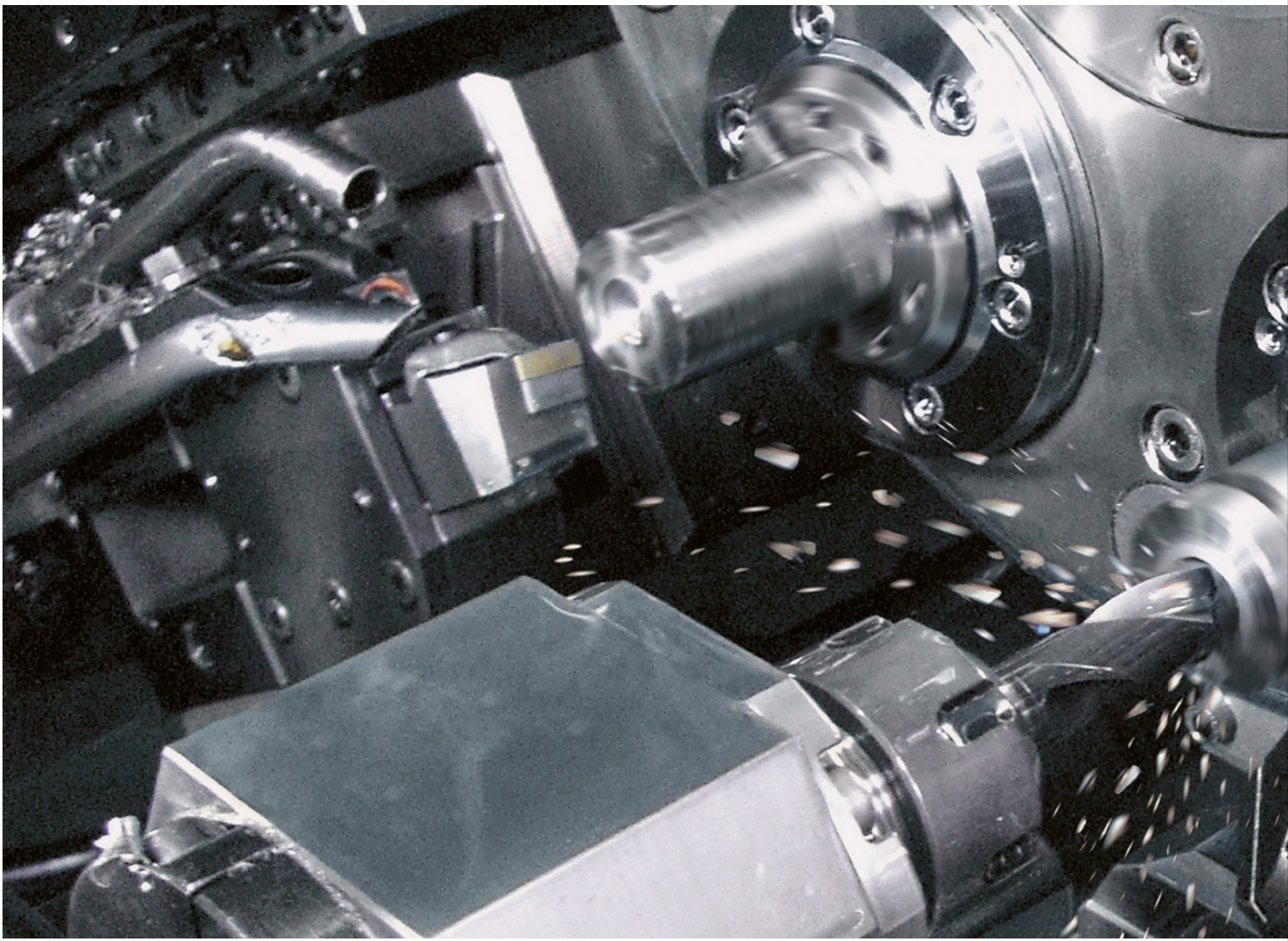




**SwissCut® Special
Free-Cutting Steels
Standard
Free-Cutting Steels**
Increase in productivity



**Swiss
Steel**
Group



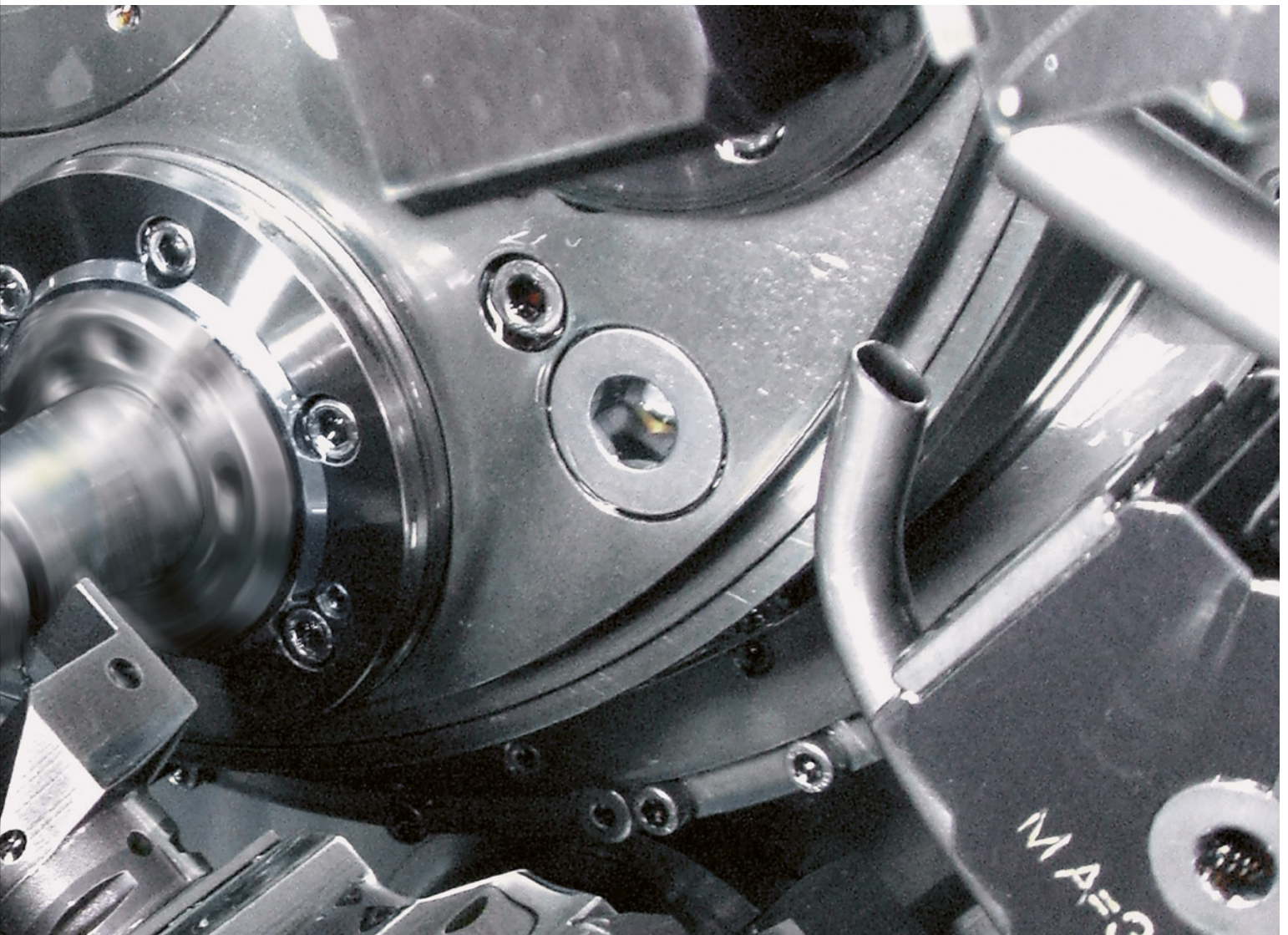
Steel for that competitive edge

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.

Innovation through development partnerships

Using the very latest material developments and innovative production technologies, the potential offered by steel has been further tapped in projects involving several different companies. With new production processes, modified free-cutting steels have been developed that clearly enhance cuttability and hence boost cost efficiency.



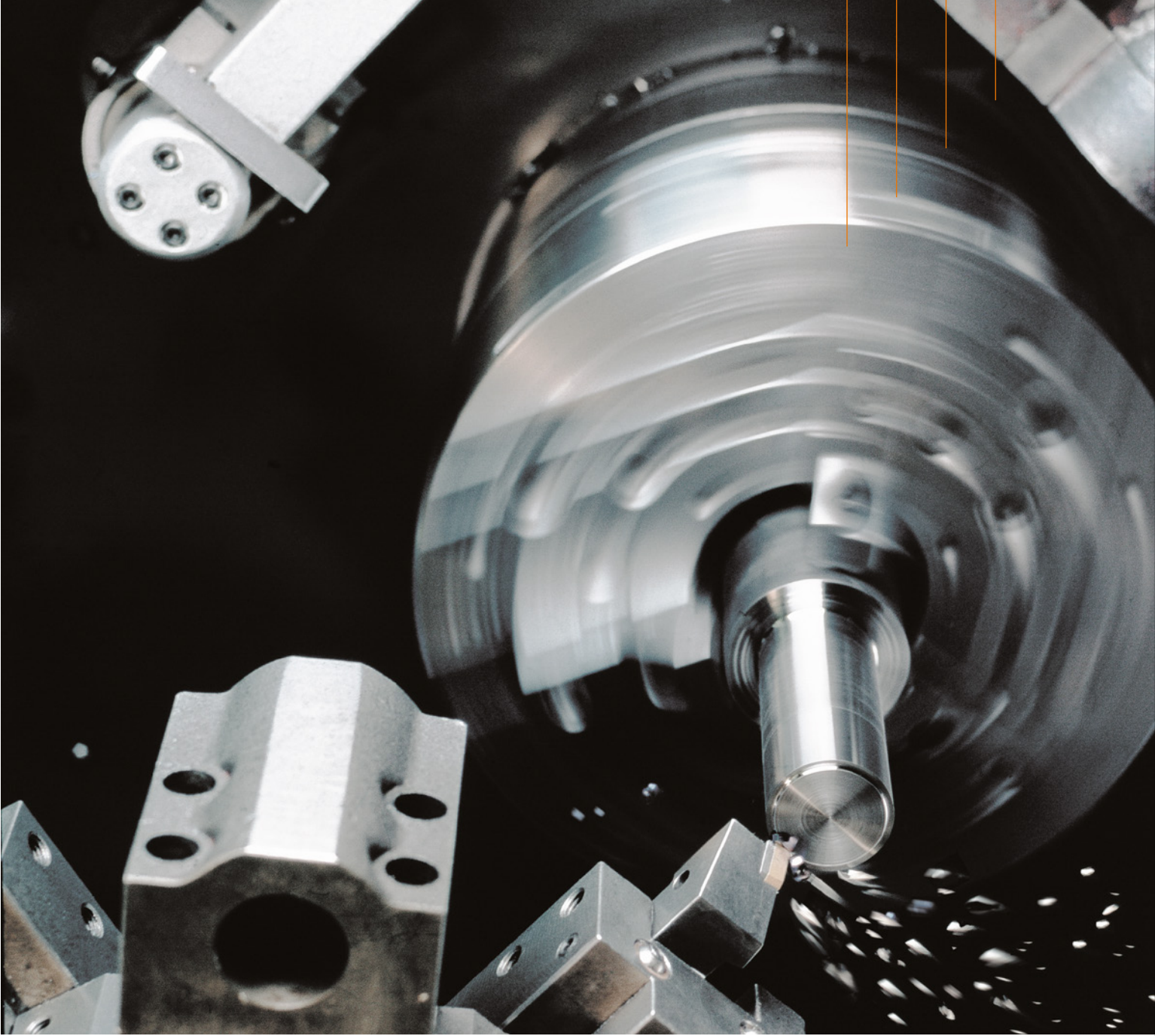
SwissCut® special free-cutting steels from Swiss Steel Group for the cost-efficient production of massproduced parts: From the molten metal through to the bright steel Competence from a single source

- innovative product development based on a high cutting competence
- considerably longer tool life
- higher cutting speeds
- uniform chip formation
- high uniformity between different batches
- marked increase in productivity
- low part costs

= Boosting your competitiveness

Factors affecting the material and process

- Metallurgy
- Structure
- Forming
- Customised products



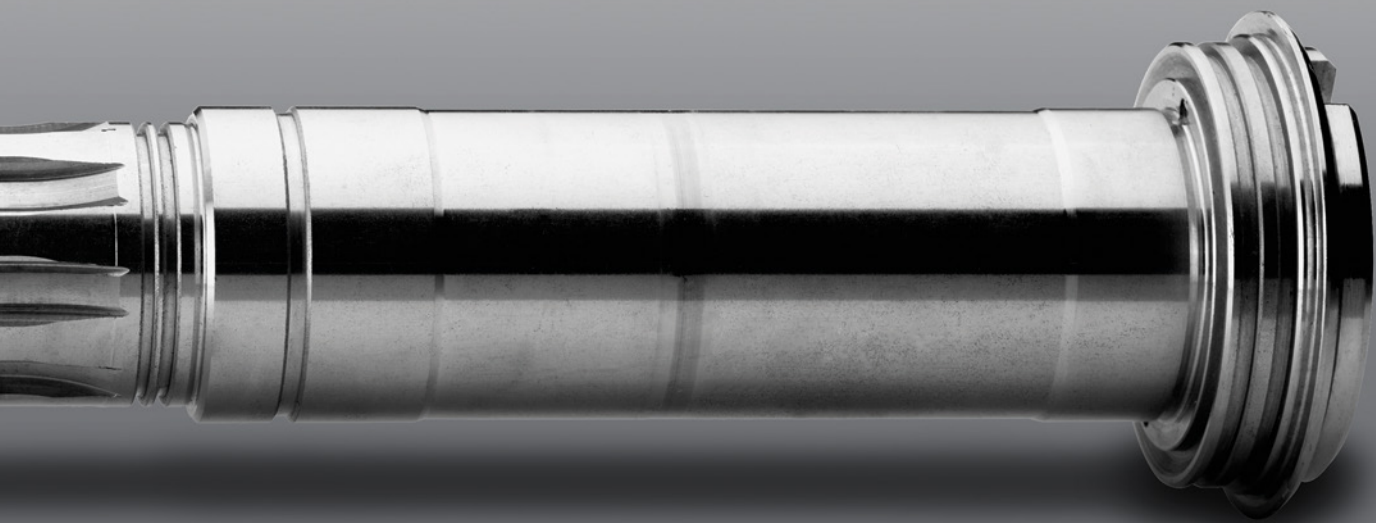
PRODUCTIVITY IN THE CUTTING PROCESS



Cuttability assessment criteria

- Tool life
- Energy consumption
- Chip shape
- Workpiece surface
- Dimensional accuracy





Cutting competence in steel production

The cutter's benchmark is productivity. Increases in productivity can only be achieved through the corresponding permanent developments – in terms of people, machines, tools and material.

Standard free-cutting steels will not attain the maximum performance that is possible with state-of-the-art cutting machines. In developing its steels, Swiss Steel Group makes allowance for the full range of performance parameters for state-of-the-art cutting machinery, tools and equipment. It conducts its development work in cooperation with its customers, with Swiss Steel Group and with universities. This unique combination generates above-average customer benefit.

Product range

Designation	DIN/EN-designation	Material No.	Supplied cond.	Process	Size range mm	Tolerance
SwissCut® SC30	~11SMn30	~1.0715	rund	+C	7–40	h 9
SwissCut® SC37	~11SMn37	~1.0736	rund	+C	7–40	h 9
SwissCut® SC30Pb	~11SMnPb30	~1.0718	rund	+C	7–40	h 9
SwissCut® SC37Pb	~11SMnPb37	~1.0737	rund	+C	7–40	h 9
SwissCut® SC37Pb plus	~11SMnPb37 +Bi+Te/Se	~1.0737	rund	+C	4,5–40	h 9
				+SL	4,5–20	≥ IT 6
			6-kt	+C	SW 10–36	h11
SwissCut® SC620Pb plus	~60SPb20+Bi	~1.0758	rund	+C	5–22	h 9
				+SL	5–20	≥ IT 6

– Bar lengths: standard 3 m, other lengths upon request

– Colour coding end face: SC30 leaf green, SC37 yellow green, SC30Pb ultramarine, SC37Pb gentian blue, SC37Pb plus sky blue, SC620Pb plus blue grey

– The surface finish and surface quality class 2 as per EN 10277-1

SwissCut® – the new special free-cutting steels from Swiss Steel Group

Swiss Steel Group produces steels for you with precisely the right properties to guarantee the highest level of productivity in your production process. A consistent focus on the cutting process has led to the new SwissCut® product family. The use of SwissCut® is particularly worthwhile for the following reasons:

- higher cutting speeds
- longer tool life
- very good chip formation
- a high level of uniformity between different batches
- a marked increase in productivity
- high surface quality

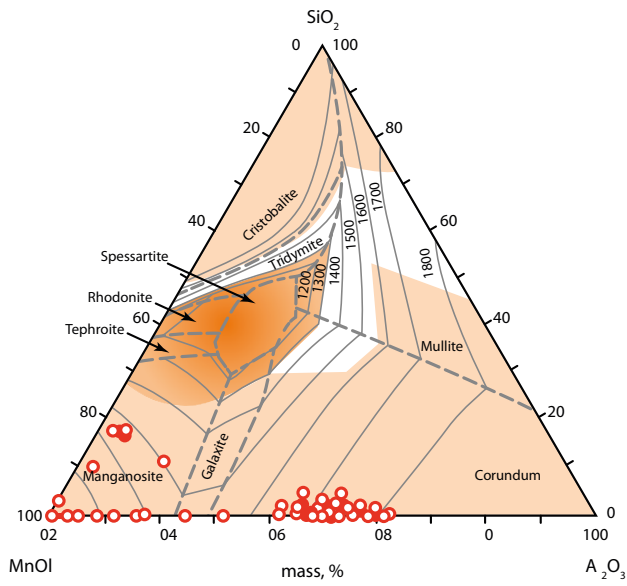
SwissCut® – improved cuttability through specific material modifications

The specially-tailored design of the oxide inclusions in the SwissCut® special free-cutting steels SC30, SC37, SC30Pb and SC37Pb suppresses wear, thereby ensuring a longer tool life or permitting higher cutting speeds. This effect makes itself felt at cutting speeds > 100m/min.

The optimum chemical analysis of the SwissCut® special free-cutting steels SC37Pb plus and SC620Pb plus reduces the steel's tendency to stick to tool cutting surfaces. The addition of Bi and Te/Se guarantees a considerably longer tool life, an improved part surface and chip breaking with process capability at cutting speeds < 100 m/min. The development of built-up edges is effectively suppressed.

Standard free-cutting steel

e. g. 11SMnPb37



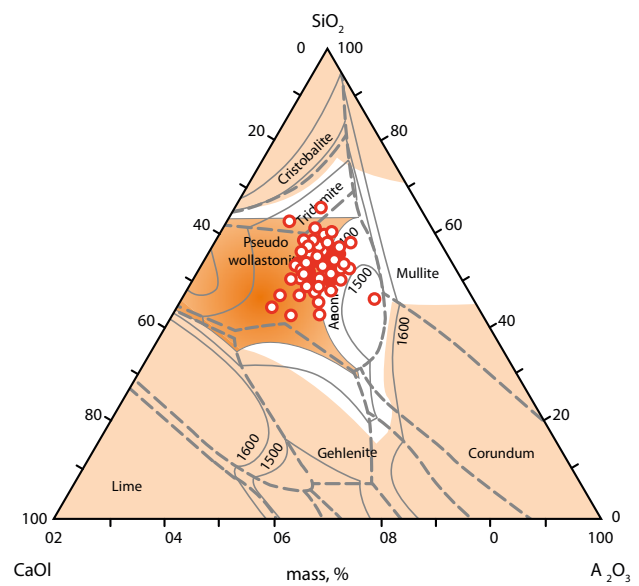
The oxide inclusions are hard and have an abrasive effect.



Wear with standard free-cutting steel

SwissCut® Special free-cutting steel

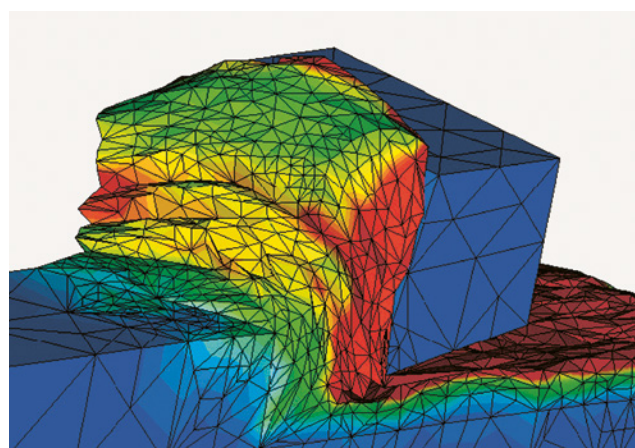
e. g. SwissCut® SC37Pb



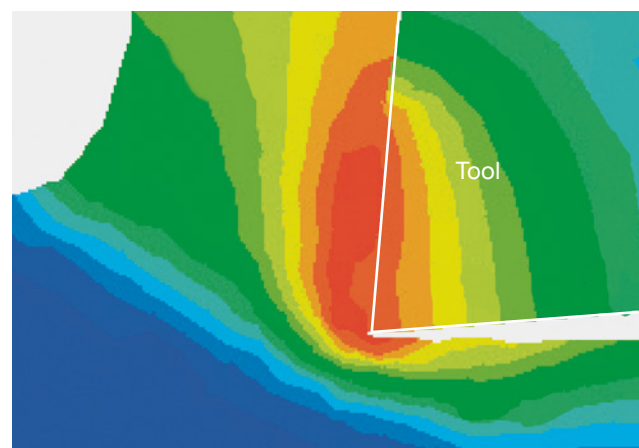
The oxide inclusions are glass-like and have a lubricating effect.



Wear with SwissCut®

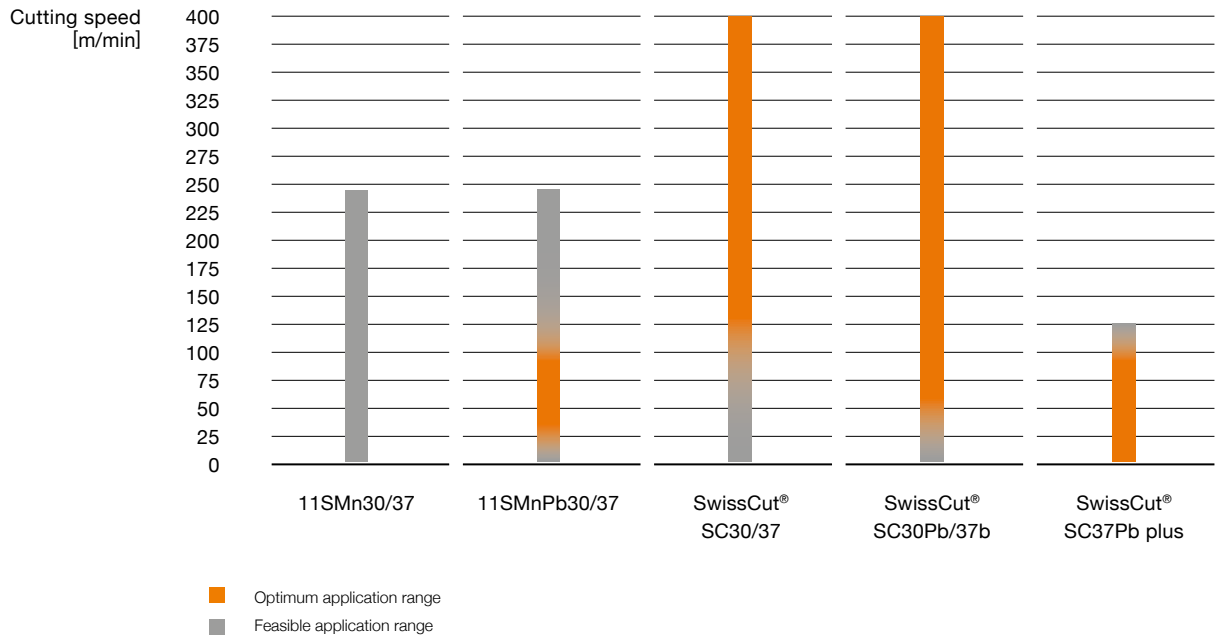


Cutting forces



Temperature profile

Material selection and application ranges



- Process costs account for up to 85 % of the costs of part manufacture. It thus makes sense to select the right material in the optimum cutting-speed range.

Reduce part costs with a process-capable, free-cutting steel from Swiss Steel Group

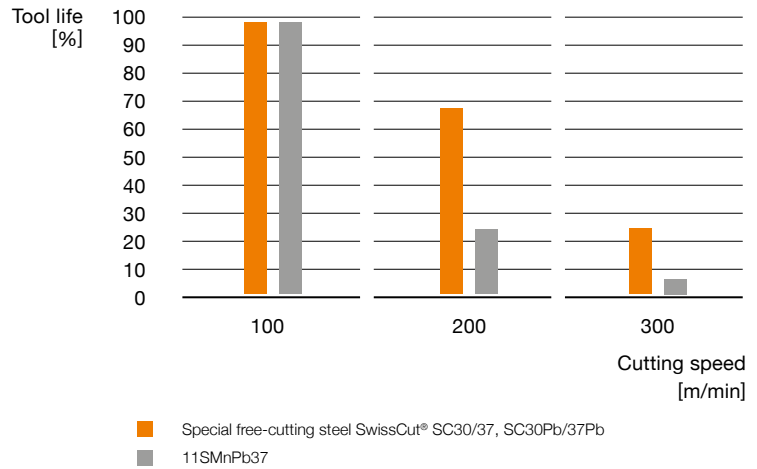
The SwissCut® special free-cutting steels and Swiss Steel Group standard free-cutting steels come in a broad product range. They make it possible to find just the right steel for a particular use. They bring you that decisive extra bonus on key points:

- bar straightness: $\leq 0,3$ mm/m
- mechanical properties: less scatter compared with the EN standard
- end finish: bevelled 30°/faced/pointed 30°
- rod lengths between 3 and 6 m by agreement
- fulfilment of customer-specific requirements

These characteristics give rise to all the advantages that will ensure higher-performance production for you:

- maximum process capability
- reproducibility at all times
- higher cutting capacity
- several machines per operator
- unstaffed shifts
- shorter processing times
- less machine downtime
- reduction of machine servicing and maintenance costs

Tool life comparison



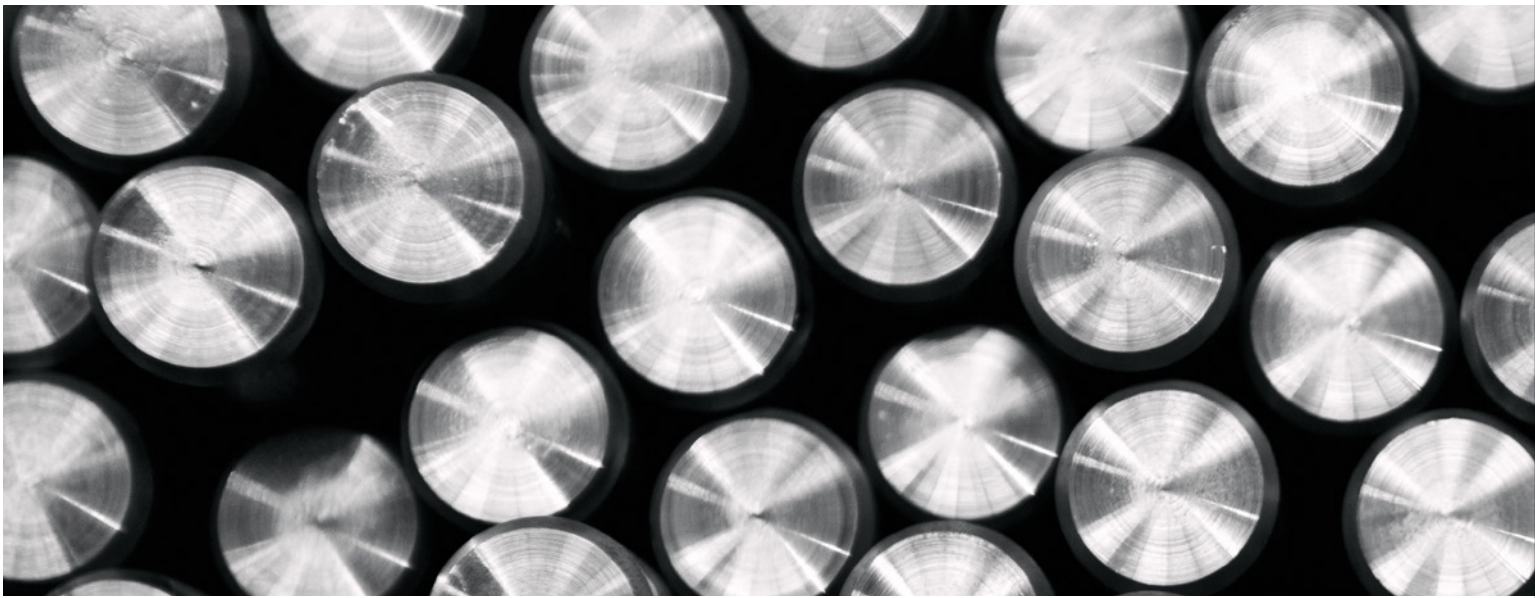
Cost savings potential

Cutting speed > 100 m/min



SwissCut® reduces tool costs and boosts your productivity

You can either reduce your tool-related expenditure, such as tool costs and ancillary time, or you can step up your cutting speed and hence your productivity.



Chemical composition

Melt analysis % by weight (EN 10087)

Designation	DIN/EN-designation	C	Si	Mn	P	S	Pb	
SwissCut® SC30	~11SMn30	≤0,14	0,10–0,40*	0,90–1,30	≤0,11	0,27–0,33		
SwissCut® SC37	~11SMn37	≤0,14	0,10–0,40*	1,00–1,50	≤0,11	0,34–0,40		
SwissCut® SC30Pb	~11SMnPb30	≤0,14	0,10–0,40*	0,90–1,30	≤0,11	0,27–0,33	0,20–0,35	
SwissCut® SC37Pb	~11SMnPb37	≤0,14	0,10–0,40*	1,00–1,50	≤0,11	0,34–0,40	0,20–0,35	
SwissCut® SC37Pb plus	~11SMnPb37+Bi+Te/Se	≤0,14	≤0,05	1,00–1,50	≤0,11	0,34–0,40	0,20–0,35	***
SwissCut® SC620Pb plus	~60S20Pb+Bi	0,62–0,70	≤0,10–0,30	1,20–1,40	≤0,06	0,15–0,30	0,15–0,30	****
11SMn30	11SMn30	≤0,14	≤0,05	0,90–1,30	≤0,11	0,27–0,33		
11SMnPb30	11SMnPb30	≤0,14	≤0,05	0,90–1,30	≤0,11	0,27–0,33	0,20–0,35	
11SMnPb37	11SMnPb37	≤0,14	≤0,05	1,00–1,50	≤0,11	0,34–0,40	0,20–0,35	

* Special version in compliance with the standard. «If, by metallurgical techniques, the formation of special oxides is guaranteed, then an Si content of between 0.10 and 0.40 % can be agreed on.» (Quote from EN 10087, page 5, footnote 2)

** No provision has so far been made in standard EN 10087 for the use of metallurgical techniques to form optimum oxides in the case of lead-alloy steels. This does not give rise to any drawbacks in respect of the mechanical properties and in the event of any downs tream heat treatment.

*** Bi+Te/Se special version in compliance with the standard. «Elements such as Te or Bi may only be added for improving the machinability, if this has been agreed at the time of enquiry and order.» (Quote from EN 10087, page 5, footnote1)

**** Bi

Technical data at a glance

The ranges and limits set out in the tables correspond to the specifications in the EN standard. That is not enough for optimum cuttability, however. You need restricted values that will guarantee good cuttability on a regular basis. This is something that Swiss Steel Group can guarantee, thanks to its longstanding know-how, state-of-the-art process technology and defined processes.

The special production process with the decisive alloy elements of silicon and calcium means that the SwissCut® special free-cutting steels SC30/37 and SC30Pb/37Pb have outstanding cuttability. Their key features are the specially-tailored oxide and sulphide inclusions in the steel. While oxide inclusions are hard and abrasive in conventional steels, they are glass-like and lubricating in the case of SwissCut®.

Supply range of Swiss Steel Group free-cutting steels

Designation	DIN/EN-designation	Material No.	Process	Size range [mm]	Tolerance
11SMn30	11SMn30	1.0715	+C	Rd 4 – 80	h 9
			+SL	Rd 4 – 80	IT 6
			+C	SW 10 – 65	h 11
11SMnPb30	11SMnPb30	1.0718	+C	Rd 4 – 80	h 9
			+SL	Rd 4 – 80	IT 6
			+C	SW 10 – 65	h 11
11SMnPb37	11SMnPb37	1.0737	+C	Rd 4 – 80	h 9
			+SL	Rd 4 – 80	IT 6
			+C	SW 10 – 65	h 11

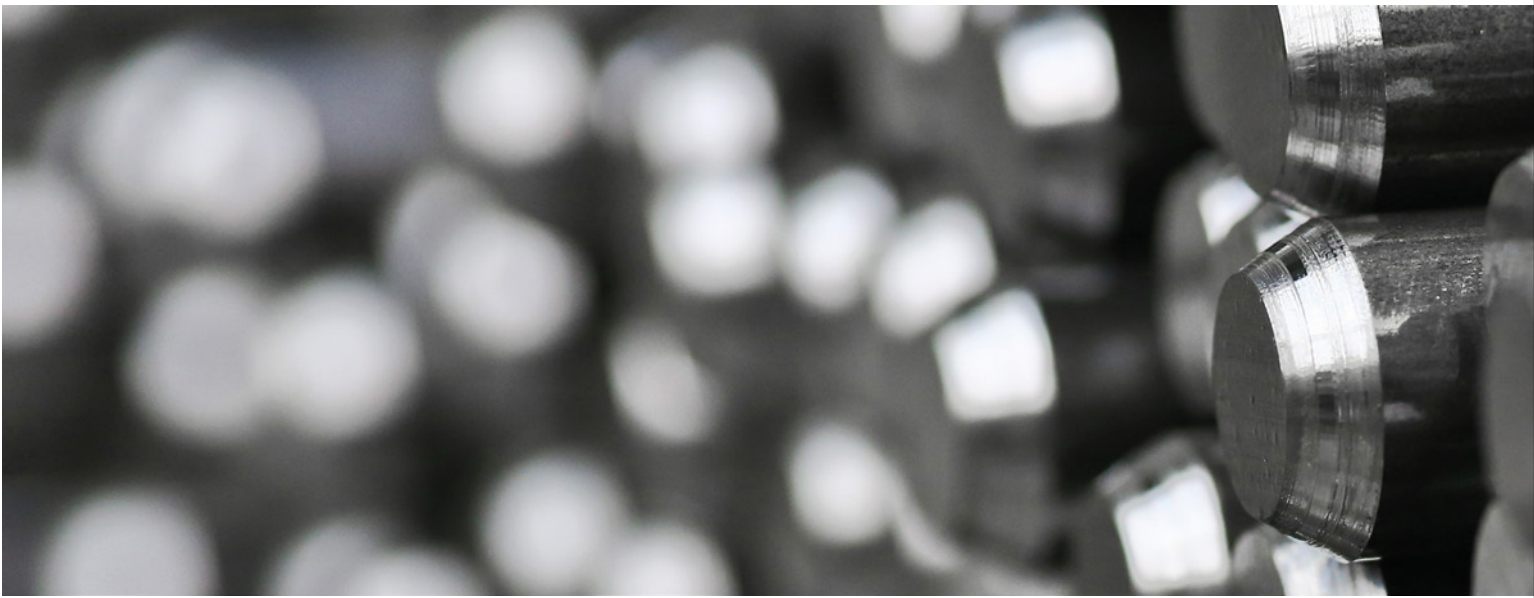
Additional standard free-cutting steels in the product range: C15Pb, C35Pb, C45Pb, 35S20, 46S20, 46S20Pb

Mechanical properties

Supplied condition cold drawn

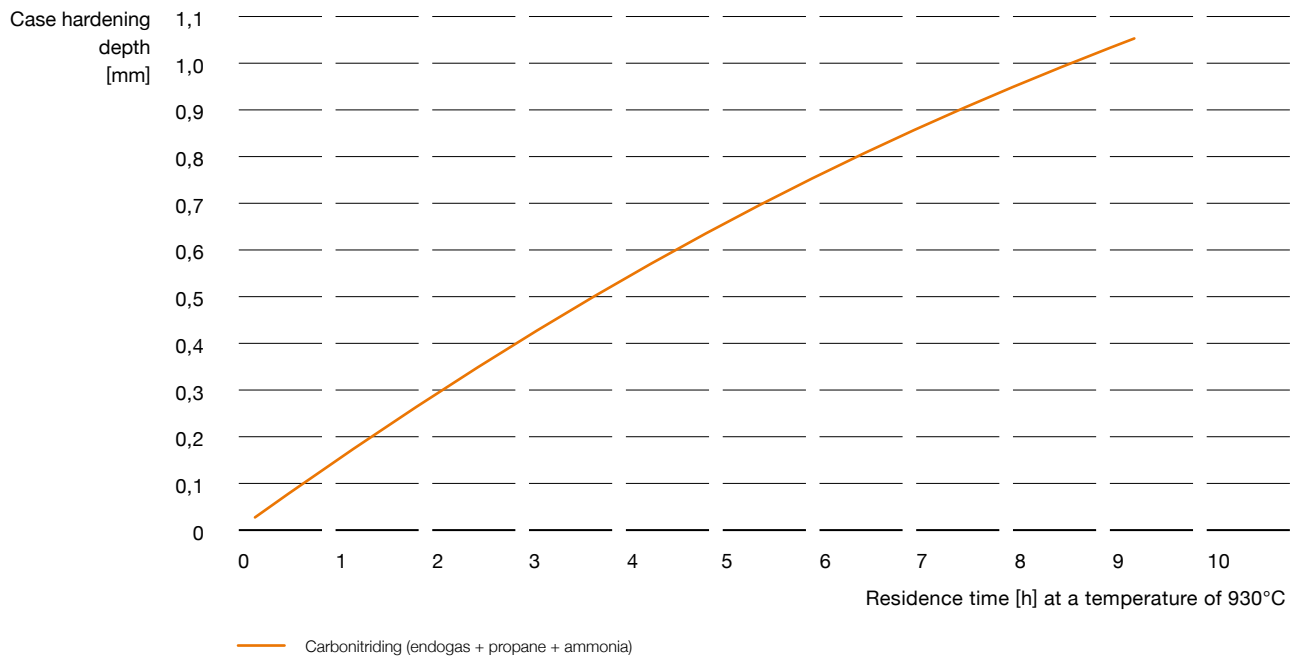
Designation	Size range [mm]	R _{p0,2} [N/mm ²]	R _m [N/mm ²]	A ₅ [%]
SwissCut® SC30	> 5 – ≤ 10	≥ 440	510 – 810	6
SwissCut® SC37	> 10 – ≤ 16	≥ 410	490 – 760	7
SwissCut® SC30Pb	> 16 – ≤ 40	≥ 375	460 – 710	8
SwissCut® SC37Pb				
SwissCut® SC37Pb plus	> 5 – ≤ 10	≥ 440	510 – 810	6
	> 10 – ≤ 16	≥ 410	490 – 760	7
	> 16 – ≤ 40	≥ 375	460 – 710	8
SwissCut® SC620Pb plus	≥ 5 – ≤ 10	≥ 645	830 – 1080	5
	> 10 – ≤ 16	≥ 540	780 – 1030	6
	> 16 – ≤ 40	≥ 430	740 – 930	7
11SMn30	≥ 5 – ≤ 10	≥ 440	510 – 810	6
11SMnPb30	> 10 – ≤ 16	≥ 410	490 – 760	7
11SMnPb37	> 16 – ≤ 40	≥ 375	460 – 710	8
	> 40 – ≤ 63	≥ 305	400 – 650	9
	> 63 – ≤ 80	≥ 245	360 – 630	9

1 N/mm² = 1 MPa



Heat treatment

Case hardening depth as a function of treatment time



This diagram is intended by way of general information only, since the batch size, furnace type and carburisation type can cause pronounced deviations.

Heat treatment

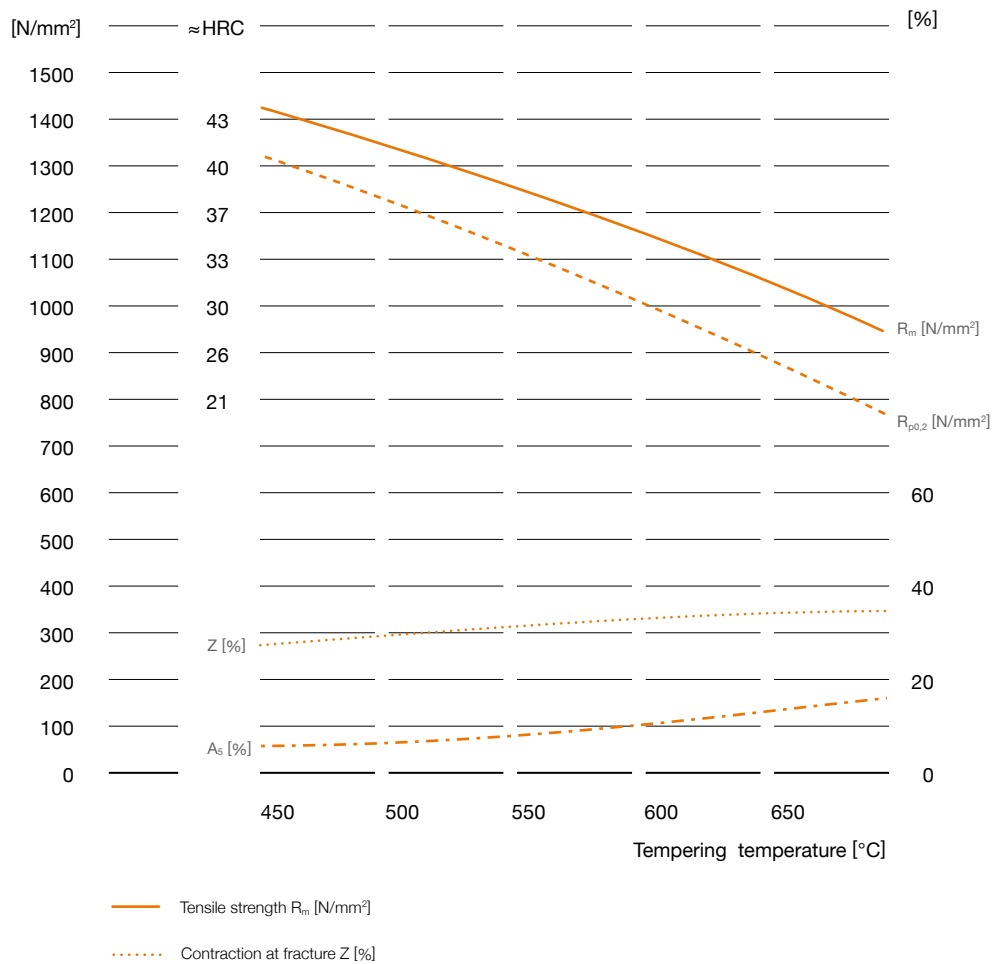
Quench in water or oil (possibly a hot bath), surface hardness ≤ 62 HRC.



Heat treatment, annealing SwissCut® SC620Pb plus

Longitudinal strength values as a function of the stress-relieving temperature

Guide values, stress-relief time approx. 2 h



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