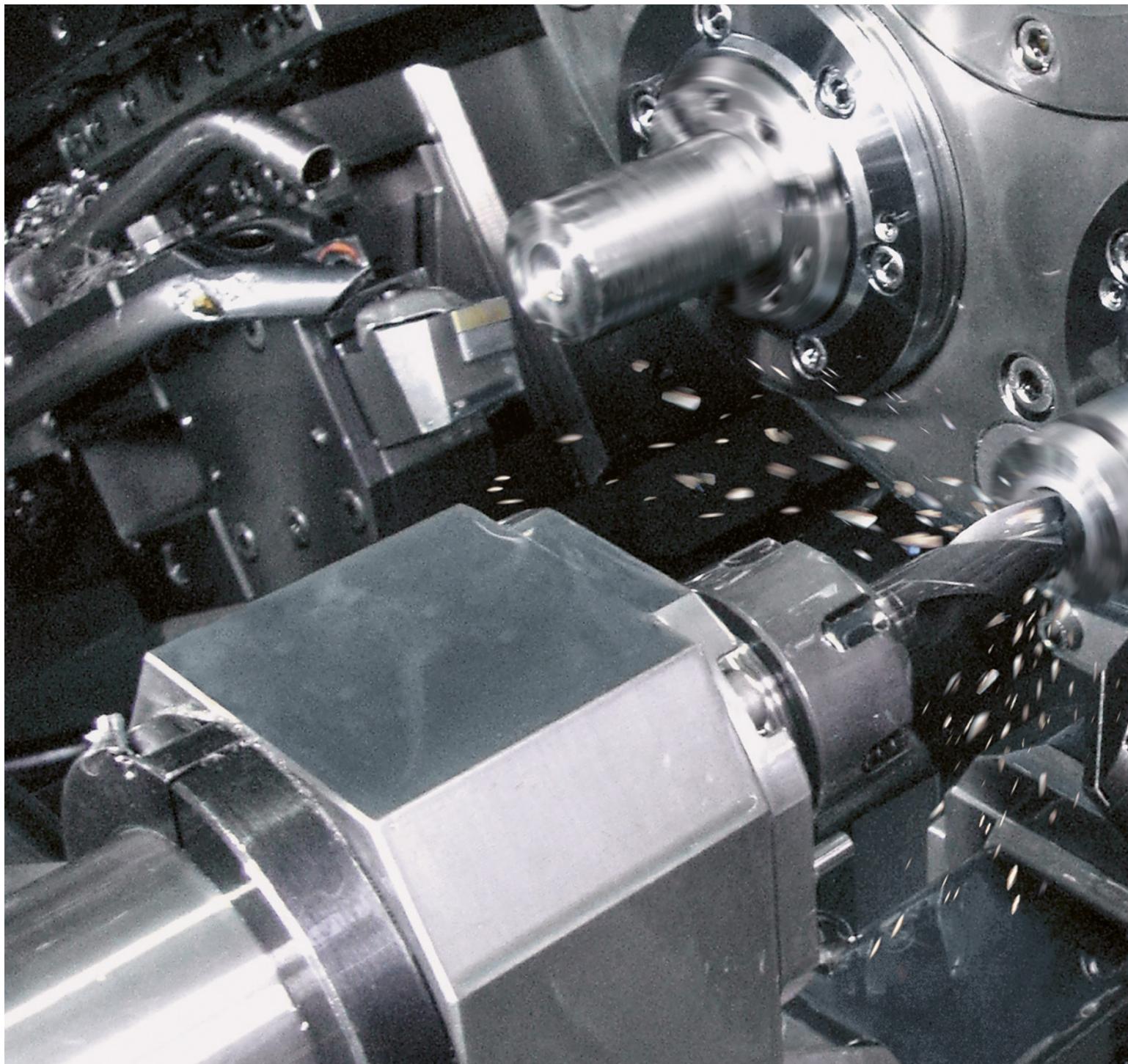




ESP 65

Case-hardening steel
optimized for
machining

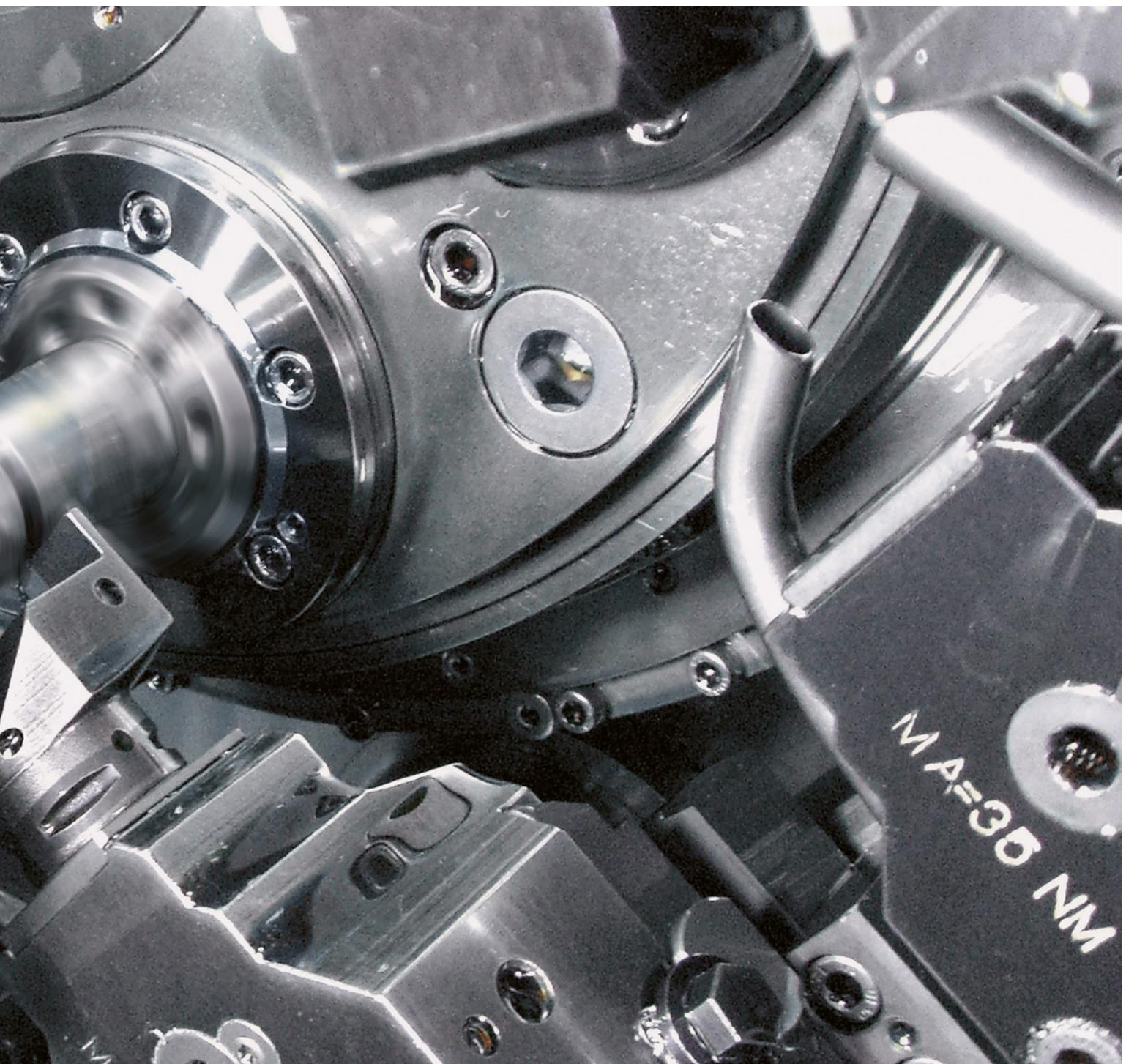




Steel for that competitive edge

Steel has been one of the most important materials for many centuries. We produce it in grades and qualities which enable our customers to succeed in an increasingly harsh competitive environment. Steel from Swiss Steel Group is used wherever precision parts are required to satisfy highly stringent demands,

millions of times over, both safely and reliably, for years on end. Parts which have to be produced both efficiently and at a very low cost. While the requirements placed on steel may vary, our past, present and future passion for continually optimising the way we fulfil them remains unchanged.



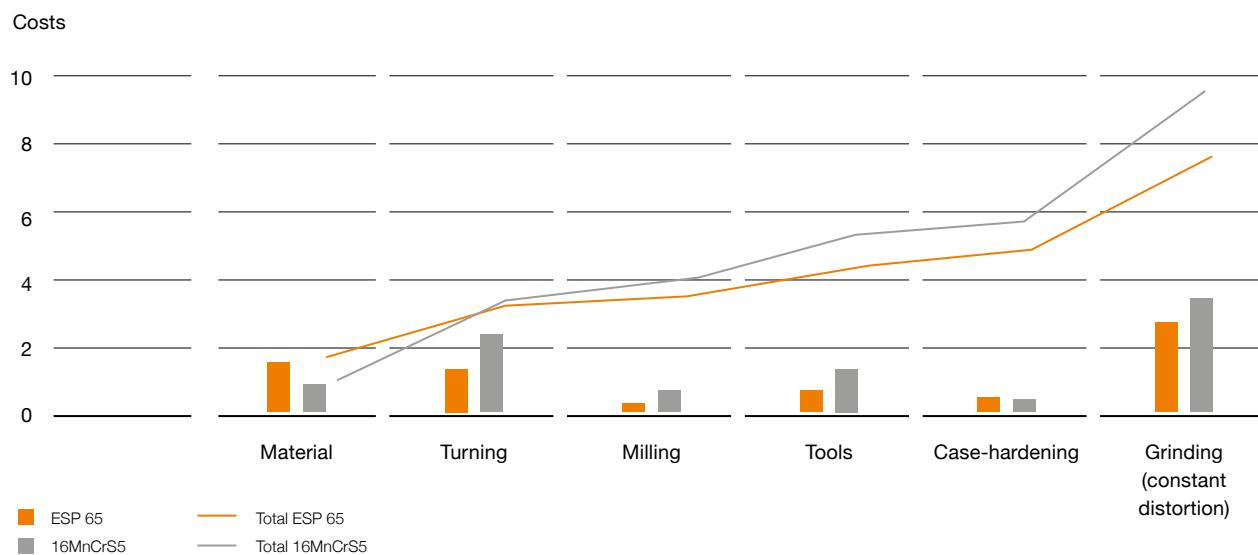
ESP 65

The material for state-of-the-art processing technology

- high speed cutting
- longer tool life
- safer chip break-off
- unmanned shifts

= Clear cost advantages

Comparison of component costs ESP 65/16mnccrs5



Material tailored to the latest machining technologies

Construction materials are subject to highly stringent demands today, particularly when it comes to exploiting to the full the performance of state-of-the-art machining equipment. What is required are materials that offer optimum machinability, coupled with highly uniform properties. ESP 65 satisfies these requirements. ESP 65 was developed as a special casehardening steel for machining. In terms of its machinability, it is clearly superior to a 16MnCr5 and 16MnCr5.

- ESP 65 can play out its advantages to the full in the cost-efficient manufacture of turned parts involving a high level of machining and/or a problematical part geometry.

ESP 65 lowers production costs

The excellent machinability of ESP 65 reduces machining time and prolongs tool life. This instantly lowers production costs while simultaneously raising productivity.

The uniform material properties of ESP 65 enable maintenance of the tightest tolerances during turning and result in uniform distortion during hardening. Extra operations such as straightening and grinding can be dispensed with in some cases, and only minimal grinding stock is required. This considerably reduces process costs, while simultaneously boosting productivity. ESP 65 offers a high process capability, since it is specially tailored to the latest machinery and comes in particularly straight bars. This means a higher output and less machine downtime.

In short: ESP 65 ensures more efficient production, improved quality and sustainably lower costs.



Straightness

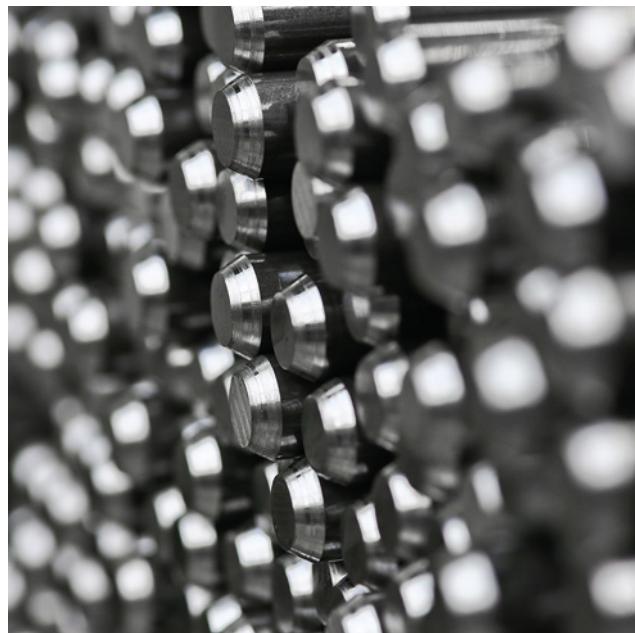
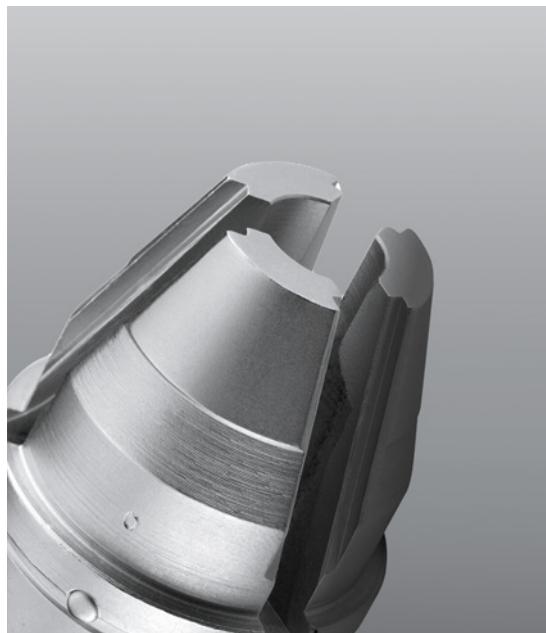
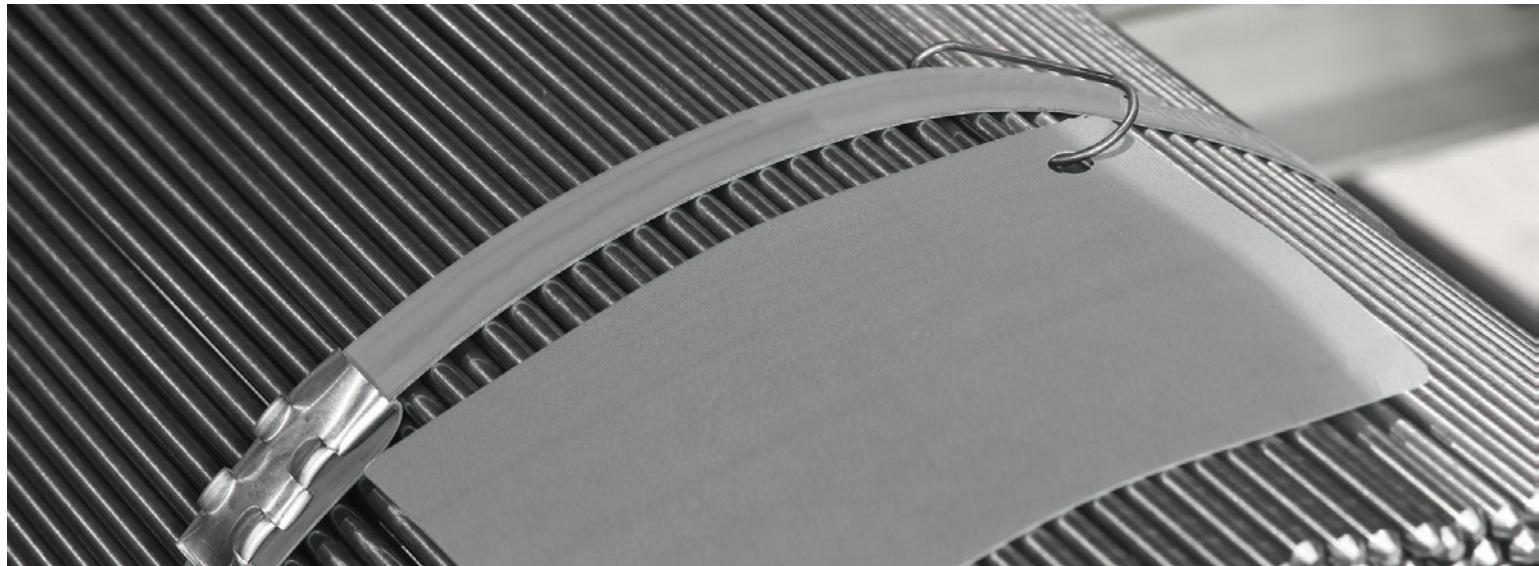
Process	Deviation from straightness
+C and +SH \leq 25 mm	0.50 mm/m
>25 mm	0.30 mm/m
+SL	0.25 mm/m

– Special straightness requirements on request

Product range

Steel cat.	Process	Size range mm	Tolerance
ESP 65	drawn, round	6–80	h9
	peeled, round	18–125	h9/h11
	ground, round	6–80	\geq IT6

– Colour coding end face: nut brown
– Bar lengths: standard 3 m, other lengths upon request
– The surface finish and surface quality class 2 as per EN 10277-



The material for the latest machining technologies

The finely dispersed lead inclusions have no influence at all on the static strength properties. The maximum attainable surface hardness after case-hardening is approximately 60 HRC (corresponding to approx. 700 HV). The Jominy values are corresponding to 16MnCr5 or 16MnCrS5.

Chemical composition

Melt analysis % by weight

Element	C	Si	Mn	P	S	Cr	Pb
min.	0.14	0.15	1.00	-	0.020	0.80	0.15
max.	0.19	0.40	1.30	0.025	0.035	1.10	0.30

Piece analysis and melt analysis may vary according to EN 10277-4

Mechanical properties

State		+C	+SH
Proof stress	R _{p0,2}	N/mm ²	≥300
Tensile strength	R _m	N/mm ²	500–740
Ultimate elongation	A ₅	%	≥12
Hardness	HB	-	140–240
			140–187

1N/mm² = 1 MPa

Hardenability values + HH

Distance from the quenched end in mm

Hardness HRC	1,5	3	5	7	9	11	13	15	20	25	30	35	40
max.	47	46	44	41	39	37	35	33	31	30	29	28	27
min.	42	39	35	32	29	26	24	22	20	-	-	-	-

according to DIN EN 10084

Ideal for drive components

The typical applications for ESP 65 include parts requiring intensive machining, such as: cogwheels, worm gears, crown wheels and gear wheels, gear components, control components, shafts and journals.

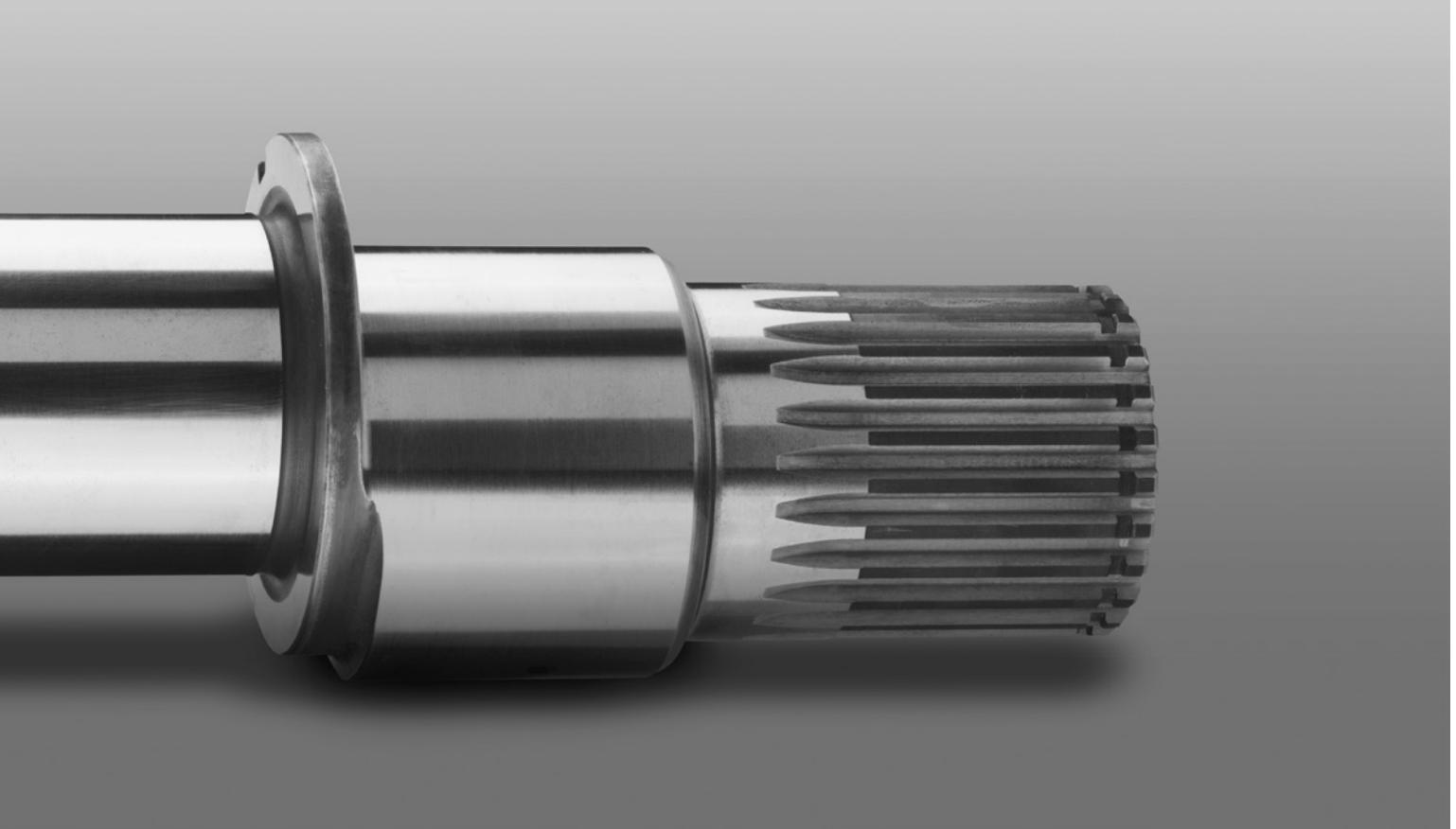
Structure

Finely dispersed lead inclusions and a selectively configured production process give ESP 65 machining properties similar to those of a free-cutting steel. Machining stresses are thus kept to a minimum, which has a positive impact on the distortion behaviour of the workpieces during hardening.

Uniformity

The uniformity of its properties and its good machinability are key respects, where ESP 65 clearly outperforms standard steels.





Processing information

Heat treatment

ESP 65 is suitable for case-hardening by all the standard processes. Heat treatment is performed under the same conditions as for case-hardening steels of similar composition. The recommendations and characteristics values for 16MnCrS5 as specified in EN 10084 apply.

Cold forming

ESP 65 is suitable for all the standard non-cutting, forming processes. Typical applications include bending, upending, upsetting, thread-rolling and Taumel forging. Depending on the application involved, prior soft annealing or spheroidising may be required.

Weldability

Providing that proven welding conditions are observed, ESP 65 can be flash-welded and fusion-welded. Special precautions, such as pre-heating, are required for fusion welding, however. ESP 65 is not suitable for electron-beam welding.

Surface finishing

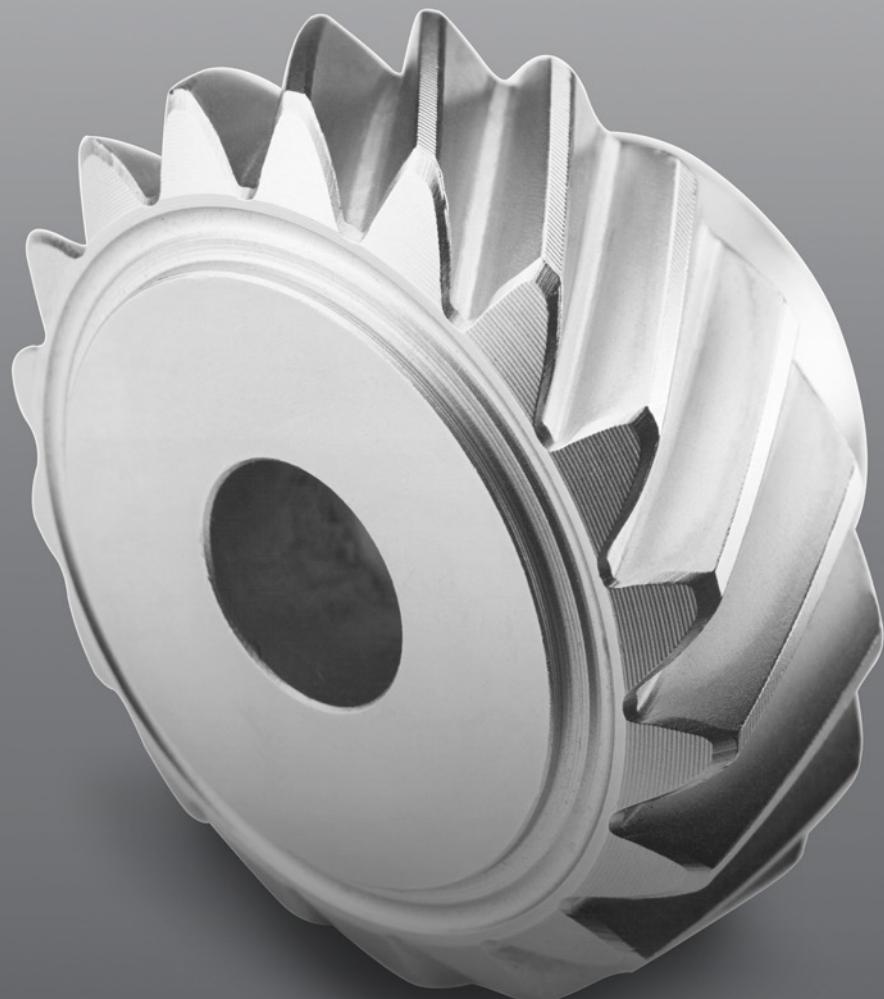
Most surface finishes can be applied to ESP 65. In the case of surface finishing, ground material is recommended.

Orientation values for various machining processes

Machining guidelines v_c [m/min] und f [mm/U]

Machining process	v_c/f	Process	ESP 65
Multi-spindle CNC turning (Carbide tooling, coated)	v_c	roughing	240–300
	f		0.20–0.60
	v_c	finishing	260–320
	f		0.15–0.40
	v_c	plunging /parting-off	160–220
	f		0.10–0.50
Multi-spindle CAM turning (Straight turning – Carbide tooling, coated)	v_c	roughing	160–220
	f		0.05–0.20
	v_c	finishing	170–230
	f		0.05–0.20
	v_c	plunging /parting-off	110–170
	f		0.10–0.40
Short-bed turning CNC (Carbide tooling, coated)	v_c	roughing	240–300
	f		0.20–0.60
	v_c	finishing	260–320
	f		0.15–0.40
	v_c		160–240
	f		0.10–0.50
Plain turning CNC (Carbide tooling, coated)	v_c	roughing	180–250
	f		0.05–0.30
	v_c	finishing	180–250
	f		0.05–0.30
	v_c	plunging /parting-off	80–140
	f		0.05–0.25
Drilling (Indexable insert drill – Carbide tooling, coated)	v_c		150–200
	f		0.10–0.30
Drilling (HSS coated)	v_c		40–70
	f		0.05–0.30
Reaming (Carbide tooling, coated)	v_c		20–40
	f		0.20–0.40
Thread (Int./Ext. threading)			
Chase threading – Carbide tooling, coated	v_c		120–170
Cutting – Carbide tooling, coated	v_c		12–20
Forming – HSS, coated	v_c		10–30

Values depending on the machine statics, cutting edge geometry, cooling lubricant, dimensions and drill diameter



We reserve the right to make changes and technical improvements without notice. Errors and omissions excepted. The product-specific data sheets take priority over the details given in the catalogue. The desired performance characteristics are only binding if they had been agreed upon exclusively at the time that the contract was made.



Swiss Steel Group

info.engineering@swisssteelgroup.com
www.swisssteel-group.com