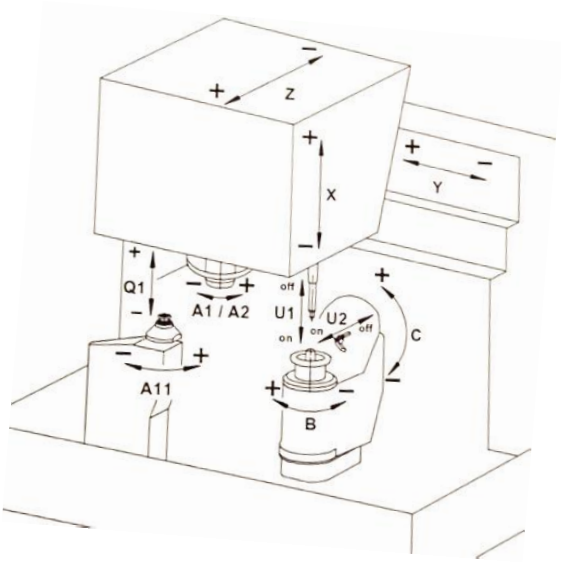
TECHNICAL DATASHEET
CNC-Bevel Gear Grinding Machine

Manufacturer	**KLINGELNBERG**
Type	**OERLIKON G60**
Control	**SINUMERIK 840 D**
Built	**2005**

The OERLIKON G60 is a precision grinding machine for high-precision finish-machining of spiral-toothed bevel gears up to 600mm ring gear diameter according to the well-known KLINGELNBERG, WIENER, OERLIKON and GLEASON systems as well as for machining spur couplings and CURVIC-COUPLINGS®.
It has a single grinding head with a grinding spindle for circular cup wheels. The integrated dressing unit allows the tool to be profiled within the machine. Due to the machine concept with only 5 CNC axes instead of 9 axes in conventional bevel gear machines, it is possible to realize the movement between diamond roll and grinding wheel required for profiling exclusively with the NC axes that are needed for grinding anyway.
Furthermore, the arrangement of the profiling tool during dressing allows the use of a single diamond roll for all applications.

The KLINGELNBERG 5-axis concept offers the following advantages:

- The axis offset can easily be superimposed on the movement of the Z-axis
- The value of the installation dimension is superimposed on the X and Y axes depending on the basic angle position of the C axis
- The position between the grinding wheel and the workpiece corresponding to the inclination of the tool can be exactly reproduced mathematically by changing the machine angle C during the rolling motion



Workpiece data			
Largest workpiece diameter	600	mm	
Normal module range	2 - 12	mm	
Adjustable dividing cone angle	-90 to +90	◦	
Axis offset above and below center	+/- 100	mm	
Max. grindable number of teeth	360		
Grindable spiral angle (in tooth center)			Without limit
Ø of the workpiece holder	203.2	mm	8“

Tool data			
Grinding wheel Ø	406	mm	16“
Max. Height of grinding wheel with base plate	135	mm	
Max. Grinding spindle speed	4.500	1/min	
Spindle mounting	HSK-E63		

Grinding head (X axis)		
Travel	340	mm
Max. Travel speed (approx.)	20.000	mm/min
Drive type		Synchronous servo motor water cooled
Spindle pitch	15	mm

Grinding slide (Y-axis)		
Travel	1.310	mm
Max. Travel speed	60.000	mm/min
Max. Acceleration	2,5	m/s²
Drive type		Linear motor water cooled

Axis radial (Z-axis)		
Travel	300	mm
Max. Travel speed	20.000	mm/min
Drive type		Synchronous servo motor water cooled
Spindle pitch	10	mm

Workpiece axis (B axis)		
Max. Workpiece spindle speed	40	1/min
Worm drive ratio	1:75	

Swivel axis workpiece (C axis)		
Max. Traversing speed	10800	°/min
Max. Speed	100	U/min

Software package

- Siemens "Safety integrated" software for safe machine operation
- Generating and plunge grinding up to max. 20 revolutions
- Double generating for max. 10 revolutions
- Dressing according to adjustable number of teeth and round pass related
- automatic test cycles for visual control of the grinding result possible
- variable units for lengths, angles and pressure units
- easy language switching to the available national languages
- easily programmable macro commands for sequence control
- data memory on hard disk for more than 10000 different workpieces
- speed and power consumption of the grinding motor as graphical bar display with power monitoring
- workpiece counter (adjustable by the operator)
- Start of each machine operation / machine movement from any machine position (collision calculation before start)
- Printout of all setting values and database contents via interface
- Technological inputs for economical deep grinding of gears
- Quick start button for serial operation

Connection data		
Total connected load approx.	81	kVA
Operating voltage	400	V
Operating frequency	50	Hz
Control voltage	24	V DC
Fuse protection	125	A
Compressed air connection	6	bars

Dimension, weight

Space requirement approx. l x w x h	ca. 3,65 x 5,5 x 3,1	m	
Machine weight approx.	19.500	kg	Ohne Filteranlage

Equipment and accessories

- Control Siemens 840 D with operating system Windows XP, drives Siemens Simodrive 611, Profibus interfaces.
- Single grinding head with fully automatic grinding wheel threading device for exact determination of the tooth gap position at any workpiece position. No manual adjustment is necessary in series operation.
- System-independent grinding of almost all spiral bevel and hypoid gears pre-toothed in single-part and continuous processes.
- Extremely efficient and precise grinding of spur gear couplings, such as Curvic® couplings.
- Fully CNC-controlled machine concept designed for shortest set-up and changeover times as well as highest gear accuracy and grinding performance.
- Manual data input or read-in via data carrier from the KIMoS calculation program with the possibility of data storage for repeat cases on fixed memory disk or floppy disk.
- Workpiece-specific pre-programmable fully automatic work sequences with automatic threading of the grinding wheel into the pre-machined workpiece profile.
- High grinding performance due to 31 kW grinding wheel drive, intensive wet grinding and eccentric grinding spindle unit to avoid structural damage due to grinding burn.
- Low proportional tool costs through optional use of commercially available ceramic, vitrified bonded SG or CBN grinding wheels.
- Free profile modification possibilities through path-controlled dressing of the ceramic and vitrified bonded grinding wheels by means of a diamond roller.
- Automatic tracking of the cooling oil nozzles during dressing.
- Workpiece spindle with 8 inch mounting
- Automatic emergency retraction in case of overload of the drives
- Lockable maintenance room for hydraulics, pneumatics, lubrication, extinguishing system
- Automatic central lubrication and integrated hydraulic and pneumatic system
- Liquid cooled grinding spindle unit and direct drives
- Hydraulic workpiece and grinding wheel clamping device
- Pressure relief flap with release contact for an extinguishing system
- 1 set of fixators for precise alignment of the machine
- automatic work area door
- documentation in German language, double version
- integrated control cabinet with automatic cooling unit, completely installed with network-compatible full CNC control for all working and setting axes and integrated PLC
- high resolution absolute or incremental encoders for all linear and rotary axes
- liquid cooled motors and spindles for grinding with eccentric and dressing
- 2 machine lights in the work area
- Machine status light
- Exhaust system for the working area
- Program hours approx. 32.000h
- The machine has an interface to an automatic loading unit (Promot RZ)

Scope of delivery of the machine as described, but **without**:

- Coolant nozzle package
- 3D probe head
- Hoffmann coolant system