TRJ ENGINEERING GROUP

FABRICATION ENGINEERING 101

HOW ON EARTH DID THEY MAKE THAT?

TRJ ENGINEERING | (03) 9703 1701 | SALES@TRJENGINEERING.COM.AU

FABRICATION ENGINEERING 101

HOW ON EARTH DID THEY MAKE THAT?

Consider the chair you are sitting on. The house you live in. The car you drive. The fridge that keeps your food cold. The device you are viewing this on. The trains, planes and ships you use for transport. From the forceps at birth to the coffin at death, the entire man-made world is a result of engineering and fabrication.

Steel is the most important class of engineering and construction material on earth.

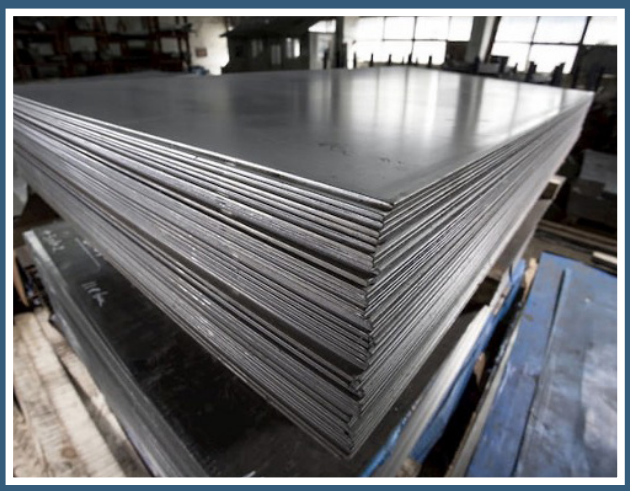
- Nearly 2000 million tons of crude steel is produced each year (World Steel in Figures, World Steel Association, 2020).
- Steel has an incredibly vast amount of uses - from fabricating enormous skyscrapers, to creating tiny parts for precise uses.

1. Common metals, their applications and uses

- Steel is not an element, but often a combination of many. There are over 3,500 grades of steel! (The White Book of Steel, World Steel Association, 2012).
- Over 75% of the steels used today have been developed in the 21st Century. Steels continue to get stronger and lighter.
- Engineers will specify the metal most suited to a particular application – 'fit for use'

1.1 Mild Steel (Coated)

Mild Steel is a medium strength, low carbon steel plate product. It is a low cost, machinable, weldable, Usually, common grades of mild steel like 250 or 350 are galvanised, painted or powder coated to increase corrosion resistance.

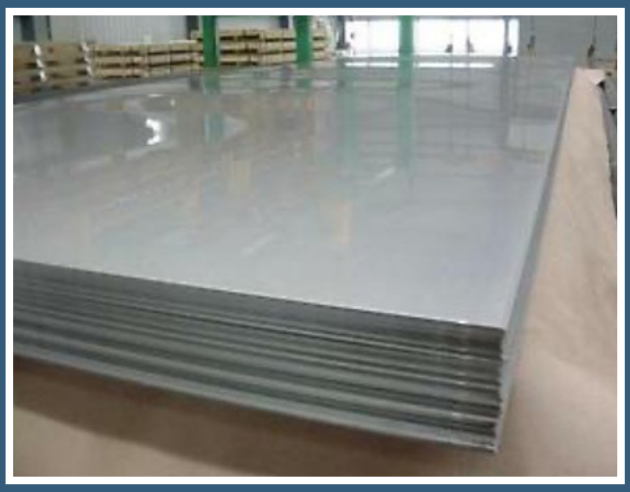


Applications:

- General part fabrication
- Street and urban furniture
- Fences and gates
- Structural steel
- Storage tanks

1.2 Stainless Steel

Stainless steels are a more expensive, corrosion resistant metal, which are alloyed with >11% chromium. Without the need for surface coating, stainless steel is durable, easy to clean and sterilize, and remains durable and visually appealing in areas where there will be exposure to liquids.



Applications:

- Handrails, counter tops, architectural design work
- Industrial equipment, storage tanks, valves and pipes
- Car exhaust systems, trims, grills
- Construction material

1.3 Weathering steel (CORTEN steel)

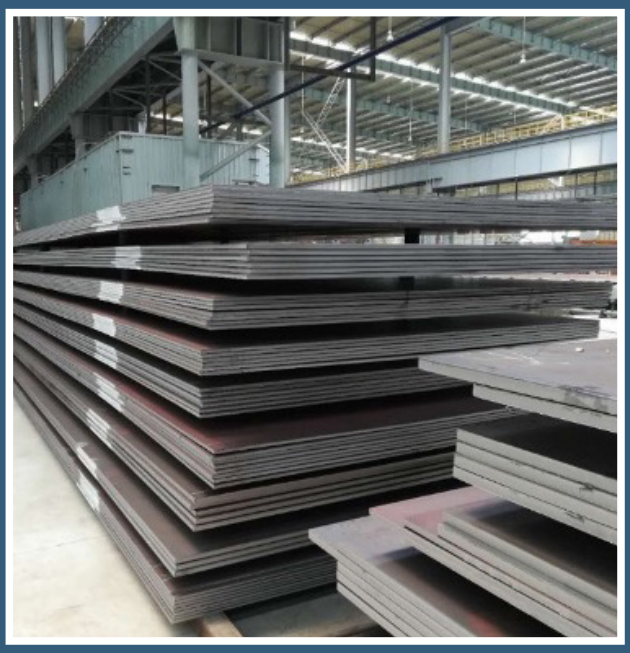
Weathering steel is a high strength, low-alloy steel that doesn't require a coating system. Often referred to as CORTEN or COR-TEN steel, weathering steel oxidises when exposed to outdoor elements. The protective cover oxidation is not only gives a desirable rust aesthetic to many architects, it can improve performance!

Applications:

- Bridges
- Highway overpasses
- Sculpture
- Architecture and construction
- Fences

1.4 Quenched and tempered steel plate (Bisalloy steel)

Bisalloy is a high strength, low alloy steel plate. 3 times stronger than mild steel, with excellent notch toughness, good weldability and formability.



Applications:

- Transport equipment
- Mining equipment
- Excavator buckets
- Bridges
- Dump truck wear liners
- Deflector plates
- Earthmoving buckets

1.5 Aluminium

Aluminium is a lightweight, corrosion resistant metal that is not as strong as steel. When alloyed, its weight is increased, its corrosion resistance decreased; but as a trade off, it gains requisite strength. The softness and malleability of aluminium means it is easy for metalworkers to form it into shapes.

Applications:

- Transportation (cars, aircraft, trucks, trains, ships)
- Building and construction material (windows, frames, doors, roofing, sheathing)
- Furniture
- Machinery and industrial equipment (processing equipment, pipes, tools)

2. Common metal fabrication procedures and their applications

2.1 Laser cutting

Laser cutting is a technology used to slice metal, by directing the output of a high-powered laser. The laser optics and CNC (computer numerical control) are used to direct the beam generated.

2.2 Guillotining

Metal guillotine cutting machines are designed to cut metal sheets into smaller, more manageable sheets, which are then further processed so that they can serve as part of some integral machine component or structural asset.

2.3 Brobo saw/cold saw/ band saw

Power saws which cut metal using sharp toothed blades.

2.4 Punching and Shearing

Punch and shear machines, also known as ironworker machines, are heavy motor industrial tools used to shear, notch, bend and punch holes in sheet metal.

2.5 Hydraulic Press Brake

A press brake is a machine pressing tool for bending sheet metal and plates. It forms precise, predetermined bends by clamping the workpiece between a matching punch and die. The higher the tonnage, the thicker grade of metal able to be bent.

2.6 Machine + Turn

Turning involves rotation of a work piece while the cutting tool moves in a linear motion. Milling refers to a multi-point tool which creates designs by removing material as the cutting tool rotates.

2.7 Drill + Tap

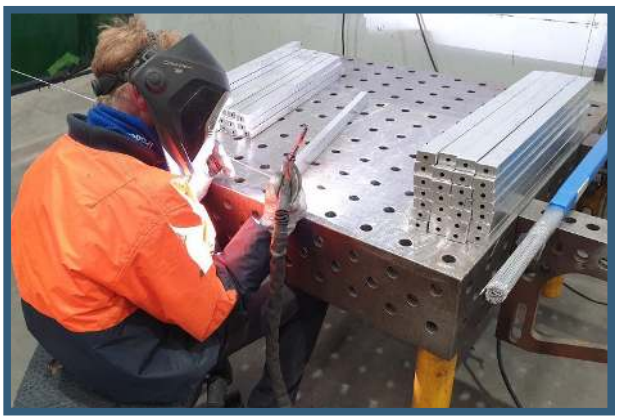
Once a hole has been drilled into the metal, tapping is the process of creating threads on the inner surface of the drilled hole. Can be performed with the aid of the CNC or manually.

2.8 Welding

Welding is the process of joining two pieces of metal together, and can be done manually or by robot/CNC welding machines. Heat softens the metals, which, when returned to room temperature, are firmly joined. There are two primary types of welding used today:

MIG Welding

Generally more effective for thicker, heavy-duty welds



TIG Welding

Generally more effective for joining thinner pieces of metal

2.9 Deburring/Linishing/Polishing

The final process of removing unwanted excess metal from a surface with grinding or belt sanding techniques. Used to create a smooth, final finish.

OUR CLIENTS

BOMBARDIER

BOSCH

colesgroup

Franklin Electric

KNORR-BREMSE

HITACHI
Inspire the Next

KOMATSU

DELTA GROUP
AUSTRALIA WIDE

Schneider Electric

TRJ ENGINEERING GROUP

www.trjengineering.com.au

(03) 9703 1701 | sales@trjengineering.com.au

47-51 Westpool Dr, Hallam VIC 3803