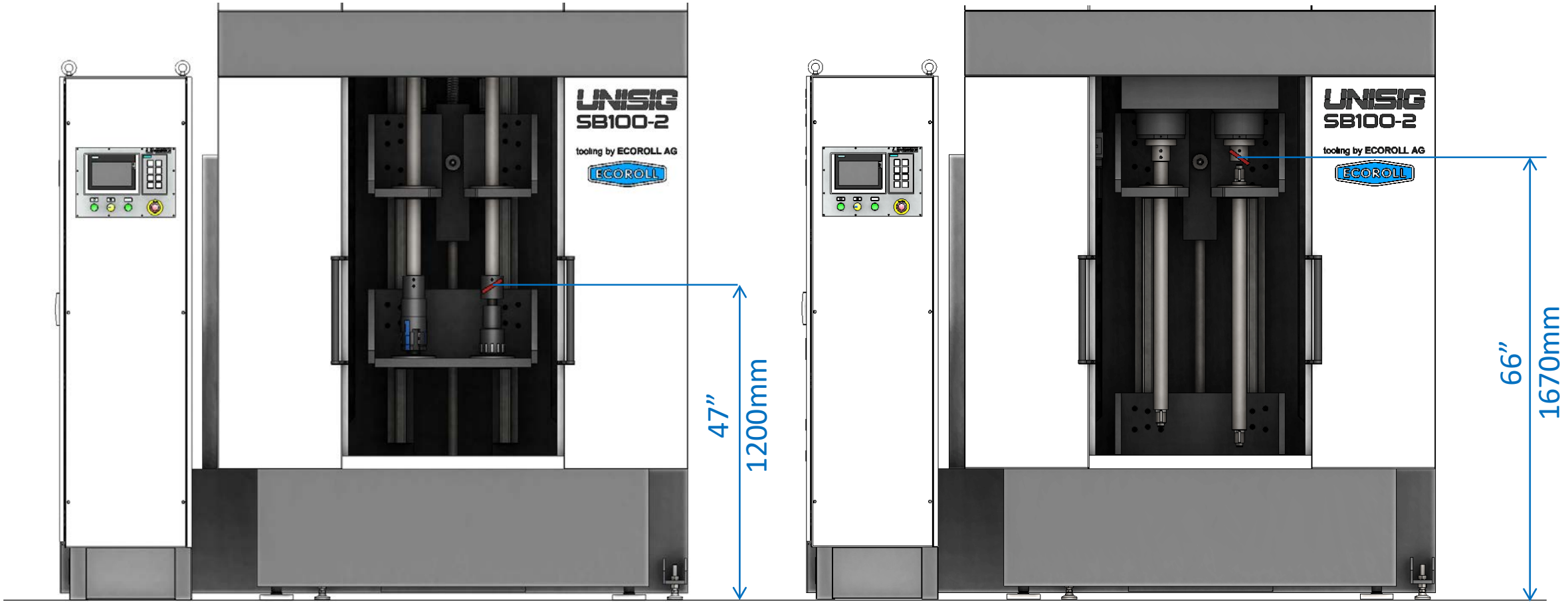
- Exchange skiving tool
  (T-handle wrench, 2x set screws)
- Exchange burnishing tool
  (T-handle wrench, 2x set screws)

Bar size change (if required)

- Remove and replace bar from spindle nose
  (T-handle wrench, 2x set screws)

Workpiece and Tooling Changeover

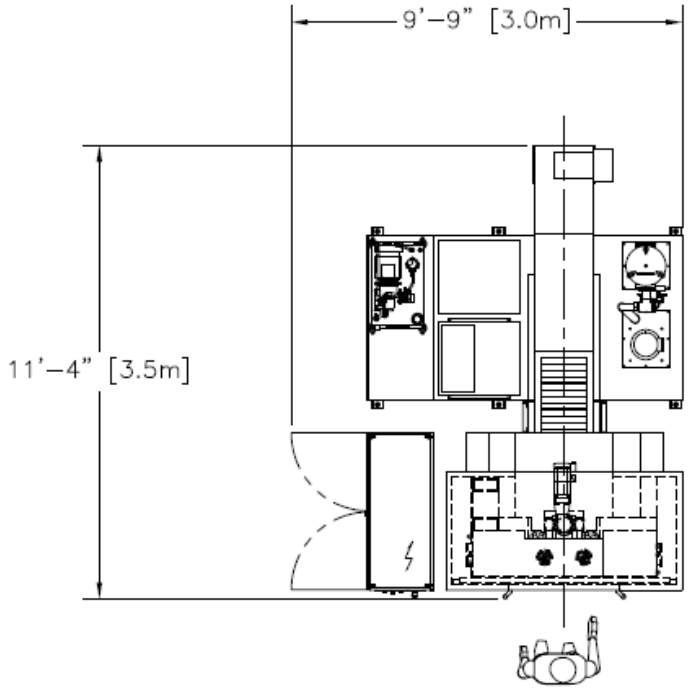
Machine travels are used to support tool setup at convenient locations.



Tool Change

Bar Change

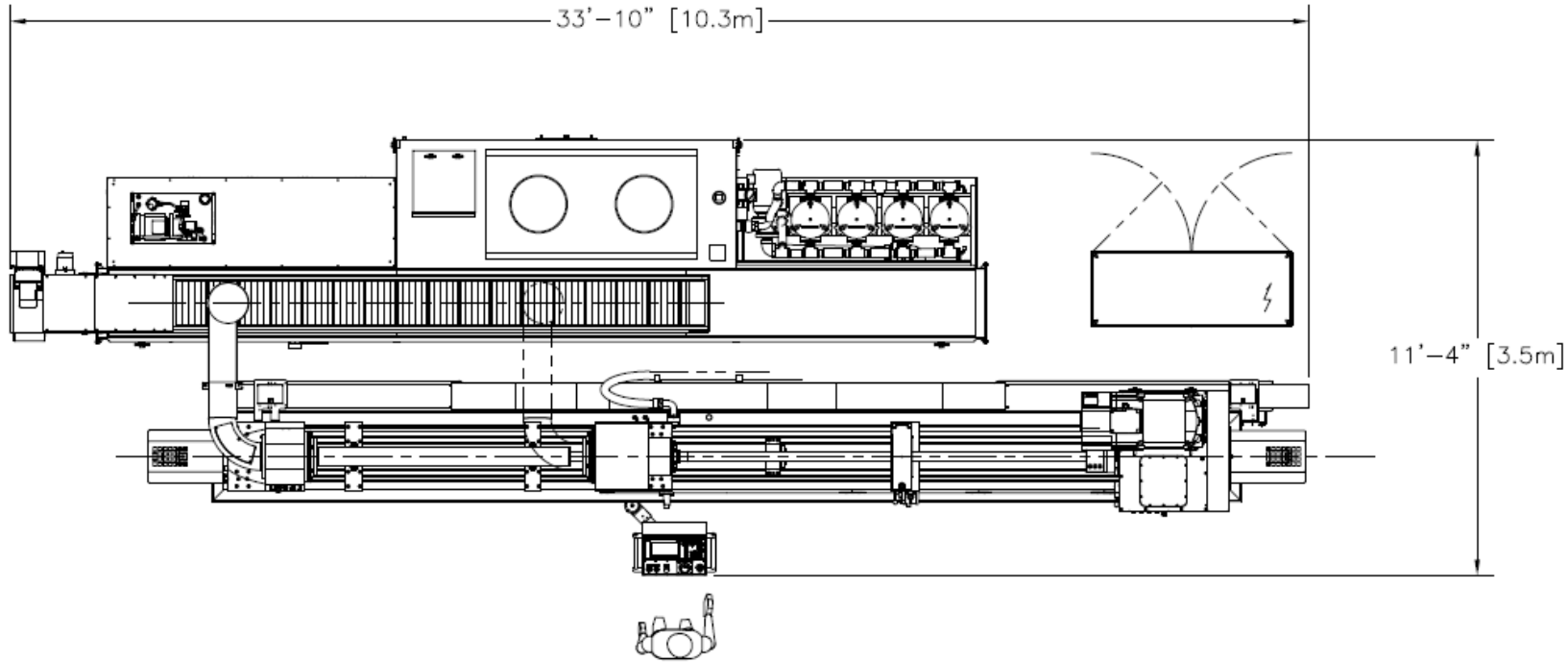
Installed Footprint comparison



UNISIG SB100 Vertical Skive + Burnish
For sequential tools

4.0-5.5 inch dia x 40 inch max capacity
110 ft^2 installation area

100-140 mm dia x 1000 mm max capacity
10.5 m^2 installation area



UNISIG S600-2M Horizontal Skive/Burnish
For combination tools

8.0 in dia x 80 inch max capacity
383 ft^2 installation area

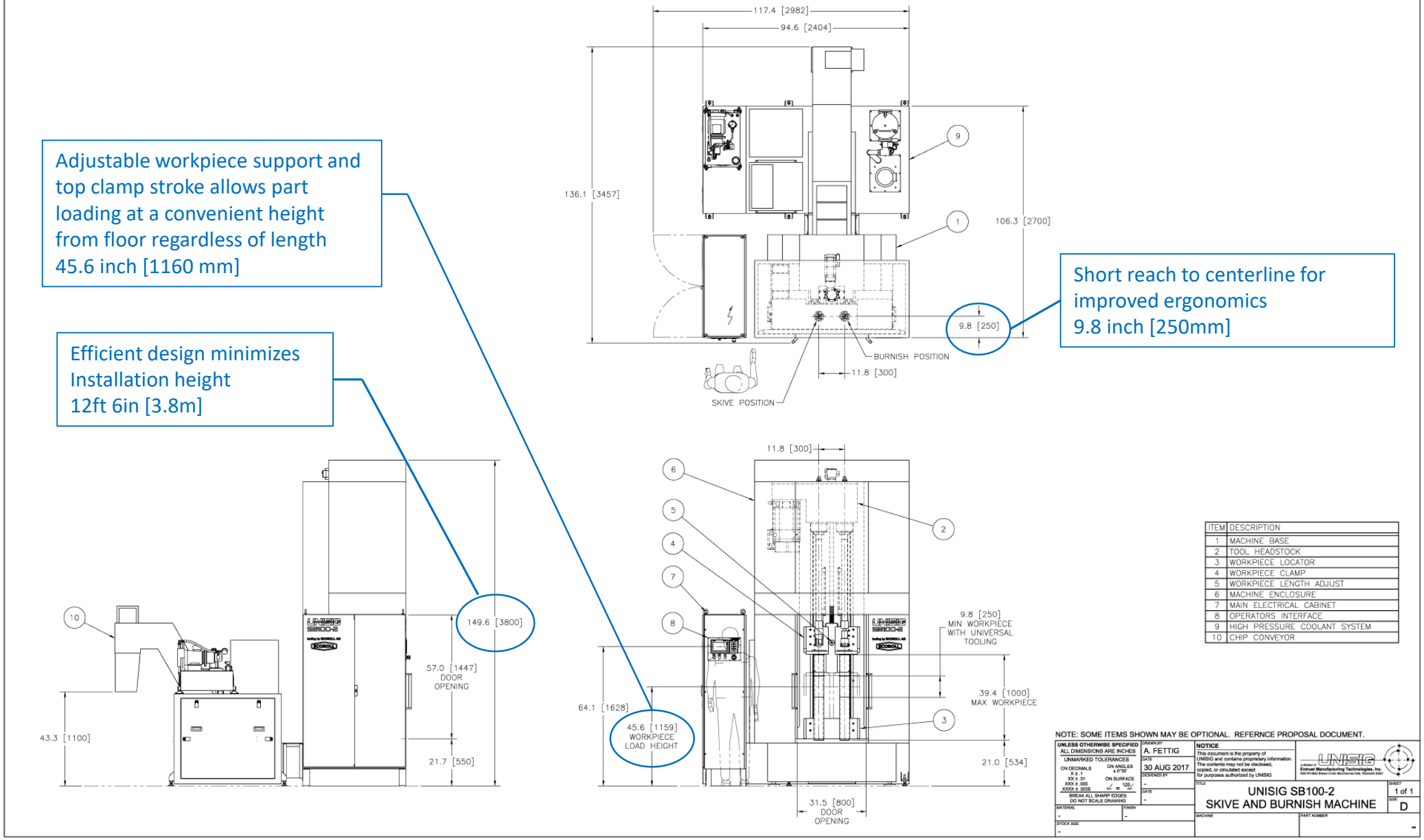
200 mm dia x 2000 mm max capacity
36 m^2 installation area

Installation Dimensions

Adjustable workpiece support and top clamp stroke allows part loading at a convenient height from floor regardless of length
45.6 inch [1160 mm]

Efficient design minimizes Installation height
12ft 6in [3.8m]

Short reach to centerline for improved ergonomics
9.8 inch [250mm]



ITEM	DESCRIPTION
1	MACHINE BASE
2	TOOL HEADSTOCK
3	WORKPIECE LOCATOR
4	WORKPIECE CLAMP
5	WORKPIECE LENGTH ADJUST
6	MACHINE ENCLOSURE
7	MAIN ELECTRICAL CABINET
8	OPERATORS INTERFACE
9	HIGH PRESSURE COOLANT SYSTEM
10	CHIP CONVEYOR

NOTE: SOME ITEMS SHOWN MAY BE OPTIONAL. REFERNCE PROPOSAL DOCUMENT.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE INCHES
UNMARKED TOLERANCES
ON DECIMALS X ± .1, XX ± .01, XXX ± .005, XXXX ± .0005
ON ANGLES ± 0°30'
ON SURFACE √ = 125
BREAK ALL SHARP EDGES
DO NOT SCALE DRAWING
DRAWN BY: A. FETTIG
DATE: 30 AUG 2017
DESIGNED BY: -
DATE: -
MATERIAL: -
FINISH: -
STOCK SIZE: -

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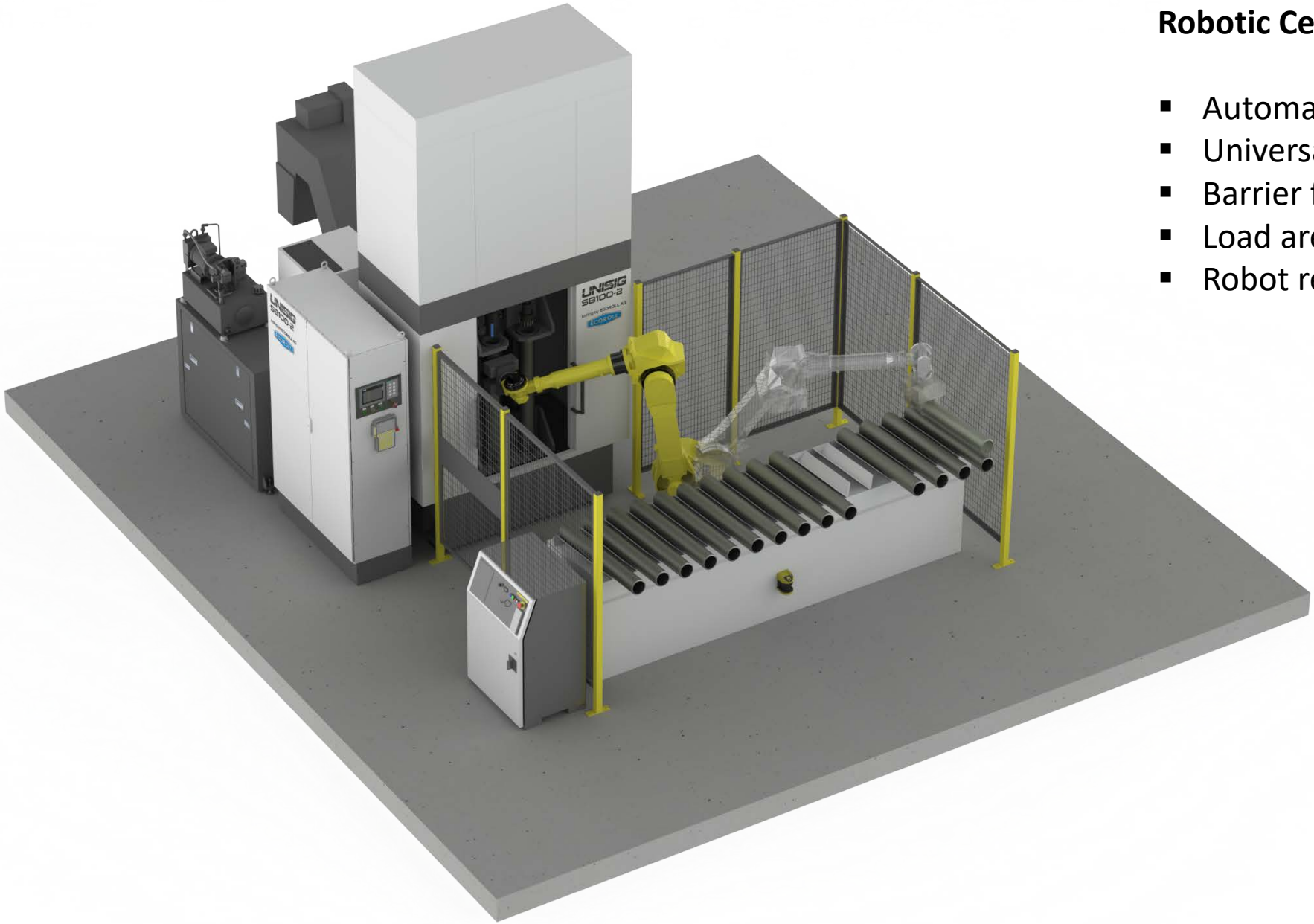
TITLE
UNISIG SB100-2
SKIVE AND BURNISH MACHINE

SHEET 1 of 1
SIZE D

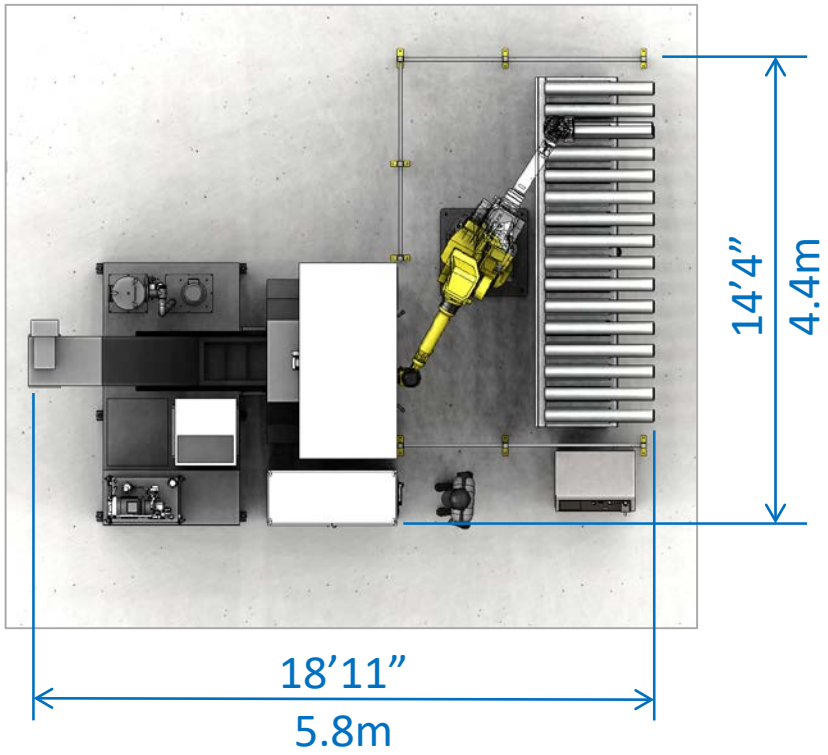
MACHINE
PART NUMBER -

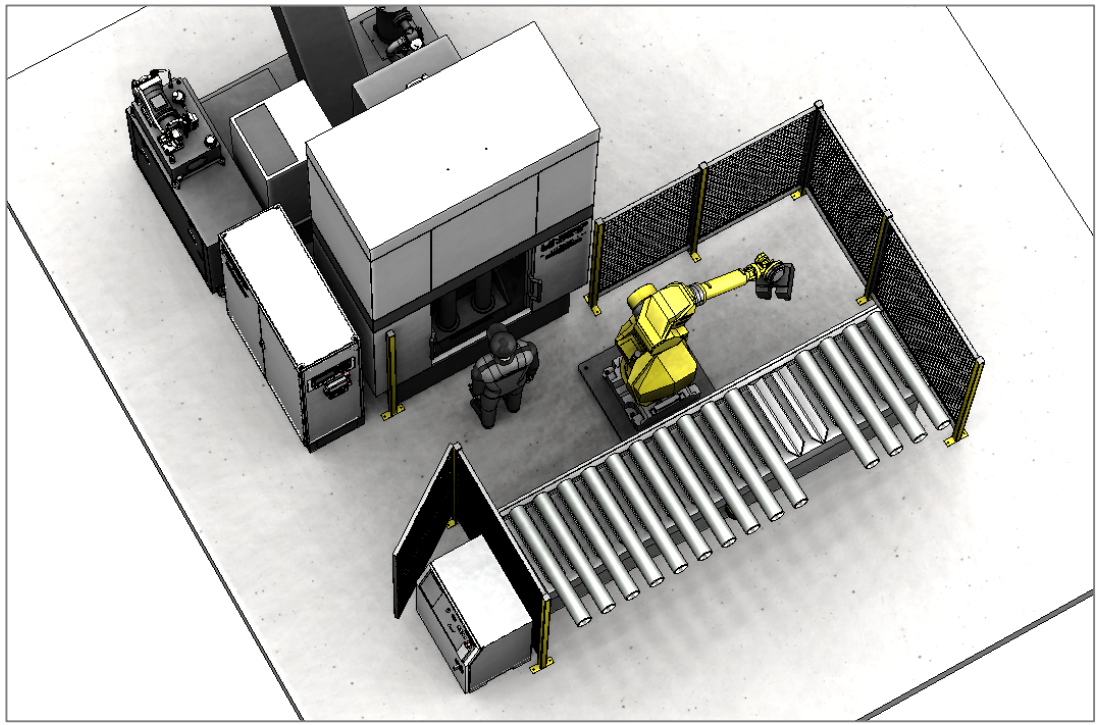


Robotic Cell Installation Example

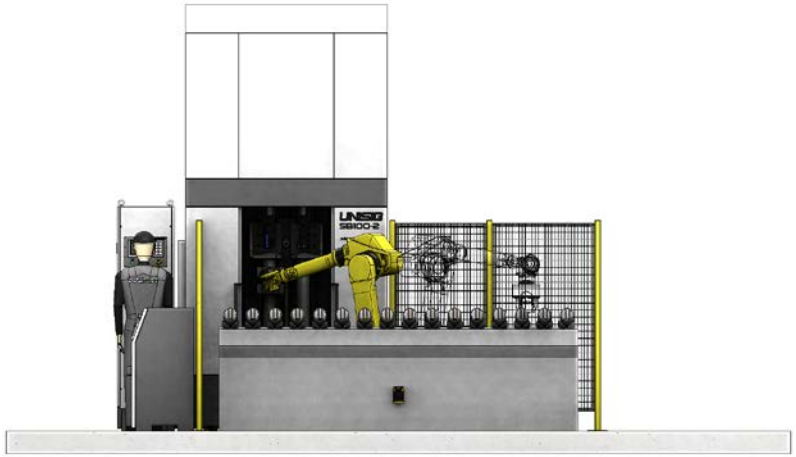
- Automatic-doors
- Universal workpiece rack – no changeover
- Barrier fencing
- Load area laser scanner
- Robot ready controls

Automation Ready Design





Easy operator access for setup is preserved with offset robot location



About UNISIG and Ecoroll

UNISIG engineers and builds state of the art machine tools for deep hole drilling and deep bore machining, used by demanding industries worldwide.

UNISIG's headquarters are in Menomonee Falls, WI USA. European Support comes from their German division, Unisig GmbH.

Ecoroll is the leader in Skiving and Roller burnishing tools and supports the production of hydraulic cylinders around the world.

Ecoroll's headquarters are in Celle, Germany. USA support comes from their Ohio facility, which provides application engineering, service and stocked parts.

UNISIG and **Ecoroll** have a very successful history working together on critical projects, as well as joint tests for new applications.

Customers receive unmatched support from UNISIG and Ecoroll.