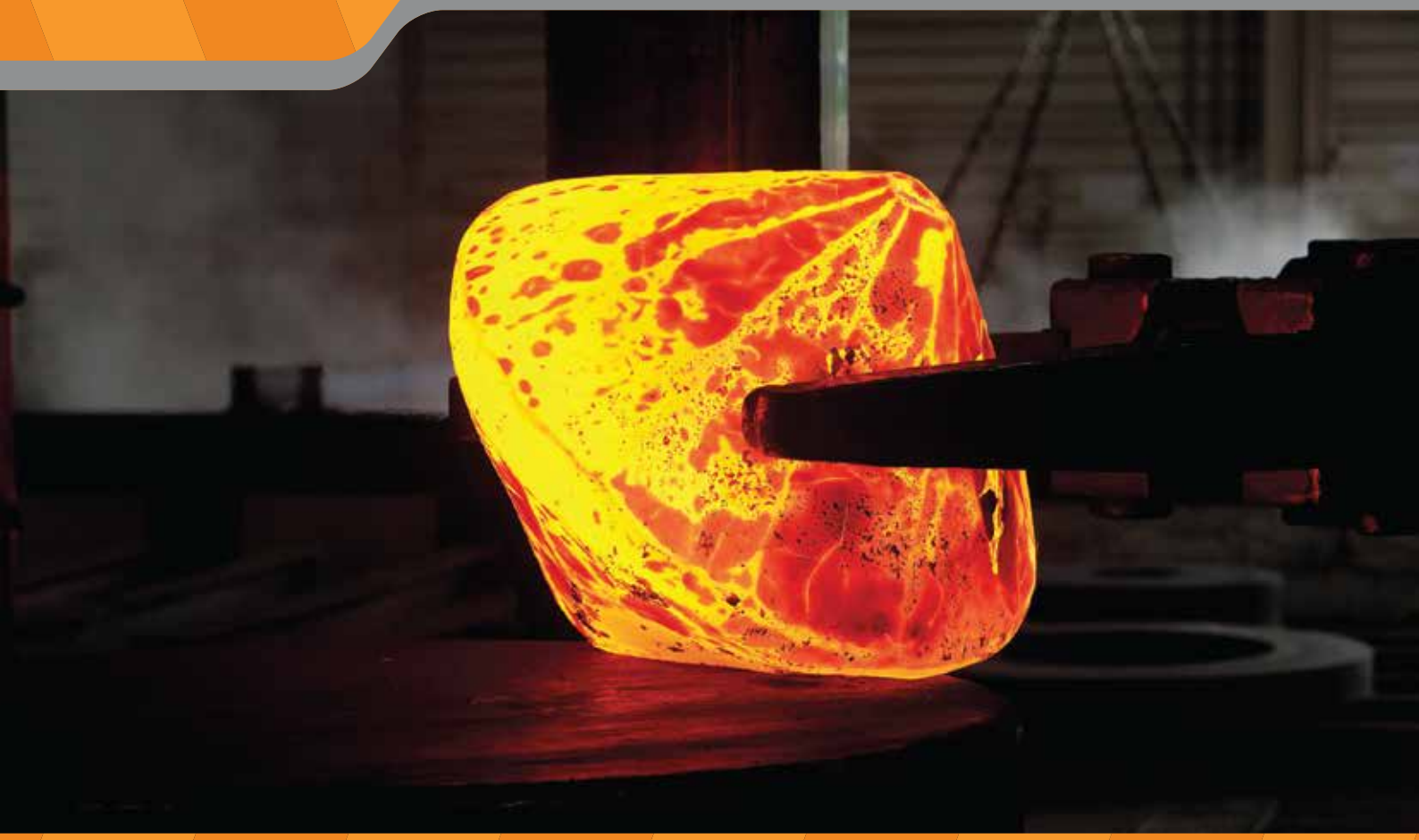
gmforging®
Free Forging Production



GM FORGING
FREE FORGING PRODUCTION

www.gmforging.com

ABOUT US

GMforging is your tailor-made solution partner for free forging, rough machining and heat treatment

Our main activities are carried out include manufacture of metallic products by plastic deformation(free forging), heat treatment of metals and machining operations.

We produce over 15000 tones forged products per year, and the have capacity of forge products up 20 tones.

- Relevant Information
- 15 million Euro per year
- %50 of production exported
- 75 employees
- Production area is more than 15000 sqm

Our plants specialize in specific forgings and materials using cutting-edge manufacturing equipment and the most innovative technology systems.

Vision

Empowering Industries Through Precision Forging Excellence

Mission

At [Gmforging], our mission is to be a beacon of innovation and reliability in the marine and machinery industries through the art and science of free forging. We are dedicated to providing superior forged solutions that elevate the performance, safety, and efficiency of our clients' products. Our commitment to precision craftsmanship, advanced technology, and sustainable practices drives us to deliver forging excellence that exceeds expectations. By fostering collaborative partnerships and continually pushing the boundaries of forging capabilities, we aim to shape a future where industries thrive on the strength of our forged creations.

Production

Press & Railbound and mobile manipulator

Forging department has 5000 MT four column pushdown oil hydraulic open die forging press and 20 MT rail bound manipülatör and mobile manipulator. This equipment enables to forge steel parts like shafts, discs, rings etc. Gm Forging is competitive in production of small series with special shapes and materials which are cast by using european quality ingots.

Machinery steel forgings for OEM and replacement parts for heavy industrial applications.

Typical applications of free forging are for oil exploration, mining, energy generation, pulp and paper manufacturing, steelmaking, alcohol and sugar production, machines and equipment in general. In many sectors, steel forging have become indispensable to standard operational processes.

Mobile manipülatör is under production to one of reputable producer

Annealing Furnace

An annealing furnace is a type of furnace used primarily for the heat treatment process known as annealing. Annealing is a heat treatment technique used to modify the physical and mechanical properties of materials, particularly metals and alloys, by heating them to a specific temperature and then cooling them down at a controlled rate. The key objectives of annealing include reducing hardness, improving ductility, and relieving internal stresses within the material.

"Our facility includes an annealing furnace with dimensions of 2 meters in length, 2 meters in width, 2.5 meters in height, and a heating capacity capable of reaching temperatures up to 1250°C. This furnace operates on natural gas and is equipped with advanced features, including graphic measurement and drawing capabilities."

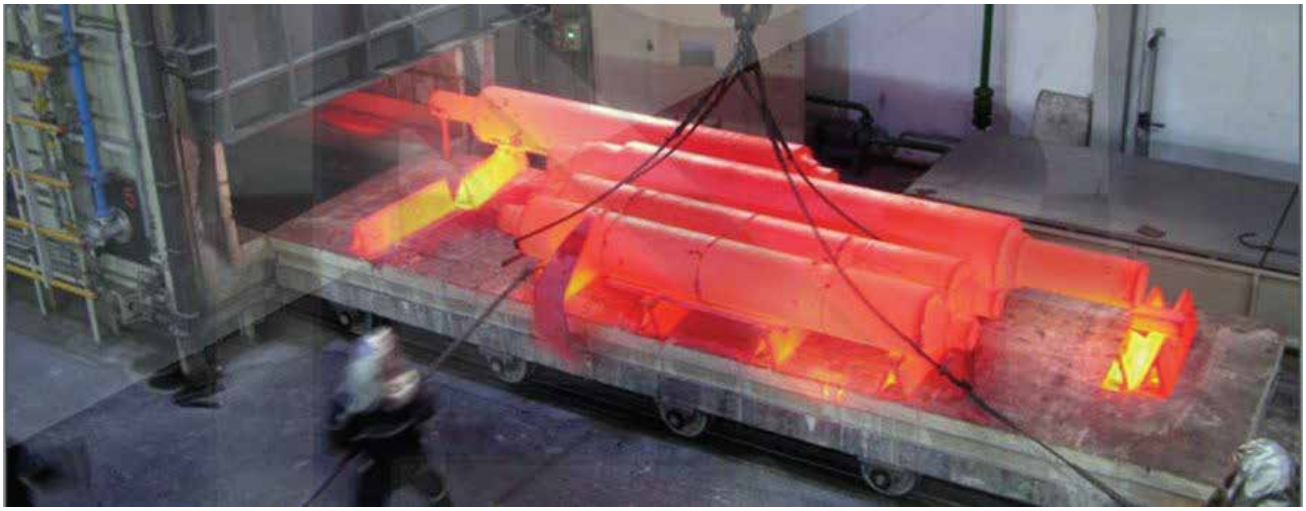
STRESS RELIEF ANNEALING

Stress relief annealing is a heat treatment process used to reduce internal stresses in materials, particularly metals and alloys, that may have built up during various manufacturing processes such as casting, welding, machining, or cold working. The goal of stress relief annealing is to improve the material's mechanical properties, dimensional stability, and reduce the risk of distortion or cracking.

"We operate a well-type electric furnace measuring 1.5 meters in diameter and 3 meters in length, along with another well-type facility of the same dimensions. Our operations encompass natural gas reclamation, tempering, stress relief, and normalization processes. In addition to these facilities, we possess a 6-ton well-type oil tank and a water tank."

Tempering

"We have a 2-meter by 2.5-meter by 7.5-meter electric furnace equipped with a heating capacity capable of reaching temperatures up to 1250°C. This furnace operates on natural gas and is equipped with an automated temperature control system spanning eight floors. Within our electronically controlled furnace, we have the capability to perform a wide range of heat treatment processes, including oil quenching, water quenching (Q+T), stress relief, welding stress relief, tempering, diffusion annealing, softening, normalization, and more. Our furnace is also equipped with graphic measurement and instantaneous drawing capabilities."



STEEL BALL CLEANING UNITS

Steel ball cleaning units, also known as steel ball cleaning systems or shot blasting machines, are industrial equipment used for the surface preparation and cleaning of various types of materials, particularly metal components and structures. These units employ steel balls or shot pellets as abrasive media to remove contaminants, scale, rust, old coatings, and other surface imperfections from the target workpieces. Steel ball cleaning units are commonly used in industries such as manufacturing, construction, automotive, and aerospace, where clean and well-prepared surfaces are essential for subsequent processes like painting, coating, welding, or inspection.

Our facilities include a dedicated steel ball cleaning operation with dimensions of 4000 x 5000 x 8000 mm. This state-of-the-art cleaning facility is equipped to handle large-scale works prepared for painting. Utilizing a ball spray system, we effectively address oxidation that may arise following the heat treatment process. In addition, our operations feature three specialized ball cleaning cabinets, each measuring 1350 x 1450 x 1450 mm."

MECHANICAL PROCESSING

We provide both semi-finished and finished products. This is made possible through our extensive machinery infrastructure for mechanical processing.

Universal Lathes	3m. – 5 meters – 10 meters
Universal Vertical Lathes	Max Ø1600 mm.
CNC Vertical Lathe	Max Ø 2000 mm.
CNC Borverk	(2500 X 3500 mm.)
Band Saws	We cut materials in Ø 200-1300mm sections of various sizes.

Products

Free for forging of bar&rod

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Max weight of disc can be forged up to 9 tonnes
diameter is Ø180-900 mmx length up to customer request,
200 – 1000 mm (square)x length up to customer request

Free for forging of discs

Free forging of discs, also known as open die forging of discs, is a metalworking process used to shape and form circular metal components, such as discs or rotors, without the use of a closed mold or die. In this process, the metal is heated to make it more malleable and then shaped by hammering or pressing it between dies that don't completely enclose the metal. This allows the metal to flow and take the desired shape while undergoing compression and deformation.

This method can be found in applications ranging from automotive and aerospace to heavy machinery and industrial equipment.

Max weight of disc can be forged up to 8 tonnes Max diameter is Ø1650 mm

Free forging of shaft

Shaft free forging, also known as open-die forging or hand forging, is a metalworking process used to shape cylindrical or tapered parts such as shafts, axles, and other similar components. Unlike closed-die forging, where the metal is shaped within a closed mold, open-die forging involves manipulating the material between two flat or slightly contoured dies. The term "open-die" refers to the fact that the metal is not fully enclosed within a die during the forging process..

Gradual Forging

"Fradual Forging" typically refers to a technique where the metal is shaped incrementally over multiple heatings and deformations to achieve a desired final shape. Each step involves reheating the metal to a malleable temperature and applying force to gradually shape it. This approach is often used when working with complex or intricate designs to minimize the risk of cracking or other defects in the metal.

Max weight of disc can be forged up to 12 tonnes

Diameter range is Ø 180 -1700 mm, length is upon the customer request

Ring Roll Forging

Ring roll forging, also known simply as ring rolling, is a specialized metalworking process used to produce seamless rings or cylindrical parts with a circular cross-section. This process is commonly used in the production of various components for industries such as aerospace, automotive, and manufacturing.

Advantages of ring roll forging include:

Material Savings: Ring rolling generates minimal waste compared to other methods, making it more efficient in terms of material utilization.

High Strength: The forging process enhances the mechanical properties of the metal, resulting in a strong and durable final product.

Seamless Rings: Ring roll forging produces seamless rings, which are free of welds or joints, enhancing their structural integrity.

Versatility: It can be used to create rings with various cross-sectional profiles and dimensions.

Common applications of ring roll forging include the production of aerospace components like jet engine bearings, flanges, gears, and other critical parts where strength, reliability, and precision are essential.

- **Out Side Diameters: 600-1650 mm Ø**
- **In Side Diameters: 350-1250 mm Ø**
- **Height : 200-500 mm**
- **Weight : 6000 Kgs max.**

Steel Alloys

Bearing Steel

100 Cr6 Steel

100Cr6 is a through hardening bearing steels intended for rolling contact and other high fatigue applications. In the hardened condition the high hardness, high strength and high cleanliness provides the steel with the right properties to withstand high cycle, high stress fatigue. 100Cr6 is mainly used for small and medium sized bearing components.

DIN 100Cr6 steel is widely used for a variety of applications in the used to the bearings in rotating machinery. Typical applications such as valve bodies, pumps and fittings, the high load of wheel, bolts, double-headed bolts, gears, internal combustion engine. Electric locomotives, machine tools, tractors, steel rolling equipment, boring machine, railway vehicle, and mining machinery transmission shaft on the steel ball, roller and shaft sleeve, etc.

C(%) 0.93～1.05 Si(%) 0.15～0.35 Mn(%) 0.25～0.45 P(%) ≤0.025
S(%) ≤0.015 Cr(%) 1.35～1.60

Carbon Steel

SAE 1020

AISI 1020 steel is characterized by its low hardenability and tensile strength, featuring nominal composition with 0.22% carbon (C) and 0.55% manganese (Mn). This steel exhibits outstanding weldability, favorable machinability, and notable ductility

It is frequently employed in the fabrication of axles, shafts, and various mechanical components, owing to its favorable attributes of weldability and machinability.

SAE 1020

AISI 1020 steel is characterized by its low hardenability and tensile strength, featuring nominal composition with 0.22% carbon (C) and 0.55% manganese (Mn). This steel exhibits outstanding weldability, favorable machinability, and notable ductility

SAE 1030

AISI 1030 is a high-carbon steel containing approximately 0.30% carbon that can be hardened by heat treatment to a maximum hardness of approximately Rockwell C 50. Soft annealed high carbon steel is intended for applications requiring moderate forming, while soft spheroidized annealed product is intended for applications requiring maximum cold forming. The soft spheroidized annealed product is processed to give the lowest hardness for maximum formability. This grade of steel is used for machinery parts, brackets, brakes, clips, clutches, springs, washers and for a wide range of applications that can make use of its good combination of mechanical properties.

Chemical Composition

Element	AISI 1030
Carbon	0.28-0.34
Manganese	0.60-0.90
Phosphorus	0.030
Sulfur	0.035

SAE 1020

"AISI 1045, classified as medium carbon steel, exhibits advantageous characteristics such as excellent weldability, favorable machinability, and notable strength and impact properties, whether in a normalized or hot forged state.

Chemical Composition

- **Carbon (C): 0.43-0.50**
- **Manganese (Mn): 0.60-0.90**
- **Phosphorous (P): ≤0.040**
- **Sulfur (S): ≤0.050**

AISI 1045 carbon steel demonstrates limited through-hardening capability, making it suitable for tempering and through-hardening processes. Nevertheless, it can be effectively induction hardened while in the normalized or hot forged state, achieving surface hardness within the range of Rc 54 to Rc 60.

It is important to note that AISI 1045 carbon steel lacks the necessary alloying elements, rendering it unresponsive to the nitriding process."

SAE 1050

"The steel grade 1050 is classified as a medium-carbon steel, possessing moderate levels of tensile strength and toughness. It conforms to the standards established by ASTM A510/A510M, ASTM A713/A713M, SAE J403, and other relevant regulatory specifications.

Steel grade 1050 finds extensive application in the production of forged components, including shafts, gears, axles, bandages, shares, screws, sickles, knives, axes, hammers, as well as in the manufacture of unloaded springs and coil springs."

SAE 1050

SAE 1060 steel grade is a a high-quality carbon structural steel with many desirable properties and uses. It has excellent machinability and heat treatment properties, as well as excellent corrosion resistance and physical properties. Let’s take a closer look at what makes 1060 steel so special and how it can be used.

The chemical composition of 1060 steel consists of 0.55 to 0.64 percent carbon, 0.30 to 0.90 percent manganese, 0.04 to 0.35 percent silicon, and up to 0.50 percent copper, with the balance being iron (Fe). This combination of elements gives this steel grade a unique set of characteristics that make it suitable for various uses in industries ranging from automotive to construction, aerospace, and more.

The chemical properties of 1060 steel make it an ideal choice for applications requiring superior corrosion resistance and wear resistance due to its high chromium content (up to 1%). Additionally, its low carbon content makes it ideal for welding applications because it will not harden during cooling after welding as higher carbon steels do.

AISI 1060 steel is an incredibly versatile option when it comes to industrial applications. Its strong, low-cost, and easy to form characteristics make it a perfect material for large-scale projects requiring tensile strength and extreme durability. It is applicable in just about any industry where contact with chemical agents, extreme weather conditions, or regular wear and tear occurs, such as construction, construction machinery, automobile manufacturing, electronics and more. 1060 steel also offers excellent corrosion resistance, which allows it to be used alongside public utilities like water mains and energy transmission systems. Given its low carbon content and impressive physical properties, there is almost no limit to what 1060 steel can be used in– making it an ideal material for countless industrial tasks.

SAE 1090

"AISI 1090 stands as a high-carbon steel renowned for its commendable attributes of wear resistance and toughness. This alloy finds its optimal utility in scenarios necessitating precise heat treatment procedures.

Furthermore, AISI 1090 distinguishes itself as an alloy steel marked by a pronounced resistance to corrosion, attributed to its distinctive amalgamation of chemical constituents. This particular composition is notably esteemed for its capacity to withstand rust, rendering it particularly well-suited for applications within the construction industry and other outdoor settings exposed to moisture and humid environments.

Moreover, due to its exceptional strength-to-weight ratio, AISI 1090 enjoys widespread adoption in the realm of automotive engineering, prominently contributing to the manufacturing of vital components such as sprockets, wheels, crankshafts, and automotive parts. Its rust-resistant properties also extend their utility to sectors such as oil drilling rig construction and general mechanical component production across diverse industrial sectors."

CASE-HARDENING STEELS

100 Cr6 Steel

16 MnCr5(1.7131) is a low-alloy steel known for its good hardenability, strength, and wear resistance. This steel is commonly used in applications that require components with a combination of these properties. The numerical composition "16MnCr5" indicates its alloying elements and approximate composition:

- 16 stands for the approximate carbon content (0.16%).
- Mn represents manganese as a major alloying element.
- Cr represents chromium as an alloying element.
- 5 signifies the approximate carbon content (0.5%) of chromium.

16MnCr5 steel is commonly used in industries such as automotive, mechanical engineering, and gear manufacturing. It is often chosen for applications like gear wheels, shafts, axles, and other components where a combination of strength, hardenability, and wear resistance is required.

16MnCr5 is a versatile steel that can be adapted to meet specific application requirements through heat treatment processes. Its well-balanced properties make it valuable for various applications in different industries, especially in situations where components need to withstand high stresses and wear.

20MnCr5 Steel

20MnCr5 (1.7147) is a case-hardening steel with low carbon content but good hardenability reaching good wear resistance due to high surface hardness after hardening. The small grain size benefits in good ductility and fatigue strength. Suitable for gearboxes and axle gears.

The numerical composition "20MnCr5" indicates its alloying elements and approximate composition:

- **20 stands for the approximate carbon content (0.20%).**
- **Mn represents manganese as a major alloying element..**
- **Cr represents chromium as an alloying element.**
- **5 signifies the approximate carbon content (0.5%) of chromium**

AISI 8620 Steel

AISI 8620, 20NiCrMo2, 1.6523) is a material suitable for cementation and nitration thanks to its low carbon content. 8620 steel is a ductile cementation steel where toughness is required in the core, hard and abrasion resistant on the surface and preferred in impact areas.

AISI 8620, 20NiCrMo2, 1.6523) is used in gear Wheel,pin, shaft,switch sleeve, Chain links and similar parts

18CrNiMo7-6 Steel

AISI 4820, 18CrNiMo7-6,1,6587 is a cementation steel alloyed with nickel, chromium and molybdenum. Surface hardness depth is much higher compared to 8620. Since 6587 steel, chromium and nickel alloy is much higher than 8620, its general mechanical properties are also better.

AISI 4820, 18CrNiMo7-6,1,6587 is used in Bushings wear pins, Bearings, Sprockets, Gears, Shafts

42 CrMo4 STEEL

Gmforging produces 42 CrMo4 forged steel is is available for saw, cut and delivery.

42CrMo4 is a high-quality, low-alloy steel known for its excellent strength, toughness, and hardenability. This steel is often used in applications requiring high tensile and yield strength, good wear resistance, and the ability to maintain its mechanical properties at elevated temperatures. The numerical composition "42CrMo4" indicates its alloying elements and approximate composition:

- **42 stands for the approximate carbon content (0.42%).**
- **Cr represents chromium as a major alloying element.**
- **Mo represents molybdenum as an alloying element**

1.7225 4140 (42CrMo4) alloy steel is widely used for engineering steel purposes, such as various machinery, automobile, mining spare part, gear wheel of engines, drive gears of superchargers, connecting rods, parts for powertrain applications, cold formed fasteners, it is frequently used in areas such as shafts, gears, oil exploration works.

34CrNiMo6 STEEL

Gmforging produces 34CrNiMo6 forged steel is is available for saw, cut and delivery.

34CrNiMo6 is a low-alloy steel known for its high strength, toughness, and good hardenability. This steel is often used in applications that require excellent mechanical properties and resistance to wear and impact. The numerical composition "34CrNiMo6" indicates its alloying elements and approximate composition:

- 34 stands for the approximate carbon content (0.34%).
- Cr represents chromium as a major alloying element.
- Ni represents nickel as an alloying element.
- Mo represents molybdenum as an alloying element.

1.6582 (AISI 4340) (34CrNiMo) tempered steel is particularly preferred in mechanical engineering parts, overloaded crankshafts, camshafts and gears.

30CrNiMo8 STEEL

Gmforging produces 30CrNiMo8 forged steel is is available for saw, cut and delivery

30CrNiMo8 is a low-alloy steel known for its high strength, toughness, and good hardenability. This steel is commonly used in applications that require excellent mechanical properties, resistance to wear and impact, and the ability to be heat-treated to achieve specific hardness levels. The numerical composition "30CrNiMo8" indicates its alloying elements and approximate composition:

- **30 stands for the approximate carbon content (0.30%).**
- **Cr represents chromium as a major alloying element.**
- **Ni represents nickel as an alloying element.**
- **Mo represents molybdenum as an alloying element.**

1,6580 30CrNiMo8 steel is used for automotive and general components which requires high demands on strength and toughness and good hardenability.It is especially suitable for heavy duty parts in the aviation, automotive and military industries.

SPRING STEEL

50CrV4 STEEL

This spring steel is aptly suited for various applications in mechanical engineering, automotive manufacturing, and the production of gear parts, as well as in the crafting of hand tools.

The composition of 50CrV4 steel includes:

- 50% Carbon (C)
- Chromium (Cr)
- Vanadium (V)

The "50" in the name indicates the approximate percentage of carbon in the steel. The addition of chromium and vanadium enhances the material's properties, making it suitable for various applications, particularly in the production of springs and high-stress components.

50CrV4 steel is known for its excellent spring properties, high strength, and good wear resistance. It is often used in the manufacture of leaf springs, coil springs, and other types of mechanical springs. Its ability to withstand repeated loading and its durability make it a preferred choice in applications where these properties are critical. Additionally, it can be found in various automotive and mechanical engineering components where high tensile strength and toughness are required.

SAE 9255 STEEL

AISI 9255 is a silico-manganese spring and tool steel having good toughness and shock resistance.

AISI 9255 steel is known for its excellent mechanical properties, including high tensile strength and good toughness. Due to these characteristics, it is commonly used in the manufacturing of various types of coil and leaf springs, as well as other suspension components in automotive and machinery applications. The alloying elements, particularly chromium, contribute to its strength and durability, making it suitable for applications where the material needs to withstand high stress and repeated loading.

Structural Steel

S355 J2G3 STEEL

S355 J2G3 Steel is a carbon manganese ,high yield non alloy steel. It is called S355 because of the average minimum yield for this material is 355 Mpa.As a structural steel,it has excellent strength and weldability.It can be readily welded to other weldable steel. For its low carbon equivalent, it possesses good cold-forming properties.

S355J2G3 is a low carbon structural steel grade often used for application which require better mechanical properties than that of S275 and S235 grade.It is widely used in engineering and construction industries.

Applications include axles, bolts and connecting rods, motor, hydraulic and pump shafts, machinery parts,transmission towers, dump trucks, cranes, trailers, bull dozers, excavators, forestry machines, railway wagons, dolphins, penstocks, pipes, highway bridges, building structures, oil and gas platforms, offshore structures, shipbuilding, power plant, palm oil equipments and machineries, fans, pumps, lifting equipments and port equipments etc.

S355 J2G3 STEEL

ST52 is low-carbon steel with manganese content. It has good impact resistance and material strength. Durable properties combined with ease of processing makes ST52 a popular option for various industries and application. In terms of other physical resilience parameters such as surface hardness and tensile strength, ST52 shows good performance. In addition, ST52 is quite ductile, meaning it can be plastically reformed into desired shapes without any need for heat treatment.

It is a standardized grade of steel in Europe, primarily Germany, where it is known as "Stahl St52" or "St52 Stahl" in German. In terms of its American equivalent, ST52 steel corresponds to ASTM A572 Grade 50 steel.

The key characteristics of ST52 steel include its high strength, good weldability, and good machinability. It is commonly used in the construction of buildings, bridges, and other structures where high-strength materials are required. ST52 steel is also employed in the manufacturing of machinery parts, such as hydraulic cylinders, axles, and various components that must withstand heavy loads and stress.

S275JR STEEL

S275JR is a specific grade of low carbon structural steel is the meaning

"S" is for structural steel;
"275" refers to the minimum yield strength is 275 MPa tested with steel thickness ≤ 16mm.
"JR" means that the minimum charpy impact value at room temperature is 27J.
"J0" refers to the minimum charpy impact value at 0 °C is 27J.
"J2" means the minimum impact value at -20 °C is 27J.

The choice of steel grade depends on the specific requirements of the project and the structural elements being used. Engineers and designers select the appropriate steel grade based on factors such as load-bearing capacity, environmental conditions, and the desired strength and durability of the structure.

Applications

Construction and Mining

The construction and mining industries exert a significant influence on the preservation and enhancement of our daily routines. At Gmforging, we specialize in delivering top-tier forgings essential for both surface and subterranean machinery. Our offerings encompass flexibility and adherence to cater to replacement needs as well as high-volume requisites.

- **Mining Trucks** (Rods/pistons)
- **Shovels** (Swing gears,roller paths, carrier ring blank, rim)
- **Motor Graders** (Circle, rims, spindle drive)
- **Wheel Loaders** (Spindle Drive, hoists)

Industrial Machinery

Our adaptable manufacturing process empowers us to supply a diverse array of geometries in numerous materials. At Gm forging, we recognize the significance of furnishing dependable components for industrial machinery and heavy equipment, which play a pivotal role in sustaining essential industries such as steel production, food processing, and healthcare services.

- Material Handling Equipment(Forged rings, contoured rings, discs and open die components)
- Pumps and Valves(Rolled rings and discs for pumps and valves)
- Transmissions(Rings and open die forgings for gears, trunnions, and pinions)
- Rotary Equipment(Large tires, trunnions, gears, rolls, shafts, and pinions)
- Heat Exchangers & Pressure Vessels(Flanges)

Petroleum And Gas

We manufacture forgings utilized in drilling stations, pipelines, and refineries across the globe. The oil and gas industry relies on forged components to ensure a safe and successful operating facility

Oil & Gas Industry Custom Forging Capabilities.

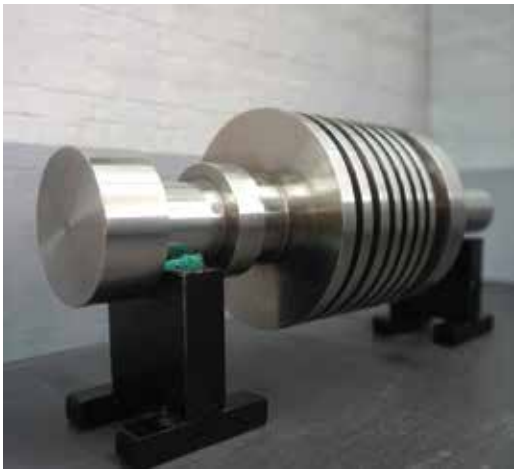
- Wellhead equipment
- Crankshafts
- Cylinder blocks
- Valve bodies
- Fluid ends
- Manifolds

Industrial Machinery

GM Forging provides high-quality custom forgings tailored for utilization in the power generation sector. Our forged metal offerings boast extended service longevity, exceptional fatigue resistance, refined grain patterns, augmented strength, and heightened operational efficiency.

Our forging facility possesses the capability to efficiently and cost-effectively manufacture forged steel components for the power generation industry, encompassing the following:

- **Impellers:**
- **Blades:**
- **Compressor & Generator Shafts:**
- **Discs and Hubs**
- **Rings(Full/segmented)**
- **Turbines**



Wind Power

Wind turbine forgings are components used in the construction of wind turbines. These forgings are typically made from high-strength materials such as steel and are produced through a forging process. Forging is a manufacturing method that involves heating a metal material and then shaping it through the application of force, typically with the use of dies or hammers. This process results in forged components that are strong, durable, and have improved mechanical properties compared to cast or machined parts. We have experience in different applications with materials such as 42CrMo4, 34CrNiMo6, 18CrNiMo7-6, and 30CrNiMo8, among others.

- Flanges
- Bearings
- Gears
- Couplings
- Main Shafts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