

C	Si	Mn	Cr	Mo	S	P
0.37	0.30	0.80	1.50	0.20	0.05	0.06

Features and Uses

PMS is premium quality Cr-Mo alloyed steel, which is supplied, in the hardened and tempered condition offering the following benefits:

- No hardening risks
- No hardening costs
- Time saving (no waiting for heat treatment)
- Lower tool cost (e.g. no distortion to rectify)
- Modifications easily carried out
- Can be subsequently Nitrided or Tuftrided to reduce surface damage.
- Good polishing & photo etching properties.
- Good machinability
- Uniform Hardness

PMS may be used in the following applications:

Injection mould for thermoplastics
 Extrusion dies for plastics
 Blow moulds
 Forming Tools, press brake dies (possibly flame hardened or Nitrided)
 Structural components and shafts

Heat Treatment

Annealing

Anneal in a protective gas atmosphere at 700°C for at least 2 to 3 hours. Cool at 10°C per hour with the furnace until the temperature falls below 600°C. Withdraw from the furnace and allow cooling to shop temperature.

Stress relieving

Where tool are heavily machined, ground or subjected to cold work, the relief of internal strains is essential before hardening. Stress relieving should be done after rough machining. To stress relieve, heat carefully to 550°C soak well and allow to cool slowly to room temperature.

Hardening

The steel should be fully soft annealed before hardening. Pre-heat to 500° / 600 °C before raising to the hardening temperature of 850°C. Pre heating is especially desirable for complex sections. Soak thoroughly, allowing 30 minutes per inch of ruling section before quenching.

Quenching Media

Gas or vacuum quenching is only suitable for small sections up to approximately 35 mm thick.

Oil produces the desired hardness but distortion should be allowed for in the design.

Martempering is advised by means of a salt bath at 450° / 550 °C for a maximum of 4 minutes, then air cool.

Tempering

Temper the tool for a minimum of 2 hours as soon as it reaches 50° / 70 °C between 180°C and 300°C according to the requirements of the job and by reference to the tempering curve. Where possible, use an air-circulating Furnace.

Flame and Induction Hardening

PMS can be hardened in this way to a maximum of approximately 50 HRC. Cooling in air is preferable.

Case Hardening

In order to increase the surface hardness PMS can be case-hardened however allowances must be made for the brittle nature of the case near sharp corners and also for dimensional changes. Our Heat Treatment Department will be glad to advise you.

Nitriding and Tuftriding

Nitriding gives a very hard surface, which is resistant to wear and erosion. A Nitrided surface also increases corrosion resistance. For best results the following steps should be followed:

1. Rough Machining
2. Stress tempering
3. Grinding
4. Nitriding

The following surface hardness and depths should be achieved after Gas Nitriding.

Temp-in °C	Time in Hours	Surface Hardness Vickers	Depth of case mm
525	20	650	0.30
525	30	650	0.35
525	60	650	0.50

A comprehensive range of round bar is held in stock. Flat sizes are cut to suit customer's requirements from mother blocks.