

Material Information



Carbon Steel 1045

Introduction

Carbon Steel 1045, also known as AISI 1045, SAE 1045, or UNS G10450, is a medium-carbon steel known for its higher strength and hardness compared with low-carbon steels. It responds to heat treatment and can also be flame- or induction-hardened, making it suitable for components requiring greater mechanical performance. Carbon Steel 1045 can be fabricated into sheet metal components when higher strength is more important than maximum formability.

Advantages

Good strength, hardness, and wear resistance make Carbon Steel 1045 suitable for fabricated parts that require higher mechanical performance than low-carbon steels. It can be heat-treated to further increase hardness and strength, while its medium-carbon composition provides a useful balance of mechanical properties for industrial components. It can also be hot-worked and forged under suitable conditions.

Disadvantages

Carbon Steel 1045 has lower formability and weldability than low-carbon steels such as 1008 and 1018 because of its higher carbon content. Extensive cold forming can be more difficult and may require larger bend radii or appropriate forming conditions. It also has limited inherent corrosion resistance and can rust when exposed to moisture or corrosive environments without suitable surface protection.

Tolerance

We offer tolerances as tight as $\pm 0.005"$. Tighter tolerances are available upon manual review.

Recommendation

The combination of higher strength, hardness, wear resistance, and the ability to respond to heat treatment makes Carbon Steel 1045 suitable for sheet metal fabricated parts used in industrial equipment, machinery, automotive, agricultural equipment, construction equipment, and general engineering applications. It is particularly appropriate for fabricated

components that require greater mechanical strength and wear resistance than low-carbon sheet steels can provide.

Material Specifications (For reference only.)	
Tensile strength	570 to 700MPa
Yield strength	310 to 505MPa
Elongation at Break	12% to 16%
Hardness	170 to 210 HB

Attention

Carbon Steel 1045 is a medium-carbon steel, and its forming behavior depends strongly on the material condition. During bending, stamping, and other cold-forming operations, suitable bend radii and forming parameters should be used to reduce the risk of cracking. Welding requires greater care than with low-carbon steels, and appropriate welding procedures and preheating may be necessary depending on section thickness and service requirements. Because 1045 can be heat treated and hardened, the required material condition should also be specified before fabrication.

Applications

3DSPRO finds people using Carbon Steel 1045 to make functional parts and prototypes in the following industries and applications.

Industrial equipment and machinery:

Machine components, brackets, supports, guards, mounting plates, and other fabricated parts requiring higher strength and wear resistance.

Automotive and transportation:

Brackets, shafts, supports, mounting components, structural covers, and other parts where higher mechanical performance is required.

Agricultural and construction equipment:

Wear-resistant covers, brackets, supports, plates, guards, and other fabricated components subjected to mechanical loads and demanding service conditions.

General engineering and manufacturing:

Housings, plates, fixtures, supports, machine guards, and other sheet metal fabricated parts that benefit from Carbon Steel 1045's combination of strength, hardness, and heat-treatment capability.