KELLENBERGER HARD TURNING

Turning Centers

Kellenberger SP42
Kellenberger SP51
Kellenberger SP65

KELLENBERGER

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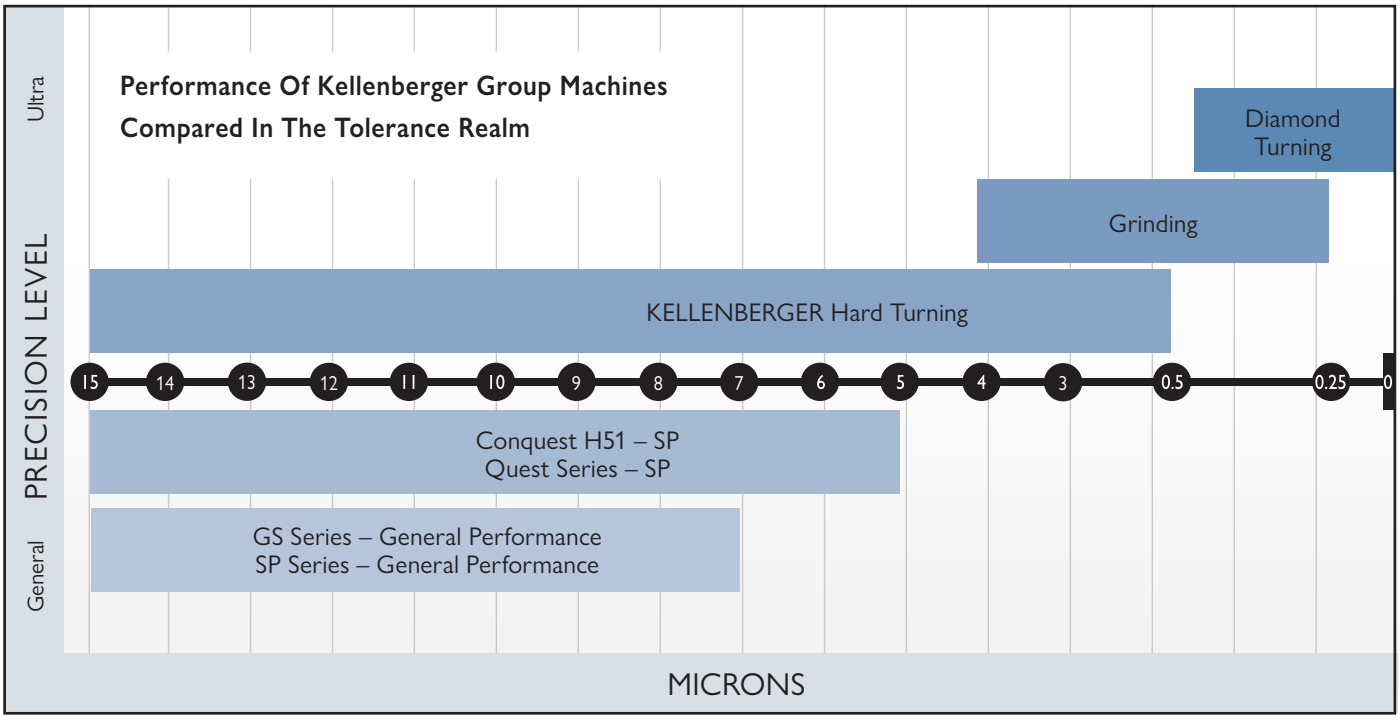
Turning Centers

Kellenberger SP is a combination of best practice, design and manufacturing of hardware and software integrated into a machine tool that provides the highest level of precision for production turning centers that require the least amount of human intervention in the marketplace today.

Key differentiators

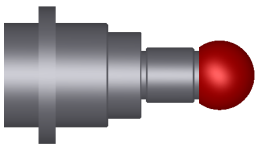
- High degree of machine stiffness qualified by Finite Element Analysis
- High surface finish capability of eight micro-inch or better
- Ball bar testing for superior geometric accuracy
- Dynamic balancing of spindle and drive motor
- Integral wrap around spindle motor technology to eliminate belts
- Matched high precision spindle bearings
- Ability to maintain 0.00012” 3 micron total deviation in diameter after a brief warm-up
- High repeatability accuracy –30 millionths (.00003”)
- Robust control/motor/drive package with 10 millionths (.00001”) control resolution
- High accuracy X-axis digital glass scales



Component Demonstration

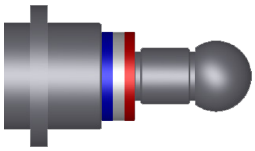
Summary of Hard Turning demonstration

- Machine Model: KELLENBERGER SP42
- Material 8620 Steel 60-62 Rc
- Surface Finish ≤ 8 micro-inch
- Holding tolerances normally reserved for grinding
- Workholding – KELLENBERGER 16C collet
- Cutting Tools – Sandvik CBN grade 7015 certified TNR
- Zeiss Rondcom 54 Form Tester
  – measurement verification



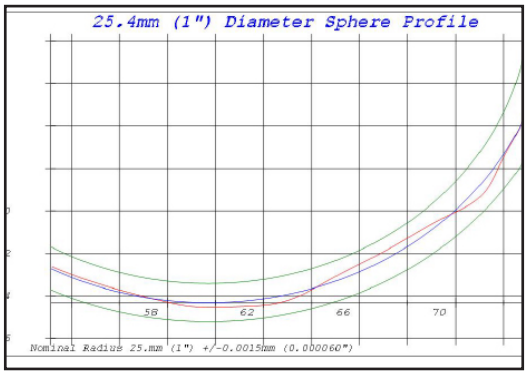
Cut #1

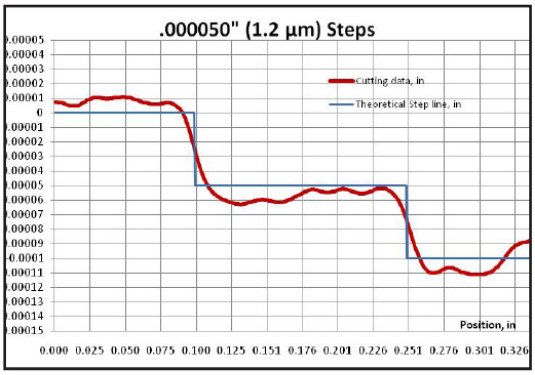
- 1.00" Diameter Sphere
- Profile Tolerance = +/- 0.000060"
  (+/- 1.5 µm)

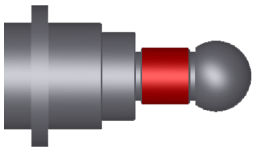


Cut #3

- Small steps .000050" (1.2 µm)
- +/- .000010 tolerance
  (+/- 0.25 µm)

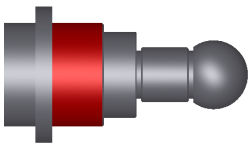






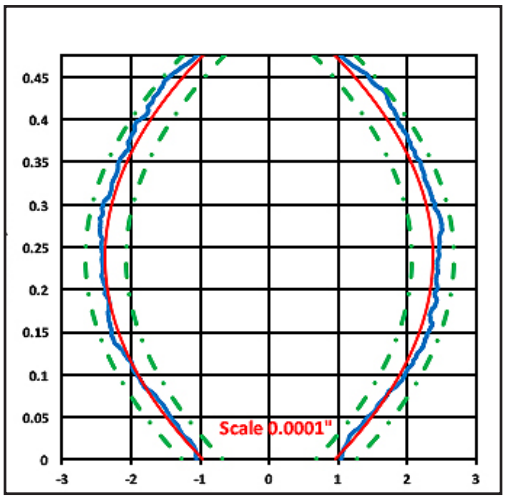
Cut #2

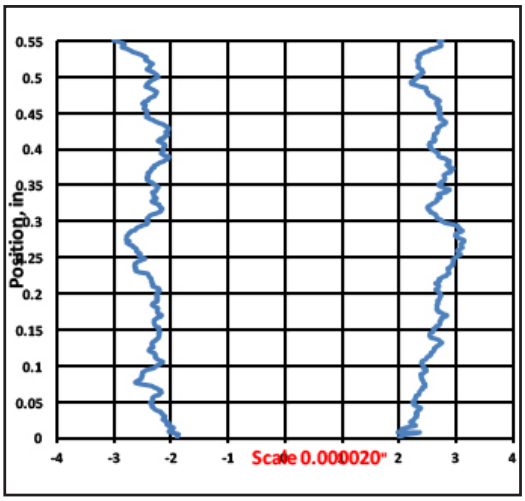
- Profile Tolerance +/-.000030" (.7 µm)
- 0.00015" (3.8 µm) chord height



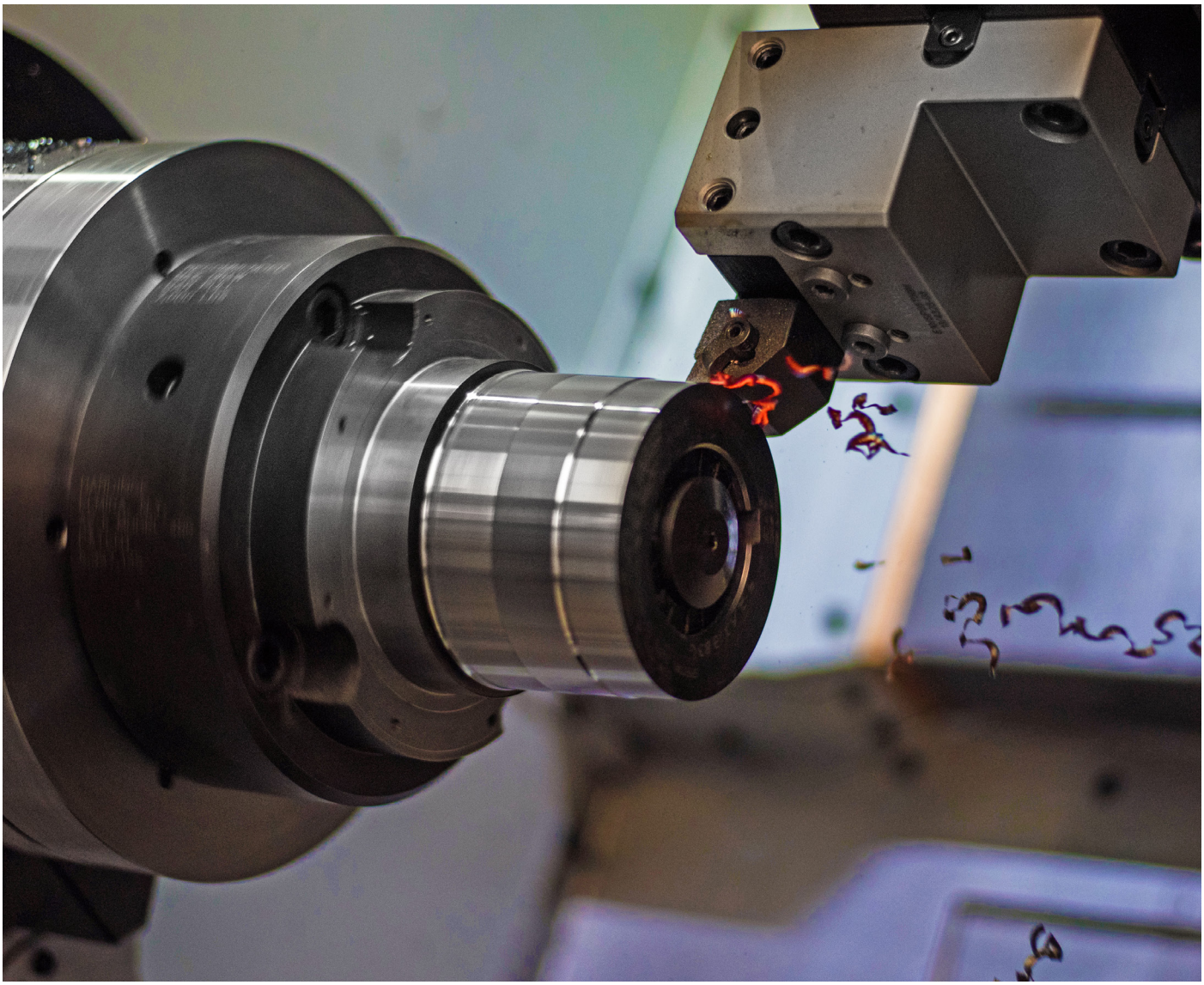
Cut #4

- Cylindricity
  = .000040" (1 µm)





Hard Turning Machines



The Kellenberger SP-Series turning centers set the standard in high-precision and high-performance turning that will take your part quality and manufacturing capabilities to new heights. SP-Series machines are designed to exceed your expectations and are ideal for two axis high-precision machining or complex multi-tasking operations that require a high level of precision, delicate part handling and for parts made complete in a single setup. Machine packages are pre-configured with our most popular features allowing you to select the proper machine tool configuration to produce your parts in the most effective and profitable manner.

The Kellenberger SP-Series turning centers are the recognized market leader in Super Precision and hard turning applications providing superior SPC (Statistical Process Control), precise micron part size control and repeatability, high surface finish capability, and thermal stability with minimal human intervention allowing the most complex parts to be manufactured to the highest precision and quality standards.

- "Soft turn" and "hard turn" on the same machine
- Less floor space requirement
- Lower overall investment
- Metal removal rates of four to six times greater
- Elminate operations
- Multiple operations in a single setup
- Finer micro finishes
- Easier Part configuration changes
- Lower cost tooling inventory
- Easier waste management (chips vs. "swarf")

KELLENBERGER SP-Series models

Standard Specifications

SP42 | Y | YT | YS | MSY | MYT

- Spindle Nose: A2-5 / 16C (A2-6 / 20C Big Bore Option)
- Collet Capacity (in/mm): 1.625 / 42 (2 / 51 Big Bore Option)
- Spindle Through Hole (in/mm): 1.890/48 (2.373 / 60.4 Big bore)
- Chuck Size (Chuck not Included) (in/mm) 6/150 (8 / 200 Big bore
- Spindle Motor (hp/kW): 15 / 11
- Max Spindle Speed (rpm): 6,000 (5,000 Big Bore Option)
- Number of Turret Stations (BMT-45 / block type): 16 / 12
- CNC Control: Fanuc 31iTB

Standard Specifications

SP51 | Y | YT | YS | MSY | MYT

- Spindle Nose: A2-6 / 20C
- Collet Capacity (in / mm): 2 / 51
- Spindle Through Hole (in / mm): 2.378 / 60.4
- Chuck Size (Chuck not included) (in / mm): 8 / 200
- Spindle Motor (hp / kW): 20 / 15
- Max Spindle Speed (rpm): 5,000
- Number of Turret Stations BMT-55 / block type): 12 / 12
- CNC Control: Fanuc 31iTB

Standard Specifications

SP65 | Y | YT | YS | MSY | MYT

- Spindle Nose: A2-6 / 25C
- Collet Capacity (in/mm): 2.5 / 65
- Spindle Through Hole (in/mm): 2.930 / 74.4
- Chuck Size (Chuck not Included) (in/mm): 10 / 250
- Spindle Motor (hp/kW): 35 / 26
- Max Spindle Speed (rpm): 4,000
- Number of Turret Stations (BMT-55 / block type): 12 / 12
- CNC Control: Fanuc 31iTB

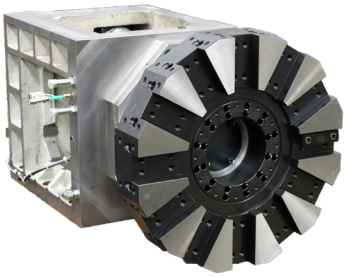
Key features

Turret & Top Plate
The Kellenberger BMT-45 Live Tooling Top Plate with Tenon tool drive system provides 16 live tooling stations with ½ stationindex between each station providing 32 stations. The Kellenberger BMT-55 has 12 and 24 stationrespectively.

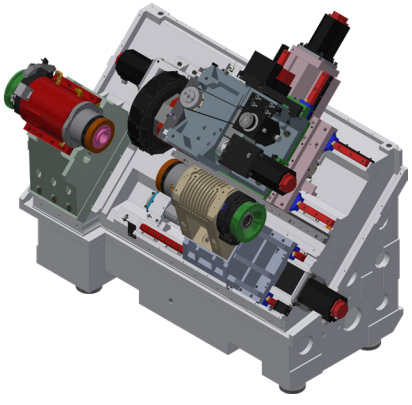
Both the static and live tool holders are designed to adapt modular add-on tool holder blocks providing the ultimate in overall tooling flexibility. The unique Kellenberger BMT system also allows fine adjustment of tools in the Y-axis plane for machines without a true Y-axis for pinpoint tool alignment. Our tooling system is keyed for precision and provides unparalleled station to station tooling accuracy and repeatability.

Kellenberger T-Style
Top Plate (static)

- Optional T-style top plate
- Utilizes T-series tool holders
- 12-station static only
- Sq. Shank: SP42: 3/4" (20mm)
  SP51 & SP65 1" (25mm)
- Rd. Shank: SP42: 1.25" (32mm)
  SP51 & SP65 1.5" (40mm)



Collet-Ready Main Spindle
The Kellenberger collet-ready spindle is the most versatile machine spindle in the industry – it is uniquely designed to accept both collets and jaw chucks without the use of an adaptor. Because the collet seats directly in the spindle, the workpiece is held close to the spindle bearings which provides the ultimate in accuracy, rigidity and gripping force. It also allows for maximum spindle RPMs which increases productivity. This exclusive design also offers numerous workholding capabilities including solid collets, master collets, dead length collets, step chucks, 3-jaw chucks and FlexC collets systems.



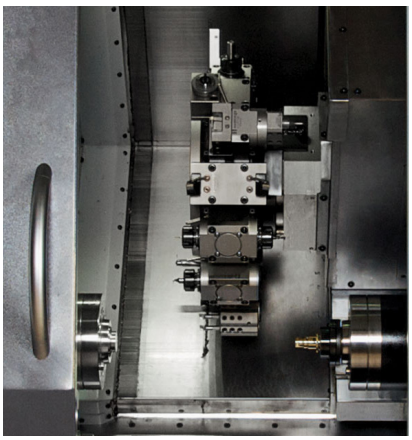
Linear Glass Scale
The Heidenhain closed-loop linear scale system on the X,Y, Z axes provide direct measurement to compensate for any ballscrew thermal growth and wear ensuring the highest accuracy through the most demanding duty cycles and over the life of the machine.

Robust 45° base structure
The one-piece 45 degree slant bed design greatly inhibits thermal deformation and twisting, allowing for precision cutting performance and demanding part accuracies.

Collet-Ready Spindle Advantages

- Collet seats directly in the Kellenberger spindle
- Maximum rigidity and gripping power is transferred to the part
- Maximum utilization of RPM
- Minimum weight on spindle
- Minimum overhang from the spindle bearings that assures spindle accuracy is transferred directly to the workpiece
- Optimum T.I.R.
- Gripping force directly over the workpiece
- Superior tolerances and finishes
- Capable of using maximum machine stroke capacity
- Longer tool life
- Quick changeover

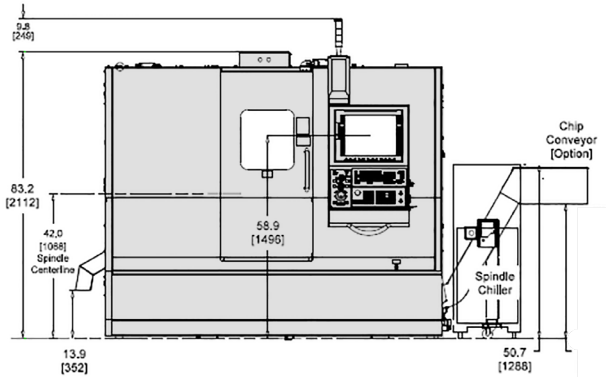
Live Tooling
Live tool holders start at 8,000 RPM and are capable of up to 32,000 RPM when purchased with ratios of 2:1 or 4:1 when high speeds are required. The Kellenberger BMT live tooling holders provide superior run-out within .00012" (3 micron) making it the overall best in class tooling system.



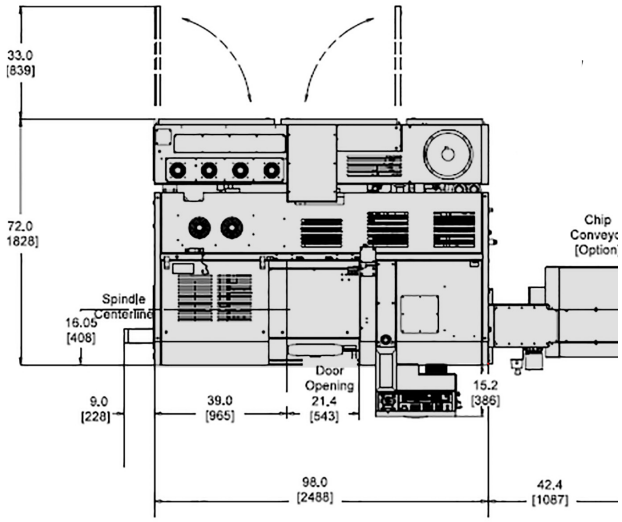
Tailstock
The servo driven tailstock features a non quill style body and is fully programmable with torque control to set the tailstock force, as well as advance or retract between machining cycles. Multiple positioning is possible to allow for multiple bar feed out applications. The system will accommodate either a live or dead center with a #4 Morse taper.

Floor plan SP42

Front View

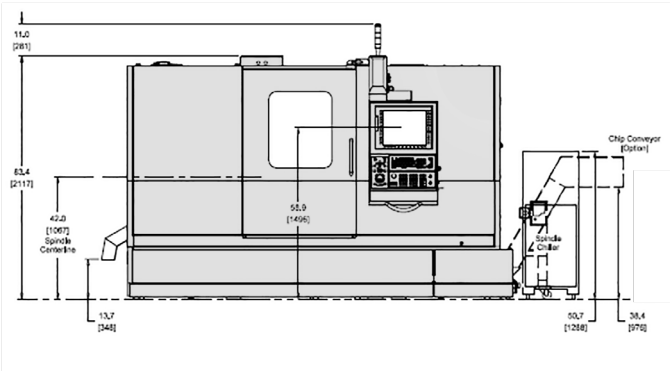


Top View

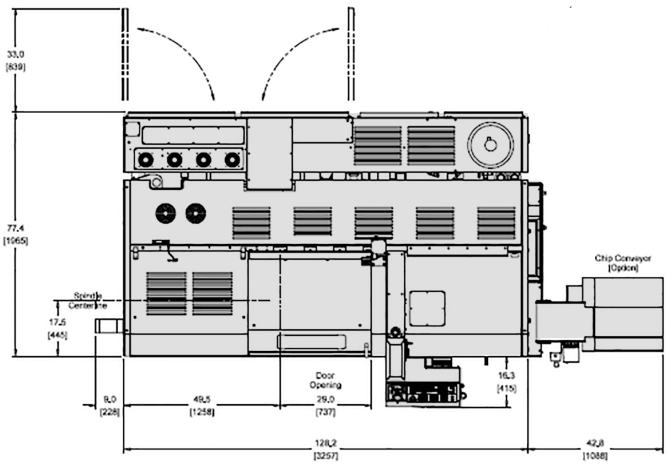


Floor plan SP51 & SP65

Front View



Top View



Controls: Fanuc 31i TB

Included Control Features

99 Geometry/Wear offsets (XYZR)
Inch/Metric Selection by G-Code
160 Meters (64Kbyte) Part Program Storage
Absolute/Incremental Programming
Alarm Display
Auto Coordinate System Setting
Background Editing
Block Skip
Canned Cycles (Turning/Drilling)
Chamfer/Corner Rounding
Circular Interpolation by R Programming
Constant Surface Speed Programming
Continuous Thread Cutting
Coordinate System Setting (G50)
Custom Macro B
Decimal Point Programming
Diameter/Radius Programming
Direct Drawing Dimension Programming
Display Position, Program, Alarm, History, Ethernet ready
Extended Part Program Edit (copy/replace)
External Workpiece Number Search
Floating Reference Point Return
Helical Interpolation (All M S models)
Help Screen
Input of Offset Values by (G10)
Interpolation (Linear/Circular)
Machine Lock/Dry Run
Manual Guide i with full color display
Program Number Search
Programmable Parameter Input
Reference Point Return
Registered Part Program Storage (1000)
Rigid Tapping – All Spindles
Run time parts counter
Self-Diagnostic Function
Spindle Orient (One degree)
Spindle Synchronization (All S models)
Sequence Number Search
Single Block Operation
Skip Function G31
Stored Stroke Check 2 & 3
Straightness Compensation
Sub Program Call (10-fold nested)
Thread Cutting
Tool Nose Radius Compensation
Workpiece Coordinate System (G52-G59)
Program Protect

Control Options: All Configurations

Additional Hard Drive 32GB or 64GB or 128GB
Additional Custom Macro Variables (500)
Additional Custom Macro Variables (1050)
Floating Reference Return
Multiple Repetitive Cycles II (Pockets)
Thread Cutting Cycle Retract
Variable Lead Threading
Arbitrary Speed Threading
Circular Thread Cutting
Circular Thread Cutting B
Tool Offsets 200 Pair
Tool Offsets 400 Pair
Tool Offsets 499 Pair
Tool Offsets 999 Pair
Tool Offsets 2000 Pair
Manual Handle Retrace
Tool Retract and Recover
Part Program Storage – 320M (128K)
Part Program Storage – 640M (256K)
Part Program Storage – 1280M (512K)
Part Program Storage – 2560M (1MB)
Part Program Storage – 5120M (2MB)
Part Program Storage – 10240M (4MB)
Part Program Storage – 20480M (8MB)
Polygon Turning (M models)
Additional Workpiece Coordinate System (48 pairs)
3D Coordinate System Conversion (MY models)
6500 I/O Device
Tool Management Function (64 pair)
Tool Management Function (240 pair)
Tool Management Function (1000 pair)
Energy Saving Level Set Function
Unexpected Disturbance Torque Function
Axis Synnchronous control (MSY model)

Machine Options

Sub-Spindle Part Present Detector
Big Bore Main Spindle (A2-6/20C, 2"/51mm Bar Capacity)
Marposs Tool Touch Probe
Marposs Part Probe, Wireless
Auto Door
Main Spindle Part Catcher with Conveyor
Sub Spindle Part Catcher with Conveyor
Remote MPG
Sub Spindle Part Ejector (for sub machines with main part catcher)
Spindle Liner Kit Includes (3) steel spacers and (4) nylon bushings
Spindle Liner Bushing (3 required for each bar stock size)
CSA Specification (Canada)
Power case air conditioner
Auto Grease System
Kellenberger Standard Automation Interface
LNS Chip Conveyor

Conversational programming features offered on the CNC control is the CNC control builder's standard product, which may not fully support all machine functions. It is recommended the end user reference the control system documentation, or contact the control manufacturer, for further details of use or customization.

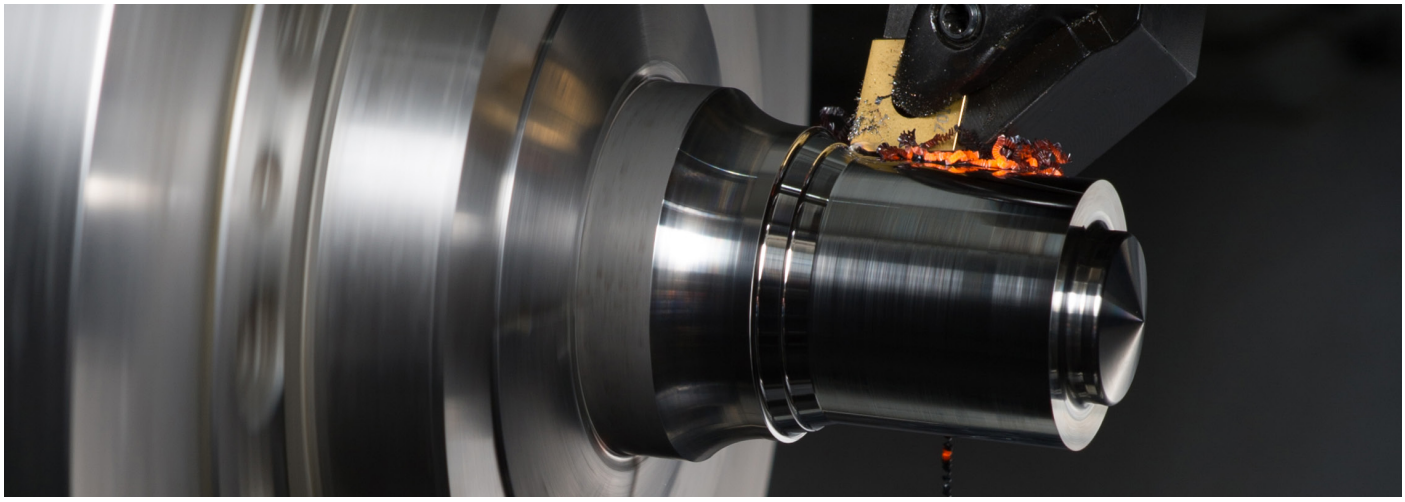
Specifications

	SP42	SP51	SP65
Max. Swing Over Way Covers	27" (685.8mm)	29.88" (758.9mm)	29.88" (758.9mm)
Chuck Size	6" (150mm)	8" (200mm)	10" (250mm)
Max. Bar Capacity	1.625" (42mm)	2" (51mm)	2.5" (65mm)
Max. Machining Diameter (BMT)	9.41" (239mm)	12.35" (313.7mm)	12.35" (313.7mm)
Max. Machining Diameter (T-Style)	12.9" (327.7mm)	15.245" (387.2mm)	15.245" (387.2mm)
Max. Machining Length w/Tailstock BMT	14.2" (360.6mm)	22.47" (570.7mm)	22.47" (570.7mm)
Max. Machining Length w/Tailstock Kellenberger T-style	14.9" (378.5mm)	23.6" (599.4mm)	23.6" (599.4mm)
Max. Machining Length w/Chuck BMT	9.63" (244.6mm)	16.85" (428mm)	15.70" (398.65mm)
Max. Machining Length w/Chuck Kellenberger T-style	10.3" (261.6mm)	17.99" (456.8mm)	16.83" (427.36mm)
Main Spindle			
Max. Speed	6000-rpm	5000-rpm	4000-rpm
Max. Power Rating (cont.)	15-hp (11 kW)	20-hp (15 kW)	35-hp (26 kW)
Max. Torque (cont.)	108 ft-lb (146.3 Nm)	256 ft-lb (347 Nm)	311 ft-lb (421 Nm)
Base Speed	750-rpm	420-rpm	590-rpm
Spindle Nose	A2-5 / 16 C	A2-6 / 20 C	A2-6 / 25 C
Chuck Size (chuck not included)	6" (150 mm)	8" (200 mm)	10" (250 mm)
Spindle Bore (not bar capacity)	1.89" (48mm)	2.378" (60.4mm)	2.935" (75mm)
Spindle Center Height	42" (1066.8mm)	42" (1066.8mm)	42" (1066.8mm)
Spindle Reach	16" (406.4mm)	17.5" (444.5mm)	17.5" (444.5mm)
Spindle Orient (opt.)	1.0 degree	1.0 degree	1.0 degree
Closer Type	Hydraulic	Hydraulic	Hydraulic
Max. Hang Weight	100 lbs. (45.3kg)	300 lbs. (136kg)	300 lbs. (136kg)
Sub-Spindle			
Max. Speed	6000-rpm	5000-rpm	5000-rpm
Max. Power Rating (cont.)	15-hp (11 kW)	15-hp (11 kW)	15-hp (11 kW)
Max. Torque (cont.)	108 ft-lb (146.3 Nm)	108 ft-lb (146.3 Nm)	108 ft-lb (146.3 Nm))
Base Speed	750-rpm	750-rpm	750-rpm
Spindle Nose	A2-5 / 16 C	A2-6 / 20 C	A2-6 / 20 C
Chuck Size (chuck not included)	6" (150 mm)	6" (150 mm)	6" (150 mm)
Spindle Bore (not bar capacity)	1.89" (48mm)	2.378" (60.4mm)	2.378" (60.4mm)
Spindle Center Height	42" (1066.8mm)	42" (1066.8mm)	42" (1066.8mm)
Spindle Reach	16" (406.4mm)	16" (406.4mm)	16" (406.4mm)
Spindle Orient (opt.)	1.0 degree	1.0 degree	1.0 degree
Closer Type	Pneumatic	Pneumatic	Pneumatic
Max. Travel	16" (406.4mm)	25.125" (638mm)	25.125" (638mm)
Max. Traverse Rate	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Max. Distance from Sub to Main Spindle Face	16.5" (419.1mm)	25.75" (654.1mm)	25.75" (654.1mm)
Min. Distance from Sub to Main Spindle Face	.5" (12.7mm)	.625" (15.8mm)	.625" (15.8mm)
Max. Hang Weight	100 lbs. (45.3kg)	100 lbs. (45.3kg)	100 lbs. (45.3kg)

Specifications

	SP42	SP51	SP65
Max. X-Axis Travel	6.37" (161.8mm)	7.76" (197mm)	7.76" (197mm)
Max. Z-Axis Travel	16" (406.4mm)	25" (635mm)	25" (635mm)
Max. Y-Axis Travel	3.25" (82.55mm)	3.50" (88.90mm)	3.50" (88.90mm)
Continuous Z-Axis Thrust	1,500 lbs. (6,672N)	2,250 lbs (10,008N)	2,250 lbs (10,008N)
X-Axis Rapid Traverse Rates	945-ipm (24m/min)	1100-ipm (28m/min)	1100-ipm (28m/min)
Z-Axis Rapid Traverse Rates	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Y-Axis Rapid Traverse Rates	500-ipm (12.7m/min)	500-ipm (12.7m/min)	500-ipm (12.7m/min)
Kellenberger BMT Live Tooling Top Plate			
BMT bi-directional	16-station + ½ station index	12-station + ½ station index	12-station + ½ station index
Square Shank	3/4" (20mm)	1" (25mm)	1" (25mm)
Round Shank Tooling	1.25" (32mm)	1.5" (40mm)	1.5" (40mm)
Index Time (rotation/including clamp-unclamp)	.35/1.45 sec	.35/1.35 sec	.35/1.35 sec
Tool Shank Dia. w/ER 25 Collets	.04 - .625" (1mm -16mm)	.04 - .625" (1mm -16mm)	.04 - .625" (1mm -16mm)
Live Tooling Power Rating (30 Min Rating)	7.5-hp (5.5 kW)	10-hp (7.5 kW)	10-hp (7.5 kW)
Live Tooling Torque Rating (30 Min Rating)	25 ft-lb (33 Nm)	31 ft-lb (42 Nm)	31 ft-lb (42 Nm)
Live Tooling Max Speed	8,000-rpm	8,000-rpm	8,000-rpm
Kellenberger Block Type (T-Style) Static Top Plate			
Block Type (Static) bi-directional	12-station	12-station	12-station
Square Shank (Left, Right or Inverted Tooling)	3/4" (20mm)	1" (25mm)	1" (25mm)
Round Shank Tooling	1.25" (32mm)	1.5" (40mm)	1.5" (40mm)
Index Time (rotation/including clamp-unclamp)	.35/1.2 sec.	.35/1.2 sec.	.35/1.2 sec.
Servo Driven Tailstock			
Morse Taper (no quill needed)	MT # 4	MT # 4	MT # 4
Max. Tailstock Travel	16" (406.4mm)	25.15" (638.8mm)	25.15" (638.8mm)
Max. Traverse Rate	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Min. Applied Force	350 lb. (1.55kN)	370 lb. (1.6kN)	370 lb. (1.6kN)
Max. Applied Force	1500 lb. (6.7kN)	1599 lb. (7.1kN)	1599 lb. (7.1kN)

	SP42	SP51	SP65
Coolant Capacity	55 gallon (208 liter)	67 gallon (254 liter)	67 gallon (254 liter)
Max. Pressure	200 psi (13.8 bar)	200 psi (13.8 bar)	200 psi (13.8 bar)
Coolant Flow Rate (Per-Minute)	6.7 gallon (25.4 liters)	6.7 gallon (25.4 liters)	6.7 gallon (25.4 liters)
High Pressure Through Turret (Option)	1,000 psi (68.95 bar)	1,000 psi (68.95 bar)	1,000 psi (68.95 bar)
High-Performance Accuracy & Surface Finish Specifications			
Part Surface Finish	12 micro-inch / .30 micron	12 micro-inch / .30 micron	12 micro-inch / .30 micron
Overall Axis Repeatability	.00005" / 1.27 micron	.00005" / 1.27 micron	.00005" / 1.27 micron
Program Resolution (non-SP)	.00001" (.0001mm)	.00001" (.0001mm)	.00001" (.0001mm)
Turret Indexing Repeatability	.000060" / 1.52 micron	.000060" / 1.52 micron	.000060" / 1.52 micron
Accuracy & Surface Finish Specifications			
Overall Axis Repeatability (X, Z)	.000030" (.76 micron)	.000030" (.76 micron)	.000030" (.76 micron)
Part Surface Finish	6 micro-inch (.15 micron)	8 micro-inch (.2 micron)	8 micro-inch (.2 micron)
Roundness	.00001" (.25 micron)	.00002" (.5 micron)	.000025" (.625 micron)
Total Variation on Diameter	.00012" (3 micron)	.00012" (3 micron)	.00012" (3 micron)
Program Resolution	.00001" (.0001mm)	.00001" (.0001mm)	.00001" (.0001mm)
Turret Indexing Repeatability	.000060" / 1.52 micron	.000060" / 1.52 micron	.000060" / 1.52 micron
Power Requirements (MSY Configuration)			
Max. kVA/Full Load Amps	81 kVA/102FLA	89 kVA/112FLA	89 kVA/112FLA
Max. Voltage/Hz	400/50Hz, 460/60Hz	400/50Hz, 460/60Hz	400/50Hz, 460/60Hz
Phase/Hertz	3-phase/50-60 Hz	3-phase/50-60 Hz	3-phase/50-60 Hz
Miscellaneous			
Lubrication	Grease	Grease	Grease
Communication	RS-232-C, Ethernet	RS-232-C, Ethernet	RS-232-C, Ethernet
Length	98" (2489.2mm)	128.23" (3257mm)	128.23" (3257mm)
Depth	85.24" (2165mm)	91.04" (2312.4mm)	91.04" (2312.4mm)
Height (no stack light)	82.25" (2089mm)	83.6" (2123mm)	83.6" (2123mm)
Approx. Weight	13,100 lb (5940kg)	17,200 lb (7800kg)	17,200 lb (7800kg)
Approx. Shipping Weight	13,600 lb (6170kg)	18,900 lb (8570kg)	18,900 lb (8570kg))
Air Requirement	70 - 90 psi (4.8-6.2 bar)	70 - 90 psi (4.8-6.2 bar)	70 - 90 psi (4.8-6.2 bar)



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