



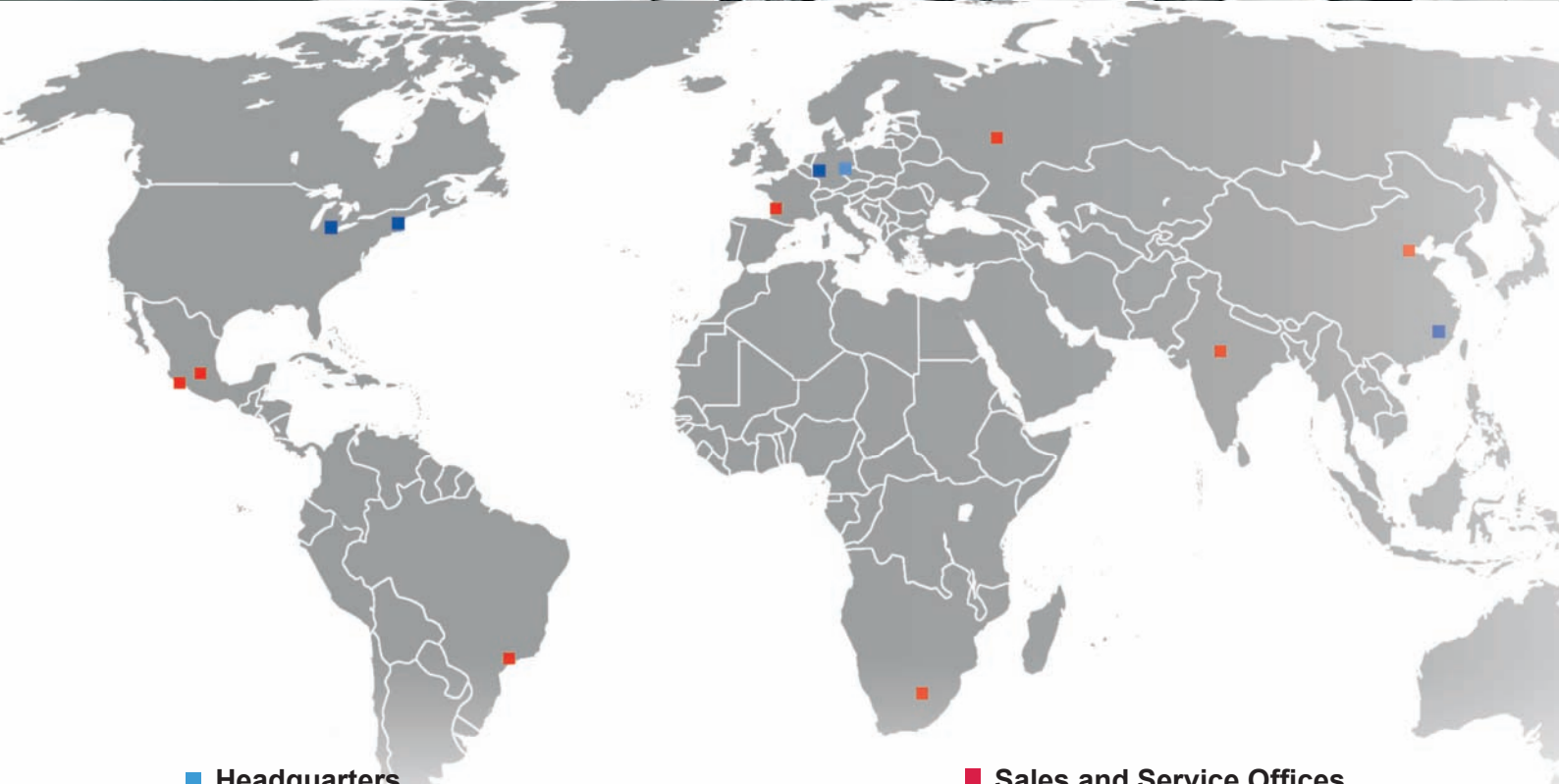
## **Automotive Industry**

System Solutions for the Manufacture of Powertrain Components



**NILES-SIMMONS-HEGENSCHEIDT**





■ **Headquarters**

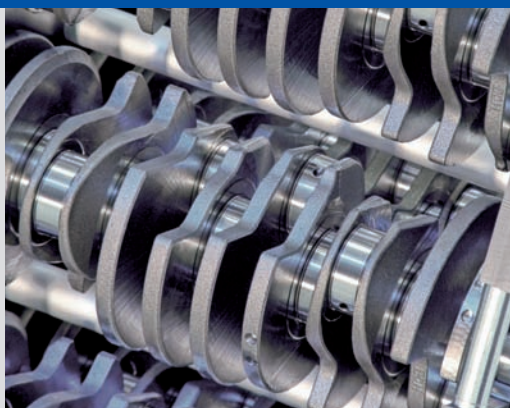
NSH Group - Chemnitz, Germany  
A member of VDMA/VDW

■ **Production sites**

NILES-SIMMONS - Chemnitz, Germany  
HEGENSCHEIDT-MFD - Erkelenz, Germany  
WEMA - Glauchau, Germany  
SIMMONS MACHINE TOOL Corp. - Albany USA  
HEGENSCHEIDT-MFD - Detroit, USA  
NSH-CTI - Nanchang, China

■ **Sales and Service Offices**

Beijing - China  
New Delhi - India  
Laperche - France  
São Paulo - Brazil  
Brisbane - Australia  
Guadalajara - Mexico  
Queretaro - Mexico  
Johannesburg - South Africa  
Nizhny Novgorod - Russia





## For higher efficiency

Highest productivity and quality, maximum efficiency along with ever shorter product life cycles – these are the requirements of the automotive industry.

As one of the leading machine tool manufacturers, we supply equipment for machining of powertrain components to passenger vehicle and system-component manufacturers worldwide.

The companies of the NSH Group, as long-standing partners of the automotive industry, have been certified according to DIN EN ISO 9001:2000 and VDA 6.4.

To cope with your machining tasks, NILES-SIMMONS-HEGENSCHEIDT offers you production solutions based on

- o **N-Series Slantbed Lathes**
- o **MC-Series CNC-Turning-Milling-Drilling Centres**
- o **CM-Series Crankshaft Milling Centres**
- o **TB-Series Crankshaft Turn-Broaching Machines**
- o **NV-Series Vertical Turning Centres**
- o **Cam Form-Milling Machines**
- o **Deep-rolling and roll-straightening Machines**
- o **Fine-turning and roller-burnishing Machines**

NILES-SIMMONS-HEGENSCHEIDT plans, designs, and implements **complete turnkey production lines** for the manufacture of engine and drivetrain components such as crankshafts, camshafts and gear shafts from prototype up to full production volumes.

This competence is based on the long-term experience gained in building machine tools and synergy effects obtained from the close co-operation between the NSH Group of companies and renowned German and international automotive manufacturers.

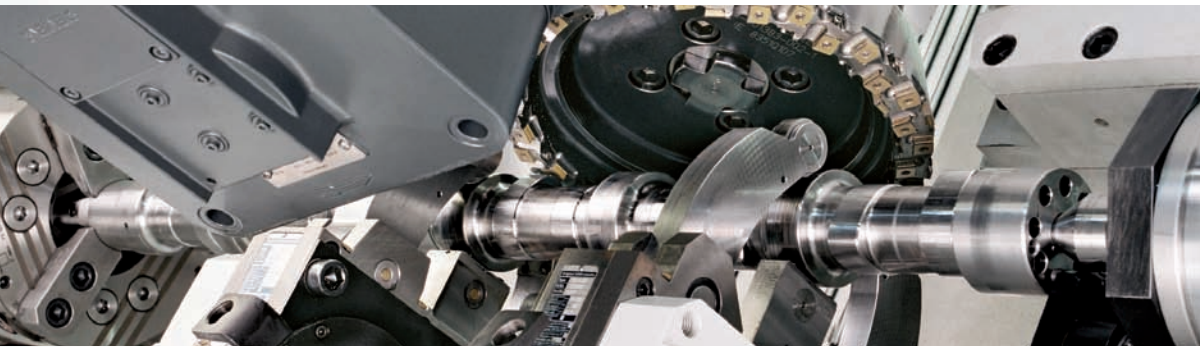
Thanks to flexible production lines combining flexible machine concepts with innovative automation of machines and work pieces, our customers are able to react rapidly to changes in market requirements.

## International references



# Slantbed Lathes N-Series





The modular series of **CNC Slantbed Lathes N10 to N50** with swing up to 1,250 mm and a turning length of up to 8,000 mm can be specifically adapted to efficiently turn and completely machine specific work-pieces.

These state-of-the-art machine tools combine experience from 50-years of development of NC-lathes and over 100-years of experience building lathes in Chemnitz.

### Your benefits at a glance

Robustly designed production machine featuring high permanent precision on the basis of the most up-to-date components

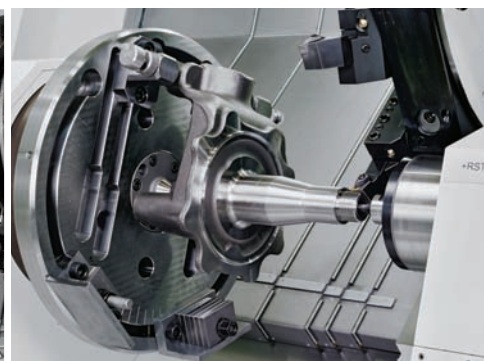
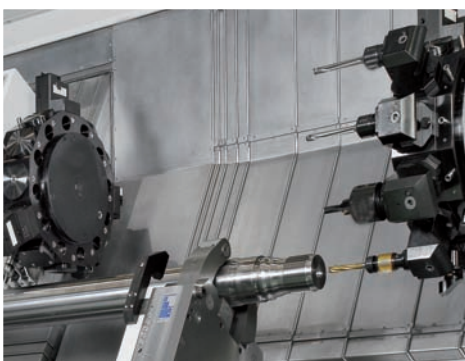
- Sturdy machine beds in composite or cast construction featuring utmost vibration dampening properties
- Single or multi-slide machines with precise antifriction roller guides and direct encoder systems
- Highly-dynamic and high-torque work spindles of thermo-symmetrical construction and high rigidity

#### Cost-per-part reduction

- Stock-removal rates and stability ensure low production times in conjunction with highest tool life
- Minimized auxiliary process times, even for auxiliary movements, due to highly-dynamic NC-drive equipment
- Highest productivity due to adapted process combinations
- Hard and finish machining in grinding quality

Our machine concept fundamentally meets the standards of the automotive industry focused on minimizing the Total Costs of Ownership (TCO).

- Control and automation components comply with the requirements of the automotive industry
- Energy efficient and consumption optimized sub-assemblies to ensure optimal use of resources
- Utmost availability due to optimized maintenance and service solutions
- Long lifecycle with the possibility of retrofitting
- We adapt our machines to your product specific design specifications and to your production environment
- In particular, the N10...N30 machines are used in stand-alone environments or integrated into automated production lines in the automotive industry

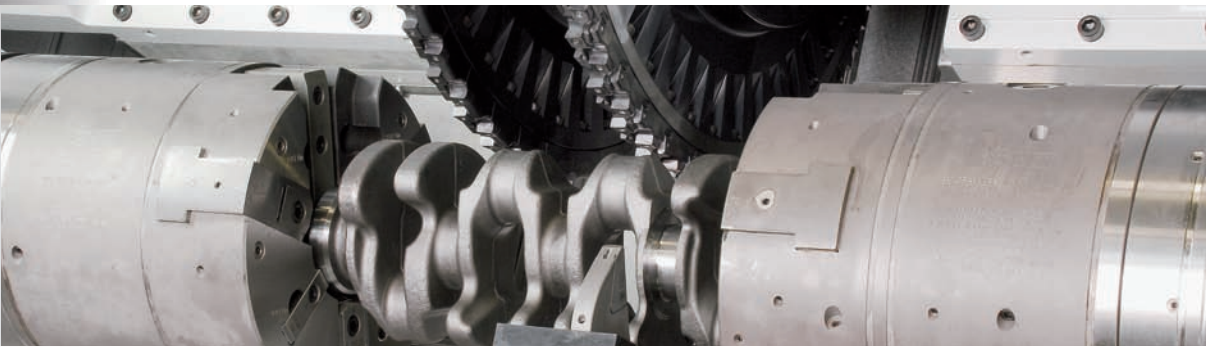


# Crankshaft Milling Centres CM-Series



FS2

NILES-SIMMONS  
N20 CM



The **N20CM and N30CM Crankshaft Milling Centres** have been conceived for rough- and finish-milling of main and pin bearing journals of truck and passenger vehicle crankshafts with lengths up to 1,800 mm.

The two machine sizes are based on robust machine beds in composite construction. The machine construction design is identical and only differs in size and technical performance.

Symmetrical work spindles are directly driven by gearless torque motors and are synchronized electronically. For this process, the work spindles are equipped with optimized bearings. Standard spindle noses size A8/A11, according to DIN 55026, are used.

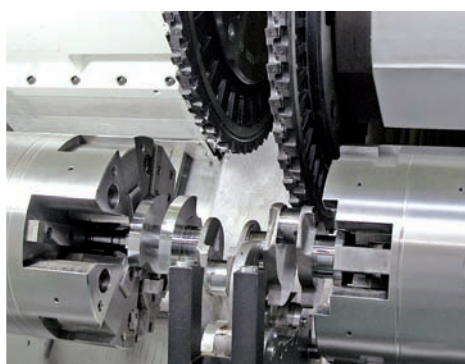
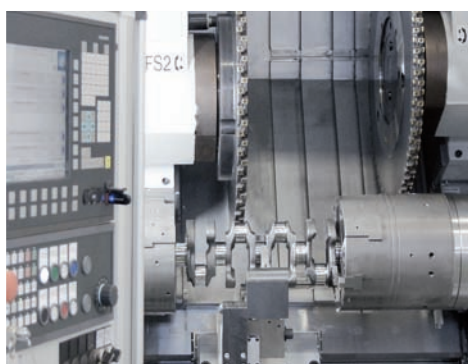
Axial and cross slides are guided by a combination of box and antifriction roller guideways.

Two compact milling units each with powerful synchronous drives ensure simultaneous milling of main and pin bearing journals on crankshafts in one concentric setup.

Electronic coupling and interpolation of the spindle tool system in combination with special compensation strategies ensure the capable manufacture of high-precision bearing geometries with minimum allowances for grinding.

### Your benefits at a glance

- Reliable dry milling of bearing geometries, cheeking and counterweight contours as well as other concentric and eccentric features with one or two external cylindrical cutters
- Torque vs. power curves adapted to machine size with an available torque of 3,030 Nm and/or 4,550 Nm on the milling spindles
- Identical A11 tool interface according to DIN 55026 including mechanical coding and interchange protection for left and right milling cutters with 700 mm diameter
- Heavy duty milling unit for machining of truck crankshafts with an available torque of 6,500 Nm
- Standardized clamping solutions with integrated or separate radial orientation of work pieces
- Configuration with up to two NC-positioned friction-pad steady rests
- Semi-automatic tool clamping, tool data is transferred automatically via ID-chip
- Customized tool and clamping fixture interfaces
- Graphic interactive programming interface for easy creation of milling programs
- Temperature compensation



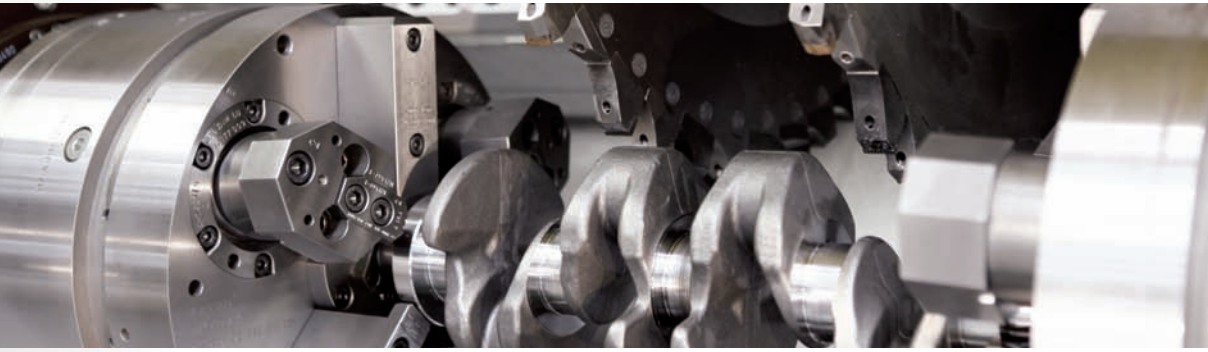
# Crankshaft Turn-Broaching Machines TB-Series



NILES-SIMMONS  
**N20 TB**







The **N20TB and N30TB Crankshaft Turn-Broaching Machines** have been conceived for turning and turn-broaching operations on truck and passenger vehicle crankshafts with lengths of up to 1,800 mm.

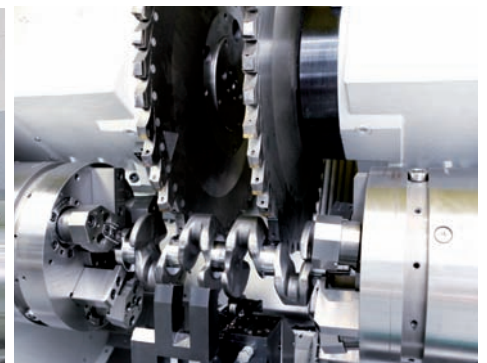
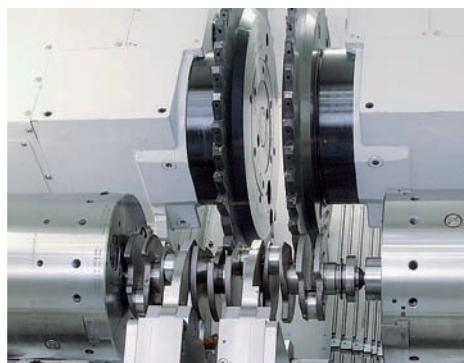
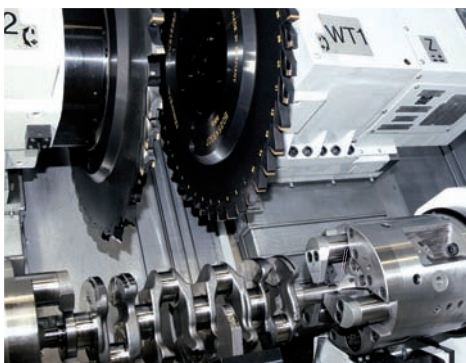
The two machine sizes are based on robust machine beds in composite construction. The machine construction design is identical and only differs in size and technical performance. Symmetrical work spindles are designed as motor-driven spindles and are synchronized electronically. For this process, the work spindles are equipped with optimized bearing supports. Standard spindle noses (A8 for N20 and A11 for N30) according to DIN 55026 are used.

Axial and cross slide are guided on antifriction guideways with damping surfaces.

Two compact turn-broaching units each with powerful synchronous drives allow quick indexing of disk-shaped tools. Rigid acceptance of tool disks with hydraulic clamping is the basis for efficient turning and turn-broaching of crankshaft bearings and other concentric features of crankshafts. The use of max. 2x48 tool cartridges to locate reversible cutting inserts ensure high flexibility and tool life which is enhanced by the use of sister tools.

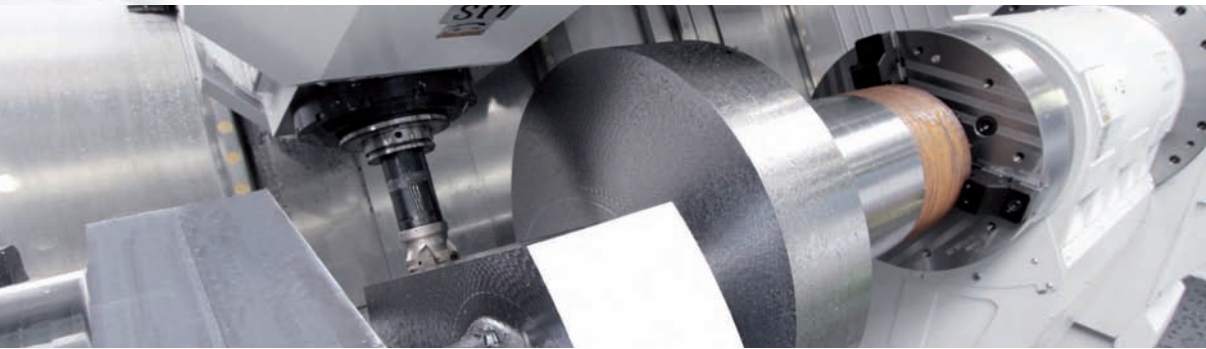
### Your benefits at a glance

- 2 identical motor spindle drives with high power and torque parameters
- Both sizes N20 and N30 with identical A11 tool locator for broaching disks with 700 mm diameter
- Quick positioning of cutting tools by highly dynamic rotational axes
- Simultaneous operation of both tool disks with independent feed rates
- Adapted clamping solutions with chucks to machine flange and journal in one setup
- Semi-automatic tool clamping, tool data is transferred automatically via ID-chip
- Optional internal tool probing
- Temperature compensation of broaching disks
- Customized tool and clamping fixture interfaces



# CNC-Turning-Milling-Drilling Centres MC-Series





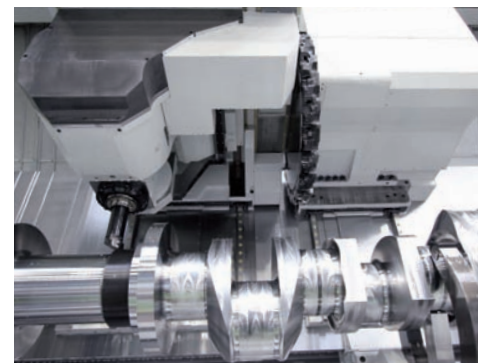
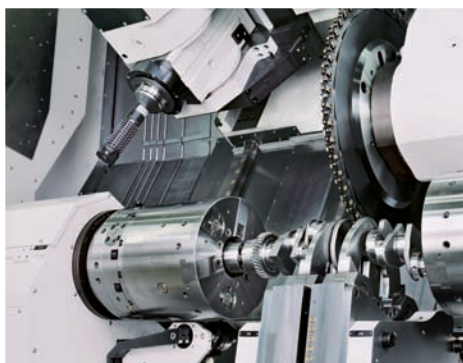
The **MC Series Horizontal Turning-Milling-Drilling Centres** have been conceived for universal complete machining of rotationally symmetrical work pieces. Using the sizes **N20MC** through **N60 MC**, various work pieces with lengths of up to 8,000 mm and swings of up to 1,500 mm can be roughed and finished in a complex manner.

Typical applications in the automotive sector are machining of **one-offs and small batch production** such as prototyping and spare parts manufacture.

On the **MCM Multi-Slide Machining Center**, the universal turning, milling, and drilling head is combined with a powerful crankshaft milling unit for **complete machining of crankshafts**. This combination permits efficient prototyping of passenger vehicle and truck crankshafts and small lot production of crankshafts for stationary engines. An essential advantage here is the powerful external milling unit, combined with the universal turning, milling and drilling head. This modular design enables the combination of heavy duty roughing processes for heavy stock removal rates during the machining of bearings and counterweights of crankshafts combined with high-precision processes such as oil hole drilling, gear milling, hard turning and hard turn-milling. The possible applications covered, range from complete soft machining up to semi-finishing or hardened crankshafts.

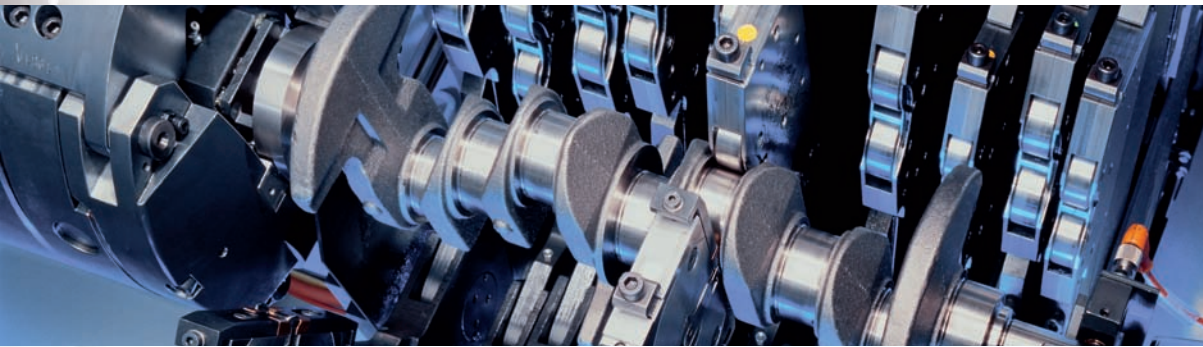
### Your benefits at a glance

- Efficient complete machining of components up to a length of 8,000 mm
- Separation of roughing and finishing processes of crankshafts with separate machining units
- Machining of bearings and counterweights by means of side milling cutters with separate powerful external milling unit
- Use for prototyping, one-offs and small batch production
- Oil hole drilling, gear milling, hard turning and hard turn-milling



# Deep-Rolling and Roll-Straightening Machine



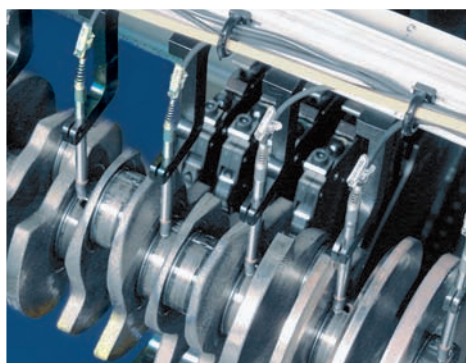


The preparation of fillet radii on main and pin bearings of crankshafts is a decisive criterion for their durability. To enhance fatigue strength, Hegenscheidt successfully introduced a newly developed technology, the deep-rolling process, into crankshaft manufacture. Using this process, compressive residual stresses are induced in the fillet radii of crankshaft bearings to enhance the fatigue life. **Using the Models 7893R and 7895 Deep-Rolling and Roll-Straightening Machines** manufactured by HEGENSCHIEDT, higher engine power output can be achieved in the automotive industry worldwide.

This technology became innovative due to the angle dependent deep-rolling and subsequent roll-straightening. Right from the development up to the current state of the art, the NSH Group was granted several patents for technologies and machine designs. Thanks to the use of this crankshaft machining process for compact engines in the automotive industry, material savings are achieved, quality is improved and durability considerably increased.

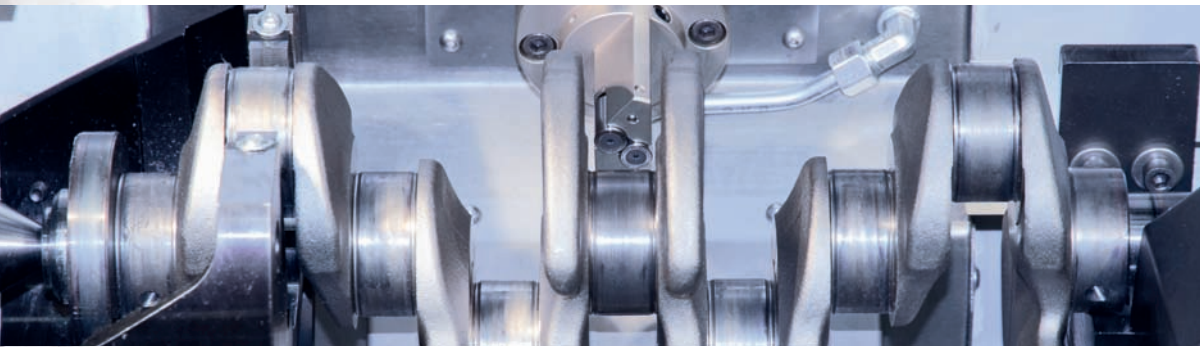
### Your benefits at a glance

- Flexible machine layout for deep-rolling and roll-straightening of crankshafts with different strokes, bearing pitches and quantity of bearings
- High in-process reliability due to monitoring of all machining parameters
- Angle dependent deep rolling to minimize the radial run-out
- Intelligent roll-straightening program
- Gauging of radial run-out on all main bearings



# Fine-Turning and Roller-Finishing Machine



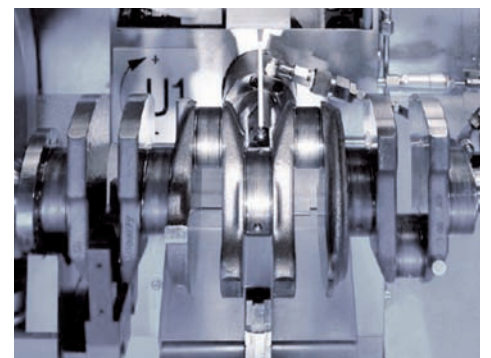
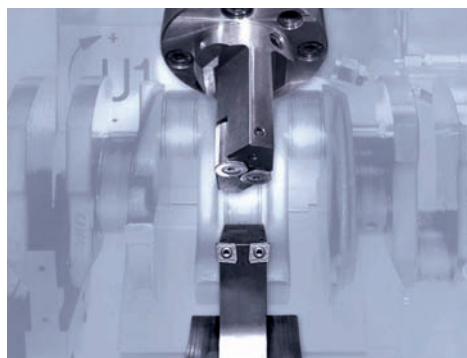


HEGENSCHEIDT has developed the model **7794U-1NC** for fine-turning and roller-burnishing of thrust walls. Thanks to the fine-turning operation, the parallelism of thrust faces is considerably enhanced due to the high machining precision and machining tolerance. The successive roller-burnishing operation decisively increases the contact ratio of thrust faces along with excellent running properties.

Short cycle times and high tool lives for both fine-turning and roller-burnishing tools were in the foreground for the NSH Group to develop these machines. Using the model **7794U-2NC**, the flange face, reluctor ring and other features can be machined by means of an additional NC-driven cross slide. Because additional machining takes place in the same setup, optimal axial machining tolerances can be achieved.

### Your benefits at a glance

- Excellent surface finish along with very good adhesive behavior of engine oil
- No aggressive surfaces, therefore, less wear in the engine's run-in phase
- Decreased wear of bearings
- Short floor-to-floor times
- Low process, tooling, and maintenance cost



# Turnkey Projects Flexible Production Lines







NILES-SIMMONS-HEGENSCHEIDT performs **planning and implementation of complete manufacturing lines** for the production of powertrain components up to and including commissioning prior to releasing the system to the customer.

The basis is the use of NILES-SIMMONS-HEGENSCHEIDT's own production technology, combined with the use of equipment made by market technology leaders for the primary applications relevant to manufacture. Based on your requirements, our experts will work with your specialists to create the optimal manufacturing solution.

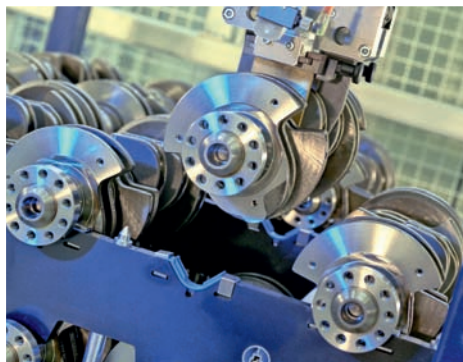
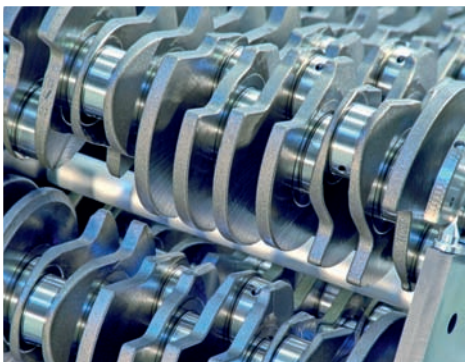
The **“Flexible Crankshaft Manufacturing Line”** designed by the NSH Group and patented worldwide has achieved a new level in the state-of-the-art of production lines. This system makes it possible to perform a ‘floating’ 30 minute flexible change-over to a new work piece within a production line without any down time.

### Our services at a glance

- Project management and project funding
- Work piece production and quality planning
- Work piece flow and automation concept
- Process simulation and process-flow control
- Layout and shop planning
- Planning and procurement of equipment
- Media planning and media supply
- Shipping logistics
- Installation and start-up support
- Handing over the complete Turnkey Line according to agreed parameters – performance tests

### Your benefits at a glance

- NILES-SIMMONS-HEGENSCHEIDT as competent partner in the solution of your machining project
- Comprehensive know-how in the design and implementation of flexible manufacturing systems
- Complete service package from planning up to handing over as one-stop service



# TECHNICAL DATA

N-Series		N10	N20	N30	N40	N50
<b>Working area</b>						
Nominal length	mm	900   1300	1000   1500   2000   2500   3000	1500   2000   2500   3200   4500	2000   3000   4500   6000	2000   3000   4500   6000   7500
Swing diameter	mm	560	650	780	820   920	1250
X-travel	mm	295	350	435	625	825
<b>Turning spindle</b>						
Spindle nose DIN 55026	size	A6	A8   A11	A11   A15	A15	B15   B20
Spindle bore	mm	54	92   105	92/123   123	160	160 / 225
Inner bearing diameter (front)	mm	120	150   180	180/200   220	240	280 / 360
<b>Spindle drive</b>						
Driving power 100%/S6-60% duty cycle	kW	29 / 37,5   28 / 36	30,4 / 34   32	64 / 78   67 / 80	64 / 78   78 / 87	64 / 78   78 / 87   100 / 115
Speed range	rpm	...5000 / ...6000	...3800   ...2000	...2000/3000   ...2000	...2400 / ...1900	..1400   ..1240   ..888
Torque 100%/S6-60% duty cycle	Nm	190 / 250   290 / 370	580 / 655   1200	779 / 932   1872 / 2110   2642 / 3135	3700 / 4315   7230 / 8000	5765 / 6890   9880 / 11021   13030 / 14990
C-axis	rpm	...100	...100	...100	...50	...50
<b>Feed drive</b>						
Rapid feed rate X/Z	m/min	40 / 50	25 / 40	18 / 30	18 / 30	12 / 24
<b>Tool turret</b>						
Quantity		1   2	1   2	1   2	1   2	1   2
Tool receptor DIN 69880		30   40	40   50	50   60	60	60
Tool arrangement		axial   radial	axial   radial	axial   radial	axial   radial	axial   radial
Tool positions		12   2x12	12   2x12	12   2x12	12   2x12	12   2x12
<b>Tailstock</b>						
Quill travel	mm	130	162	160   170	170	300
Quill diameter	mm	110	140	150	180	195 / 240
Center-point location	size	MK 4	MK 5   MK 6	MK5	MK 6	MK 6 / ME 80
Clamping power	kN	1 - 10	4 - 20	4 - 20	5-30 / 8-40	5 - 35 / 8 - 55

MC-Series		N20 MC	N30 MC	N40 MC	N50 MC
<b>Turn-milling unit</b>					
Y-travel	mm	-150...+200	-200...+300   -250...+250	-200...+300   -250...+300	-400...+395   -350...425
Max. speed	rpm	...6000	...5000	...3500 / ...4500 / ...5500	...3500 / ...4500 / ...5500   3000
Tooling system	size	HSK 63A, C6*	HSK100T   C8* HSK 63T   C6*	HSK 100A, C8*	HSK 100A, C8*, C10*
Motor power 100%/S6-60% duty cycle	kW	22 / 25	34 / 37   22 / 25   18 / 22	38 / 43	38 / 43   67 / 80
Torque 100%/S6-60% duty cycle	Nm	173 / 275	264/395   173/275 145/190	533/678   413/525 339/431	533/678   413/525 339/431   800
Swivel range	degree°	-105...+95	-105...+95	-105...+95	-105...+95
<b>Tool magazine</b>					
Magazine pockets	number	48(60)   96(120)	48 72 96 120 144	48 72 96 120 144	48 72 96 120 144
Max. tool length	mm	600	600 / 900	600 / 1000	600 / 1000
Max. tool weight	kg	15	25	25	25

CM-Series		N20 CM	N30 CM
<b>Working Area</b>			
Nominal length	mm	1000	1500   2000   2500
Swing diameter	mm	650	780
Max. work piece length	mm	500	800   1300   1800
<b>Workspindle (main/counter)</b>			
Spindle nose DIN 55026	size	A8	A11
Spindle bore	mm	80	102
Spindle diameter	mm	150	170
<b>Milling unit</b>			
Configuration	position	li/re	li/re
Tool receptor DIN 550266	size	A11	A11
Tool diameter	mm	700	700
Max. power 100% / S6-60% duty cycle	kW	29,3 / 37,5	46 / 64

TB-Series		N20 TB	N30 TB
<b>Working Area</b>			
Nominal length	mm	1000	1500   2000   2500
Swing diameter	mm	650	780
Max. work piece length	mm	500	800   1300   1800
<b>Workspindle (main/counter)</b>			
Driving power 100% / S6-60% duty cycle	kW	2x30,4 / 34	2x64 / 78
Speed range	rpm	...3800	...3000
<b>Broaching unit</b>			
Configuration		li/re	li/re
Tool receptor DIN 55026	size	A11	A11
Tool diameter	mm	700	700
Tool cassettes	number	45 / 48	45 / 48

HEG-Series		7893R	7794
<b>Working Area</b>			
Nominal length	mm	1250	1000
Max. work piece length	mm	1100	700 / 950
<b>Workspindle (main/counter)</b>			
Driving power 100% / S6-60% duty cycle	kW	12 / 14	7 / 9
<b>Spindle headstock</b>			
Speed - deep-rolling/roller-burnishing	rpm	120	210
Speed - roll-straightening	rpm	30	-
Speed - gauging	rpm	30	-

*The Technology Provider*



Aerospace  
Industry



Automotive and  
Truck Industry



Railway and  
Metro Industry



Machine Building  
Industry

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