



POWDER
METALLURGY

HIGH PERFORMANCE STEELS PRODUCED BY POWDER METALLURGY

MICROCLEAN®

HEAT AND PRESSURE CREATE GREAT THINGS

HIGH SPEED STEELS AND TOOL STEELS FROM THE TECHNOLOGY LEADER

Steels, made from uniquely fine, pure powder produced in the world's most modern PM plant at BÖHLER in Kapfenberg, Austria.

- » High homogeneity
- » Improved toughness
- » High fatigue resistance
- » Optimal reliability
- » Uniquely consistent properties

BÖHLER MICROCLEAN offers the following advantages:

- » Extremely high wear resistance
- » Optimum grindability
- » High toughness
- » Only minor isotropic dimensional changes
- » Better resistance to cyclic loads (fatigue)
- » More resistance to mechanical shocks
- » Excellent corrosion resistance
- » Easily polishable to a high mirror finish

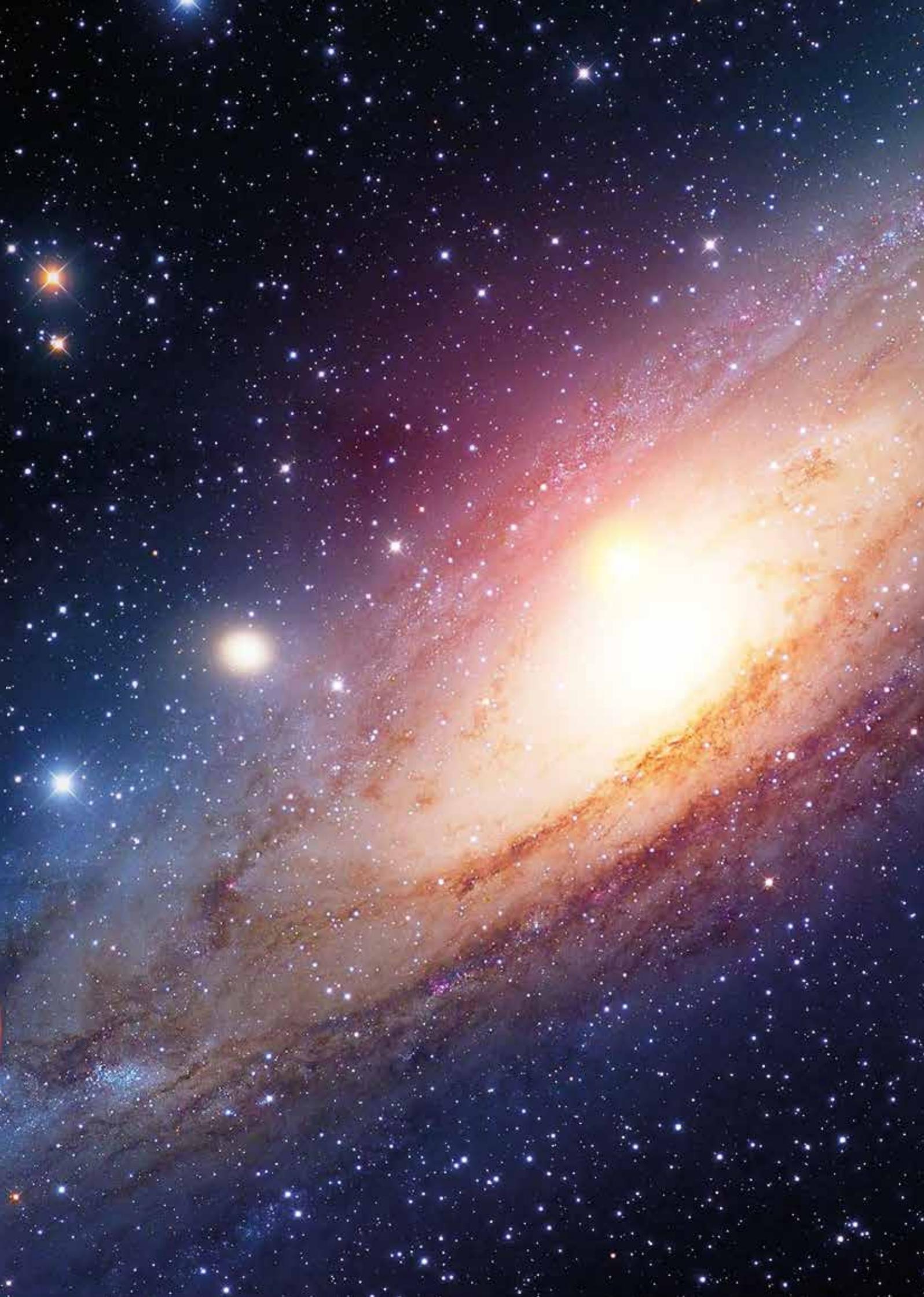
ENABLE ↓

- » High precision components
- » Long tool life
- » Consistant tool life

ENSURE ↓

- » **INCREASED PRODUCTIVITY**
- » **REDUCED UNIT COSTS**







HIGH SPEED
STEEL



COLD WORK
TOOL STEEL

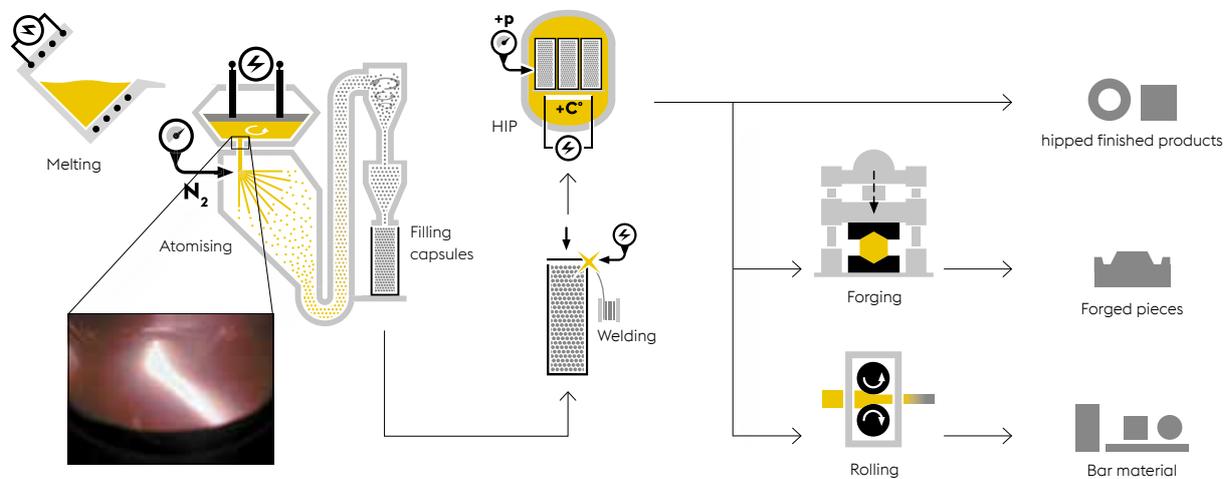


PLASTIC
MOULD STEEL

THE PRODUCTION PROCESS AND MATERIALS



Flow chart



High purity, homogeneous alloyed powders, with appropriate particle size and distribution are subjected to a high pressure, high temperature process to obtain a homogeneous, segregation-free tool steel with virtually isotropic properties.



BÖHLER grade	Chemical composition (nominal in wt.%)						Standards	
	C	Cr	Mo	V	W	Co	DIN	AISI
BÖHLER S290PM MICROCLEAN®	2.00	3.75	2.50	5.00	14.30	11.00	-	-
BÖHLER S390 * MICROCLEAN®	1.60	4.80	2.00	5.00	10.00	8.00	-	-
BÖHLER S590 * MICROCLEAN®	1.30	4.20	5.00	3.00	6.30	8.40	-	-
BÖHLER S690 * MICROCLEAN®	1.35	4.30	4.90	4.10	5.90	-	-	~ M4
BÖHLER S790 MICROCLEAN®	1.30	4.20	5.00	3.00	6.30	-	~ 1.3344 ~ S6-5-3	M3 Class 2
BÖHLER K190 MICROCLEAN®	2.30	12.50	1.10	4.00	-	-	~ 1.2380 ~ X220 CrVMo134	D7
BÖHLER K390 MICROCLEAN®	2.45	4.20	3.80	9.00	1.00	2.00	-	-
BÖHLER K490 MICROCLEAN®	1.40	6.40	1.50	3.70	3.50	+Nb	-	-
BÖHLER K890 MICROCLEAN®	0.85	4.35	2.80	2.10	2.55	4.50	-	-
BÖHLER M368 MICROCLEAN®	0.54	17.30	1.10	0.10	-	-	-	-
BÖHLER M390 MICROCLEAN®	1.90	20.00	1.00	4.00	0.60	-	-	-
BÖHLER M398 MICROCLEAN®	2.70	20.00	1.00	7.20	0.70	-	-	-

*) also available in a sulfur-alloyed version

For special applications (e.g. large broaching tools) we can also supply powder metallurgy in the as-hipped condition as hollow bars, near net shapes, rings and blanks.

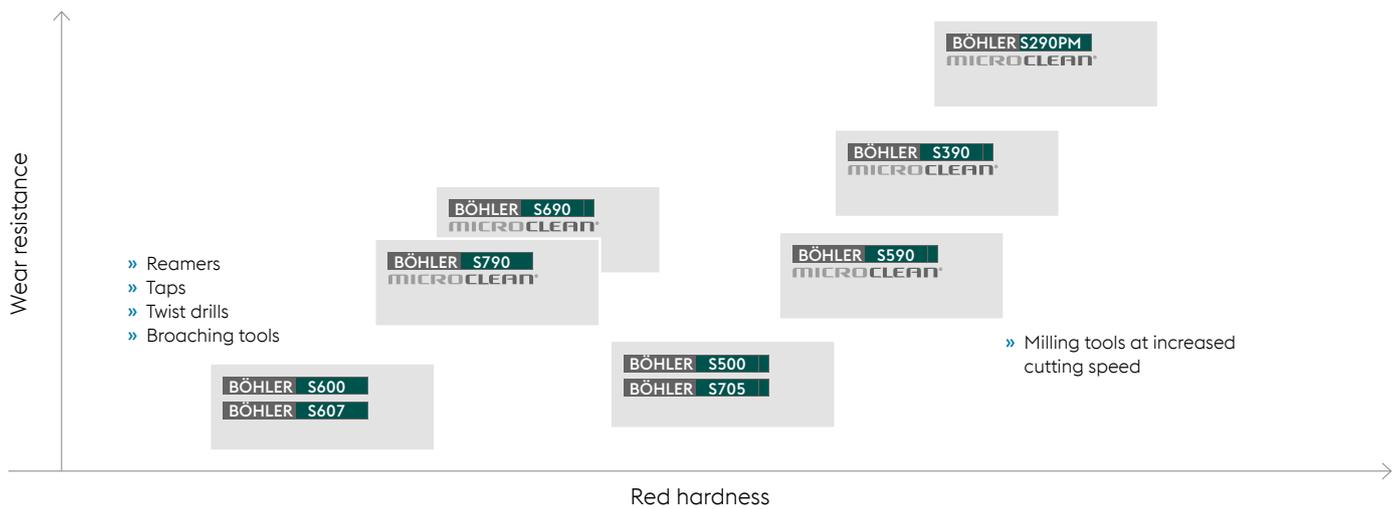
Further details regarding the material properties can be found in our data sheets for the individual steel grades, available on request.



HIGH SPEED
STEEL

COMPARATIVE OVERVIEW

Property profile of BÖHLER high speed steel for cutting applications

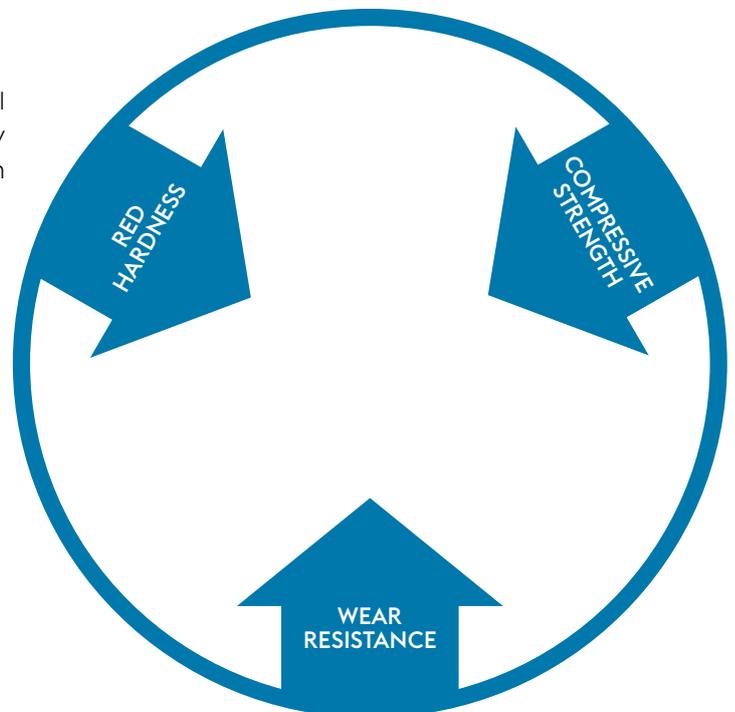




APPLICATIONS

In addition to their use in the machining of conventional alloys, high performance PM machining tools are particularly suited for the processing of non-ferrous metal alloys, such as nickel-based and titanium alloys.

- » Side-milling cutters, profile cutters, hobbs
- » Broaches
- » Machine taps
- » Pinion-type cutters of solid or composite design
- » End mills
- » Twist drills
- » Chasing tools
- » Reamers
- » Bimetal saw bands

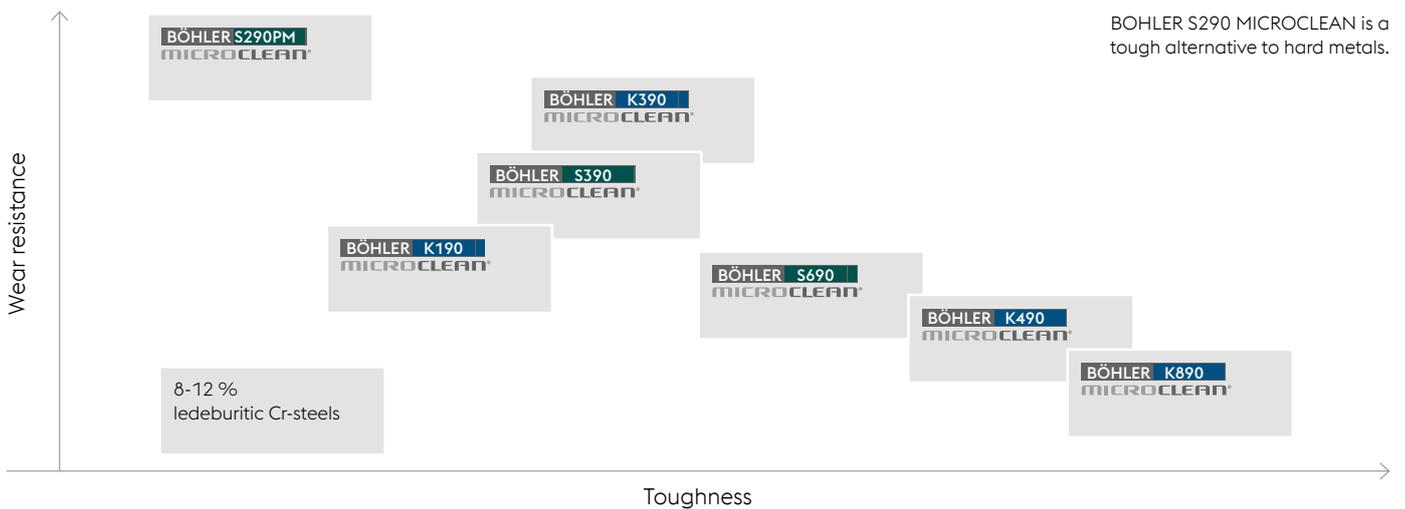


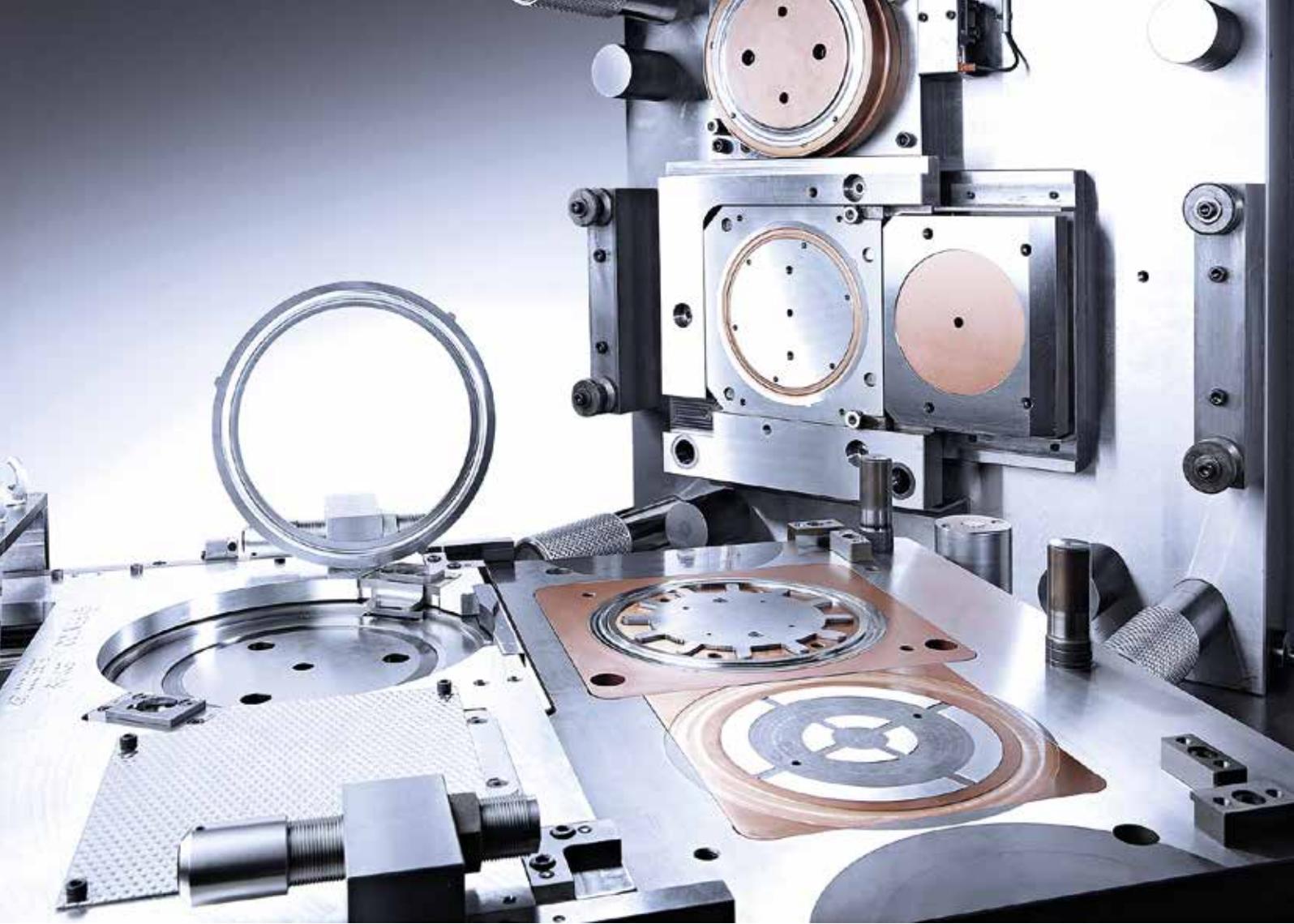


COLD WORK
TOOL STEEL

COMPARATIVE OVERVIEW

Property profile of BÖHLER cold work tool steels and high speed steels for cold work applications

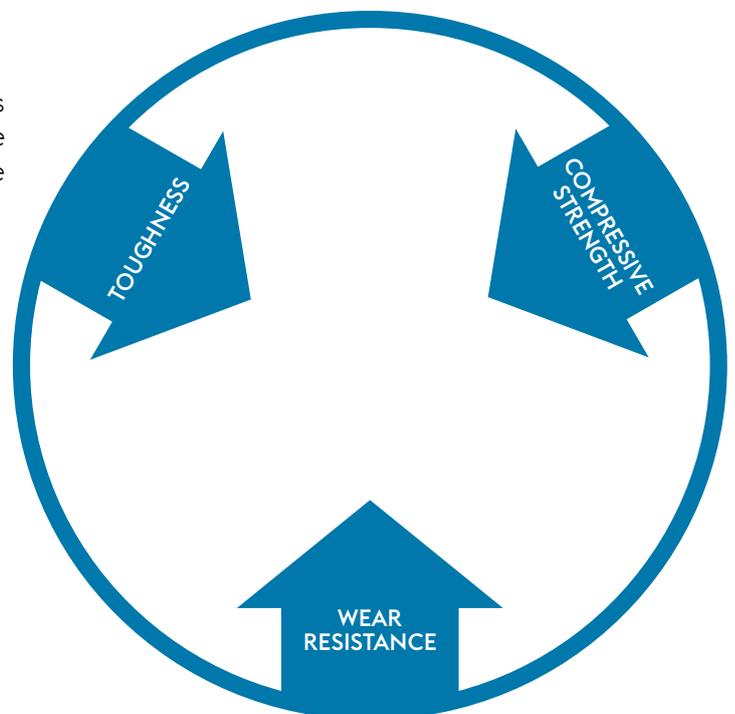




APPLICATIONS

Due to their properties MICROCLEAN cold work tool steels are used in challenging segments of cold work, where toughness, compressive strength and wear resistance are required.

- » Blanking and fine blanking tools
- » Extrusion tools (cold and warm extrusion)
- » Drawing and deep-drawing tools
- » Stamping tools
- » Thread rolling tools
- » Cold rolls for multiple roller stands
- » Cold pilger rolling piercers
- » Piercing dies
- » Knives
- » Powder compacting
- » Cold massive forming

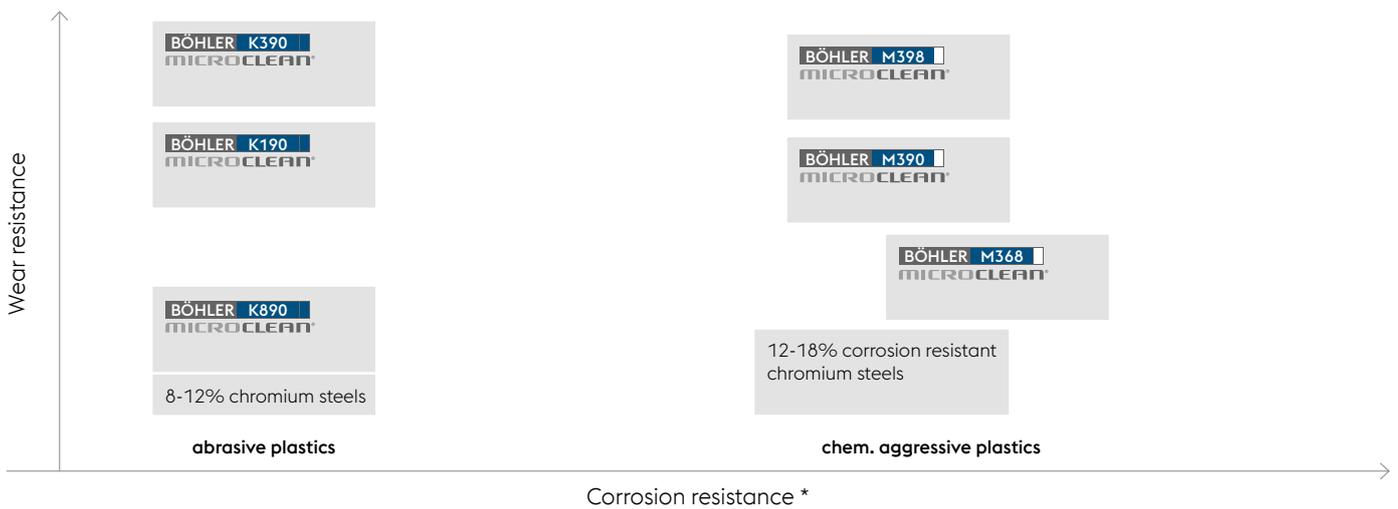




PLASTIC
MOULD STEEL

COMPARATIVE OVERVIEW

Property profile of BÖHLER tool steels for the plastics processing industry



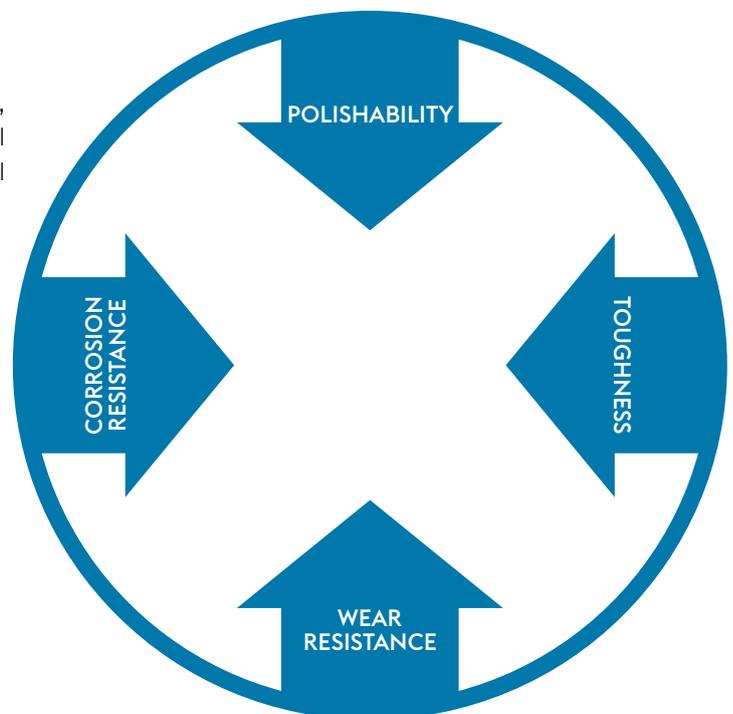
* High tempered, weight loss test with 20% boiling acetic acid, 24 h.



APPLICATIONS

The excellent material properties e.g. wear resistance, corrosion resistance, polishability, erodibility and thermal conductivity contribute to an increase in performance in all segments of the plastic mould industry.

- » Screws for injection moulding machines
- » Backflow check valves for injection moulding machines
- » Moulds for the processing of chemically aggressive materials containing highly abrasive fillers
- » Moulds for the processing of duroplasts
- » Moulds for the production of chips for the electronics industry
- » Machine components for the food- and paper-processing industry
- » Knife blades
- » Cutting-type surgical instruments



The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.



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ONE STEP AHEAD.