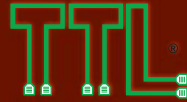


# BSA HEAT TREATMENT FACILITIES



**VERTICAL HARDENING**  
Ø 2500x8000 mm - 60 tons



High Frequency  
Medium Frequency  
Double Frequency  
Laser Hardening  
Furnace Hardening

**STATIC DEEP HARDENING**  
Ø 1200x4000 mm - 20 tons



**HORIZONTAL HARDENING**  
Ø 1400x16000 mm - 120 tons



## INFORMATION FOR THE CORRECT STEEL SELECTION **SPECIAL GRADES FOR ROLLS**

*To increase  
the lifetime of your rolls  
RUN IN YOUR LEVELER a*

**CHROMIUM  
MOLYBDENUM  
VANADIUM  
STEEL GRADE**



**CHROMIUM:**  
FOR BETTER WEAR RESISTANCE.



**MOLYBDENUM:**  
IMPROVE SURFACE HARDNESS

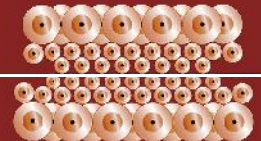
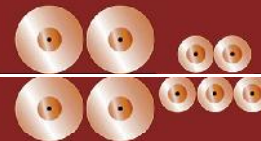


**VANADIUM:**  
INCREASE TOUGHNESS AND FLEXIBILITY



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WORK ROLLS      MADE IN ITALY      BACKUP BEARINGS





# MATERIAL PROPERTIES

## Influence of elements in steel chemistry

**C:**  
Carbon is the most relevant element to control hardness characteristics, it is necessary to guarantee the correct martensitic transformation.

**Caution:**  
High C rate can lead to reduced toughness and is the principal cause of brittleness.  
High C rate can give final undesired metallic structures leading to lack of wear resistance  
High C rate is responsible of thermal shock sensibility and heating cracks propagation.

**Cr:**  
Chromium carbides increase wear resistance, evenly increase the hardenability, break corrosion phenomena at high temperature, decarburization and oxides, increase mechanical characteristics at high temperature conditions, improve polishability.

**Mo:**  
Molybdenum is responsible for steel hardenability, increases surface hardening depth because it decreases the critical cooling rate, guarantees uniformity for cross-section hardness, helps to keep small the austenitic grain during heating leading to fine martensitic structure.

**V:**  
Vanadium is responsible for high yield strength and elongation and increases compressive strength, giving steel the best toughness and shock resistance capabilities; further increases wear resistance and helps to guarantee low grain size after hardening.

**Ni:**  
Nickel increases the mechanical characteristic leading to high tensile strength materials, slightly helps hardenability and increases impact strength.

### BSA cold working grades:

Material DIN	Werkstoff N°	Cr	Mo	V%	Surface Hardness	Tensile strength
51CrMoV4	1.7701	1.1	0.2	0.1	64 → 66 HRC	860 → 1100 N/mm <sup>2</sup>
58CrMoV4	1.7792	1.1	0.2	0.1	64 → 66 HRC	900 → 1200 N/mm <sup>2</sup>
86CrMoV7	1.2327	1.8	0.3	0.1	64 → 67 HRC	900 → 1050 N/mm <sup>2</sup>
X63CrMoV5.1	1.2362	5.3	1.2	0.3	62 → 64 HRC	860 → 1000 N/mm <sup>2</sup>
X82CrMoV8.2	1.2390	7.8	1.6	2.5	60 → 64 HRC	800 → 1000 N/mm <sup>2</sup>
X155CrMoV12.1	1.2379	12	1.4	1.6	60 → 63 HRC	800 → 1000 N/mm <sup>2</sup>

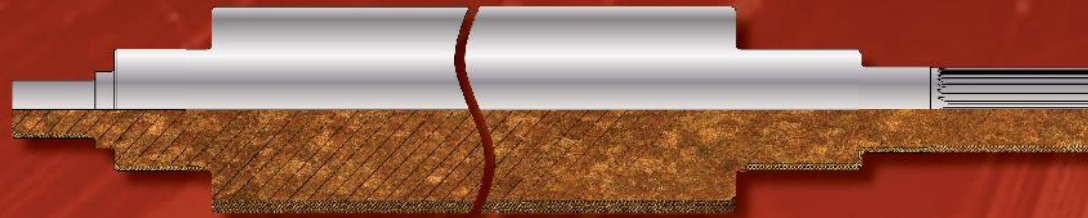
**MEDIUM FREQUENCY**  
Induction Hardening - Depth 3±30 mm



**ROLLS CROSS SECTION**  
Sample Test



**HIGH FREQUENCY**  
Induction Hardening - Depth 1±4 mm



**MARTENSITE STRUCTURE**



Hard and wear resistant

**TRANSITION**



**SORBITE STRUCTURE**

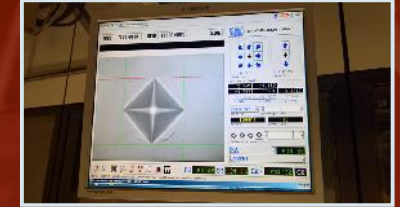


Tough and flexible

## INSPECTION Metallurgical Laboratory



**HARDNESS TEST**  
Rockwell / Shore / Vickers / Brinell



**MATERIAL ANALISY**



**EQUOTIP**



**MAGNETIC PARTICLE INSPECTION**

