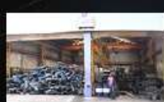

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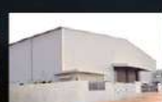

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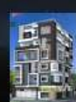

CORPORATE
8TH MAIN

SAKSHI STEEL -N- ALLOYS

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BENGALURU - 560058, KARNATAKA, INDIA.

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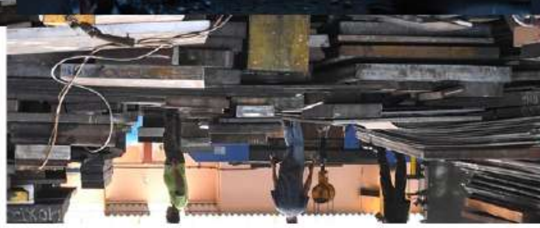
Web: www.sakshisteel.com



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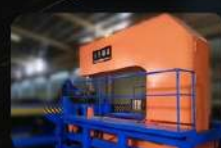
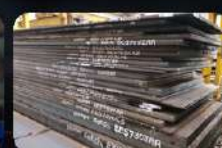
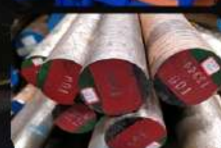
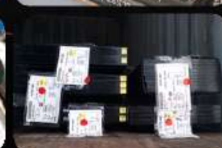
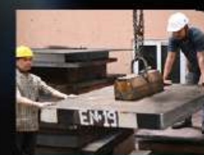
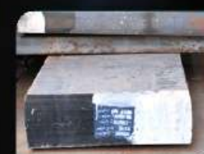


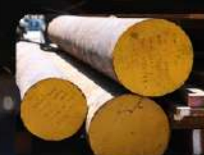












IMPORTER & STOCKIST OF TOOL & ALLOY SPECIAL STEEL

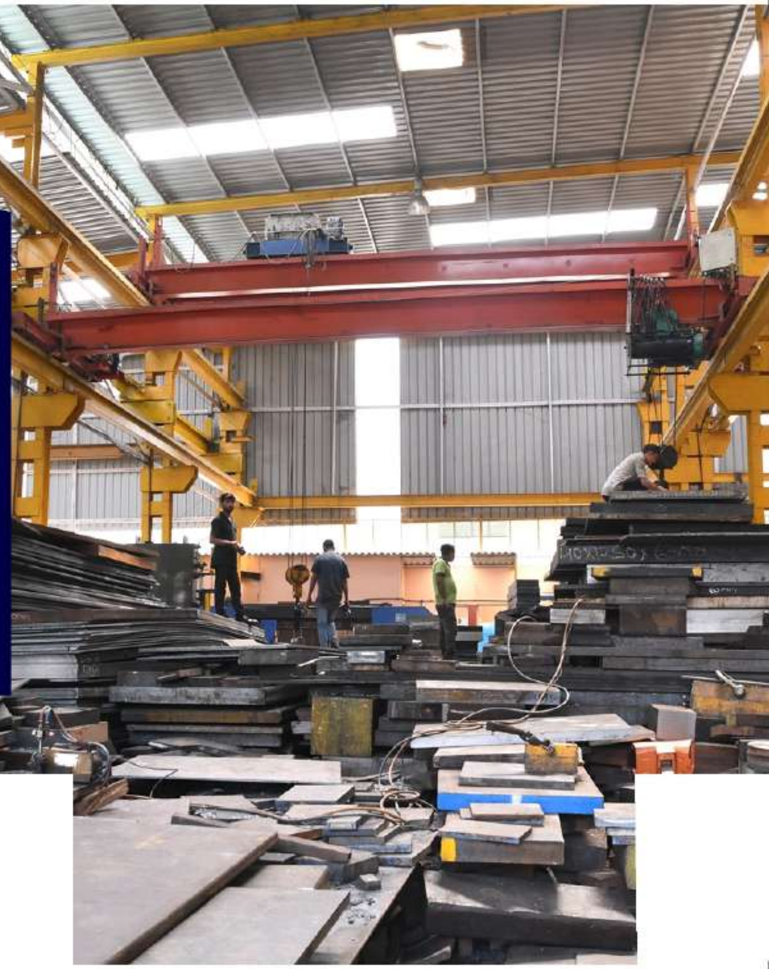
1. HIGH SPEED STEEL
2. H-13/1.2344
3. D-2/1.2379
4. D-3/1.2080
5. P-20/1.2311
6. P-20+Ni/1.2378
7. STAVAX / 1.2083
8. C-45 PLATES
9. EN-19/ 4140 PLATES
10. 20Mncr5 /EN 353
11. EN-24 / SAE 4340
12. EN-19 / SAE 4140
13. EN-47

The History & Journey of the legendary SAKSHI STEEL-N-ALLOYS

With over 20 years in the steel industry SAKSHI STEEL-N-ALLOYS has come a long way, cherishing all the experiences and strengthening its expertise, yet the firm believes it is young in its modern vision inculcating world class technology to revolutionalise the industry.

In the year 1997 SAKSHI STEEL-N-ALLOYS was founded by Mr.Tarun Kumar Gupta and Mr. Arun Kumar Gupta, who steered the Company that launched major modernization and expansion program around South India providing International quality standards supplying more than 1500 Companies that spans small, medium and large scale industries.

With an annual volume of 6000 to 7000 tons SAKSHI STEEL-N-ALLOYS is one of the biggest global Tool & Alloy Steel Importer/Stockist from reputed manufactures like Uttam Value Steel. Gerdau Steel, Bhusan Steel, SAIL, VSP, JSW, Usha Martin, Kalyani Steel, L.S.R.M, K.I.S.C.O, etc.



VISION & MISSION

Sustainable innovation is an essential investment of any enterprise that wants to stand strong and sustain in the market.

We at SAKSHI STEEL -N- ALLOYS have come a long way in emerging as experts in not just meeting national steel needs but also have created a benchmark in creating value for customers by being the suppliers of choice, delivering premium products and services with a host of variants to meet customer needs.

The team and its leaders believe in ethical and viable business practices and aspired to be global steel leaders, creating value for the industry and the society at large.

Mr Tarun Kumar Gupta
MD (Managing Director)

Mr Arun Kumar Gupta
CEO (Chief Executive Officer)

High Speed Tool Steel DIN 1.3343

Standard	Grade
AISI/SAE	M2
W.Nr/DIN	1.3343
JIS	SKH51
GB	

Chemical Composition (%)

C	Si	Mn	Cr
0.86-0.94	< 0.45	< 0.40	3.8-4.50

W	Mo	V
6-6.70	4.7-5.2	1.7-2

Steel Properties

Molybdenum high - speed tool steel. Very high resistance to softening at elevated temperatures and wear. Good toughness and cutting capability. Deep hardening response.

Physical Properties

	20°C
Thermal conductivity W/(m.K)	19
Density g/cm³	8.12

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700°C	20-800°C
10^{-6} °C^{-1}	10.7	11.7	11.9	12.4	12.7	13.1	13.4	13.4

Applications

Knives, thread cutting and twist drills, broaching and milling tools, woodworking tools, cold working tools, Sendizimir rolls, reamers circular saw segments, cold forming like cold extrusion rams and dies, plastic moulds with elevated wear resistance and screws

Stress Relieving

Holding at approx 650°C for one hour.

Heat Treatment

Soft annealing °C		Cooling	Hardness HB			
820 - 880		Furnace	225-280			
Heat up	Preheating 1. Step	Preheating 2. Step	Hardening From		Tempering	As tempered hardness HRC
°C	°C	°C	°C	in	°C	
450 - 600	850	1050	1180-1230	oil, air, thermal bath 5500C	3 x 1h 540 - 560	min. 64

Tempering

°C	200	300	400	500	525	550	575	600	650	700
HRC	63	61	61	62.5	64	65	64	62.5	57	47

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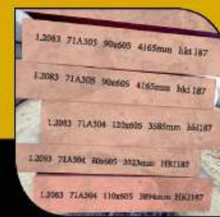
Plastic Mould Steel DIN 1.2083



Standard	Grade
AISI/SAE	420
W.Nr/DIN	1.2083
JIS	SUS420F
GB	

Chemical Composition (%)

C	Si	Mn	Cr
0.38-0.45	≤1.00	≤1.00	12.5-13.5

Steel Properties

High alloyed corrosion resistant Cr Contain more near to Stainless Steel & popularly known as STAVAX which can be hardened & tempered for better polish ability

Physical Properties

	20°C
Thermal conductivity W/(m.K)	30
Density g/cm³	7.73

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700°C
10^{-06} $°C^{-1}$	11.3	11.2	11.4	11.7	12.0	12.4	12.8

Applications

For corrosion resistant tools. Dies for artificial resins, for corrosive acting synthetic plastics. All kinds of cutting tools - knives, shears, surgical instruments. Also used as structural steel.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
760-800	Furnance	Max. 230
Hardening Form °C	In	Hardness after quenching HRC
1000-1050	Oil,Air,Thermal bath 500- 550°C	55-57

Tempering	°C	100	200	300	400	500	600	700
	HRC	56	55	52	51	52	42	28

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HOT Work Tool Steel DIN 1.2344

Standard	Grade
AISI/SAE	H13
W.Nr/DIN	1.2344
JIS	SKD61
GB	4Cr5MoSiV1

Chemical Composition (%)

C	Si	Mn	P
0.37-0.43	0.90-1.20	0.30-0.50	0.03

S	Cr	Mo	V
0.03	4.80-5.50	1.20-1.50	0.90-1.10

Steel Properties

Good hot wear resistance and thermal conductivity. It maintains high hardness and strength at elevated temperatures. Resistance to thermal fatigue, hot cracking, erosion and wear. Very high toughness. Good ductility and hardenabilty - air cooling. Tools can be water cooled.

Physical Properties

Thermal conductivity W/(m.K)	20	500	600°C
	25	28.5	29.3

Density g/cm^3	20	500	600°C
	7.78	7.64	7.60

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700	20-800°C
$10^{-6}\ {}^{\circ}C^{-1}$	10.7	11.9	12.2	12.5	12.7	13.1	13.5	13.7

Applications

Wear resisting tools, pressure die casting and extrusion dies, pressing tools for light and heavy metal. Used for ejector pins, tool holders and shrink fit chucks. For the highest requirements we recommend UTOPMO2 ESR EFS.

Stress Relieving

Holding at approx 650°C for one hour.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
760-810	Furnace	Max. 229
Hardening From °C	In	Hardness after quenching HRC
1020-1060	Oil, thermal bath ca. 450-550°C	52-56

Tempering									
°C	100	200	300	400	500	550	600	650	700
HRC	53	52	51	52	54	53	50	43	31
N/mm2	1845	1790	1730	1790	1910	1845	1680	1360	995

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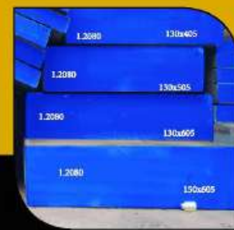
Cold Work Tool Steel DIN 1.2080



Standard	Grade
AISI/SAE	D3
W.Nr/DIN	1.2080
JIS	SKD1
GB	Cr12

Chemical Composition (%)

C	Si	Mn	Cr
2.00-2.35	0.10-0.40	0.15-0.45	11.00-13.00

Steel Properties

It is an oil hardening tool steel with high wear resistance, Good cutting capability. High compressive strength and is deep hardening.

Physical Properties

	20°C
Thermal conductivity W/(m.K)	20
Density g/cm³	7.67

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700°C
10^{-6} °C^{-1}	11.7	12.0	12.4	12.9	13.3	13.6	14.0

Applications

High performance cutting tools, stamping, woodworking, drawing, deep drawing and pressing tools, for ceramics and pharmaceutical industries, rolls, measuring tools, plastic moulds, shear blades.

Stress Relieving

Holding at approx 650°C for one hour.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
800-840	Furnace	Max. 250
Hardening From °C	In	Hardness after quenching
940-980	Oil, thermal bath approx 400°C	64-66
960-1000	Air,compressed air for thickness upto 30mm	63-65

Tempering							
	°C	100	200	300	400	500	600
	HRC	64	62	60	57	53	42

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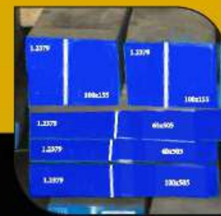
Cold Work Tool Steel DIN 1.2379



Standard	Grade
AISI/SAE	D2
W.Nr/DIN	1.2379
JIS	SKD11
GB	Cr12MoV

Chemical Composition (%)

C	SI	Mn	P
1.50-1.60	0.10-0.40	0.15-0.45	0.03

S	Cr	Mo	V
0.03	11.00-13.00	0.7-1	0.7-1.0

Steel Properties

High wear resistance. Very good toughness, compression strength and dimensional stability. Possibility of nitriding.

Physical Properties

	20°C
Thermal conductivity W/(m.K)	20
Density g/cm³	7.70

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700	20-800°C
10^{-6} °C^{-1}	9.8	11.7	12.1	12.8	12.9	13.0	13.2	13-5

Applications

High performance cutting tools, stamping, woodworking, drawing, deep drawing and pressing tools, for ceramics and pharmaceutical industries, rolls, measuring tools, plastic moulds, shear blades.

Toughness is better than CR12 (AISID3).

Stress Relieving

Holding at approx 650-700°C for one hour.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
840-880	Furnace	Max. 250
Hardening From °C	In	Hardness after quenching HRC
1000-1050	Oil,Thermal bath ca. 500- 550°C	62-64

Tempering °C	100	200	300	400	500	600	700
HRC	63	61	58	58	60	51	35

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Plastic Mould Steel DIN 1.2311

Standard	Grade
AISI/SAE	P20
W.Nr/DIN	1.2311
JIS	
GB	

Chemical Composition (%)

C	Si	Mn
0.35-0.45	0.20-0.40	1.30-1.60

Cr	Mo
1.80-2.10	0.15-0.25

Steel Properties

Plastic mould steel supplied in hardened and tempered (280 - 325 BHN) to 880 - 1080 N/mm2. Good match inability, better polish ability as companied to W. Nr. 1.2312. Suitable for texturing.

Physical Properties

	20°C
Thermal conductivity W/(m.K)	33
Density g/cm³	7.83

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700°C
10^{-6} °C^{-1}	11.7	13.1	13.5	14.0	14.4	14.6	14.7

Applications

Large & medium size moulds for plastics processing, mould frames for the injection moulding and pressure die casting.

Stress Relieving

Holding at approx 650°C for one - two hours.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
710-740	Furnace	Max.230

Hardening from °C	In	Hardness after quenching HRC
830-840	Oil, air, thermal bath 180 - 220°C	51 HRC (1730 N/MM²

Tempering								
	°C	100	200	300	400	500	600	700
	HRC	51	50	48	46	42	36	28
	N/mm²	1730	1680	1570	1480	1330	1140	920

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Plastic Mould Steel DIN 1.2738

Standard	Grade
AISI/SAE	P20+Ni
W.Nr/DIN	1.2738
JIS	
GB	

Chemical Composition (%)

C	Cr	Si	Mn
0.28-0.4	1.8-2.1	0.2-0.4	1.3-1.6

Mo	P	S	Ni
0.15-0.25	.03max	.03max	0.9-.1.2

Steel Properties

Plastic Mould steel, hardened and tempered (280-325 BHN) to 950 - 1100 N/mm2. Good machinability, excellent polishability, suitable for texturing. Improved through hardenability compared to W. Nr. 1.2311.

Physical Properties

Thermal conductivity W/(m.K)

20°C
33.5

Coefficient of linear thermal expansion

	20-100	20-200	20-300	20-400	20-500	20-600	20-700°C
$10^{-6}\,°C^{-1}$	11.7	13.1	13.5	14.0	14.4	14.6	14.7

Applications

Large and medium size moulds (over 400 mm thickness) for plastic processing, synthetic plastic moulds and dies, mould frames for injection moulding and pressure die casting dies.

Stress Relieving

Holding at approx 650°C for one - two hour.

Heat Treatment

Soft annealing °C	Cooling	Hardness HB
710-740	Furnace	Max.235

Hardening from °C	In	Hardness after quenching HRC
840-840	Oil, air, thermal bath 180 - 220°C	52 HRC (1790 N/MM ²)

Tempering							
°C	100	200	300	400	500	600	700
HRC	52	51	49	46	42	36	28
N/mm²	1790	1730	1620	1480	1330	1140	920

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HEAT – TREATMENT HINTS

ANNEALING

Annealing is carried out in order to soften the material and, at the same time, to relieve internal stresses with refining of the grain which improves toughness.

"True" or "full" Annealing, which should always be employed with alloy tool steels, involves heating steel to temperature above the upper critical point followed by slow cooling, i.e., furnance cooling or is Equivalent, exception are in certain of the nickel-chromium- molybdenum qualities which should be sub critically annealed at 640⁰C .

Work should be charged in to a furnace standing at not more than 200⁰ C then heated steadily to the annealing temperature . Fully machined tools should be packed during annealing to avoid surface decarburisation.

STABILISING

As an alternative to full annealing heavily – machined Tool Steel parts may be stress relieved before hardening. In this case the steel is charged into a furnance standing at not more than 200⁰ C. and heated steadily to the stabilising temperature of approximately 650⁰ C., Followed by furnance cooling.

The relieving of heavy machining stresses may be accompanied by slight distortion The components should therefore have a slight machining tolerance left on for removal by light cut (before hardening and tempering, if it cannot be done after).

HARDENING

Before hardening an adequate amount of metal should be removed from the surface of all forgings and black bar material.

In any hardening operation the heating of the steel and it is subsequent cooling are equally important. Components of complex shape, or Steels for which the hardening temperature exceeds 970⁰ C. Should be pre-hearted to 550/650 C. { 850⁰ C. in the case of high – speed steels},

The steel is heated steadily to the hardening temperature, which differs according to the composition of the steel and at which the greater part of the carbide is dissolved in a uniform solid solution know as austenite.

Typical soaking times per inch thickness of rulling section, at hardening temperature, are { for furnance hardening } 15mins for carbon tool steels and 20 mins for other types except high speed steels. When using liquid baths, the normal hardening temperature should be reduced by 10/15⁰C. and the soaking times reduced by 30/50. %

High speed steel tools, on attaining the hardening temperature, should be withdrawn from the – high temperature furnance or bath, Tasts on appropriate trial pieces are advised to determine the time require to reach the hardening temperature: if this exceeds 20 mins a second preheating treatment at 1100/1120⁰C. is recommended.

As soon as the soaking period is complete the steels are quenched in water, oil or air, when the austenite changes to a very hard structure, namely martensite, in which the carbide is uniformly dispersed .

The degree of hardening increases with increased agitation of the quench bath and with decrease in temperature of the quenching medium . A suitable range for water, and for brines containing upto 10% salt, is 20/30⁰C with oil, on other, hand there is little effect on cooling rates, even when the bath temperature ranges from 20/60⁰C. in addition oils give greater uniformity in structure and hardness.

The temperature of quenching baths should never be allowed to drop below 20⁰C. Work should be quenched down to, but not below, a temperature at which it may be comfortably handled, following which it should be tempered immediately.

TEMPERING

For some applications such as Cutting Tools, a materialistic structure is satisfactory, but in most cases the steel must be tempered to discompose the hard brittle as quenched constituent into a softer and tougher product. Thus the ductility is increased that the hardness and strength are reduced, the effect being greater, the higher tempering temperature.

A further purpose served tempering is to relieve stresses set up during the hardening operations.

Tools, especially of carbon tool steel, either of a complex shape or requiring high-tempering treatment, ,may conveniently be charged into a furnance standing at not less than 150⁰C, and heated steadily to the appropriate tempering temperature.

Time at temperature naturally depends upon the size and nature of the work, but 30mins suffice for most small pieces where as larger parts will require longer periods in proportion. This normal method of cooling is in still air.

Certain Manganese and Nickel – Chromium steels when tempered between about 250⁰C and 450⁰ C, show a loss in impact value. In the heat treatment of certain steels, such as high- speed steels and certain hot- work qualities, the maximum hardness is not developed on quenching, and a double tempering treatment { also called secondary hardening } is required.

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HEAT – TREATMENT HINTS

SURFACE HARDENING

The packing of tool in spent charcoal during annealing or hardening is not a carburising process.

A hard-wear-resistant case may be conferred by the introduction of carbon {as in carburising }, nitrogen (as in nitriding)or bath { as in cyaniding}. In carburising a carbon content of about 0.1/0.2 % is usual in the steel to be treated. Alloy additions made to strengthen the heat treated core and to provide a stronger support for the case, also generally improve the carbon diffusion Chromium steels show more rapid, and Nickel steels less rapid, carburisation than carbon steels. Normal times are about 6-8 hours (half that for gas carburising) at 930°C, Which will give a case depth of 0.040/0.060".

The "single quench" treatment does not give optimum properties to either the case are core, but is a com-omise it is useful when distortion must be kept to a minimum.

Cyaniding is carried out at the hardening temperature for the steel giving a shallower but generally harder case than carburising,

Nitriding is carried out on certain steels only for long periods at a temperature of about 500°C. Case depths are shallow but extremely high surface hardness are possible. (950/1100 V. P .N)

GENERAL NOTES

Pyrometers should be checked regularly against a standard instrument.

The temperature over a furnance hearth should be as uniform as possible and allowance should made for any unavoidable variation.

In direct- fired furnances, local flam – impingement should be strictly avoided , also the gas –air ratio should be adjusted to give a natural or slightly reducing flam.

Finish- machined components should be protected during heat- treatment by " packing" or by using liquid baths or controlled atmosphere chambers.

FREQUENT HEAT TREATING ERRORS

It happens time and again that heat treatment operations are carried out improperly, particularly in plants where they are not a routine necessity. The limited space provided by this booklet does not permit exhaustive dealing with large number of possible heat treating errors and their consequences. Therefore: the following list is intended to cover the most frequent causes only.

UNSATISFACTORY OR NON- UNIFORM HARDNESS

Too low a hardening temperature or uneven penetration of heat, too high a hardening temperature or excessive holding time at temperature, decarburization .

1. "Soft skin" due to steam bubbles produced in quenching, Work piece not agitated enough in quenching bath,
2. Loss of heat in metal because of great distance from furnance to quenching bath (specially with light sections),
3. Improper handling to tongs, e.g in such a way that portions to be hardened by are covered by mouth of tongs,
4. Unsuitable quenching agent or too high a bath temperature,
5. Untimely interruption of quenching, Surface contact of pieces in the quenching bath
6. Excessive tempering

HARDENING CRACKS

Confusion of steel grades.

Over heating or very irregular distribution of heat.

Defective quenching position.

Incorrect covering practice in furnance.

Too drastic a quenching agent.

Charging of cold material into very hot furnances or baths.

HARDENING DISTORTION

1. Extreme variations in cross section.
2. Uneven or too rapid heating overheating.
3. Incorrect covering practice when heating.
4. Incorrect quenching position and faulty agitation in bath.
5. No stress relieving anneal prior to hardening operation.

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