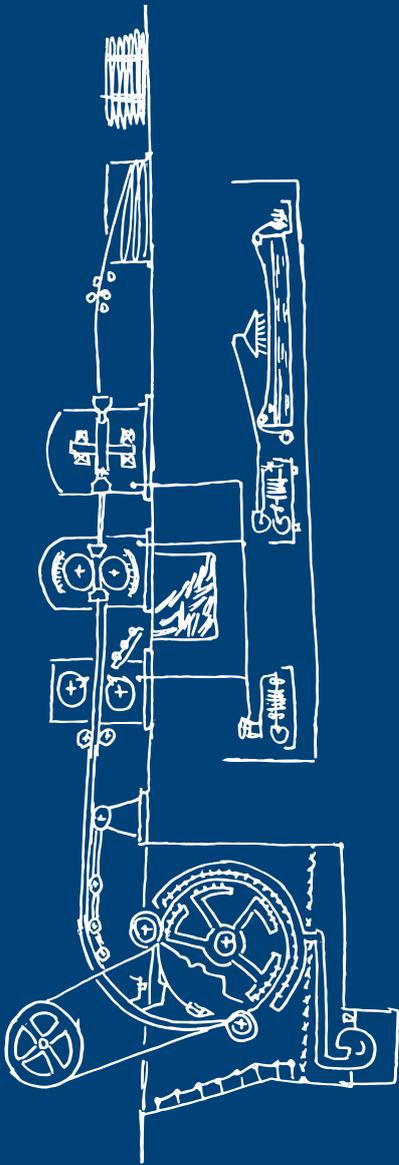




Continuus
Properzi

Properzi Aluminium Rod Application



Properzi





Aluminium rod is produced by different processes namely extrusion, rolling and coiling, or casting, rolling and coiling directly from molten aluminium. These processes elongate the aluminium into circular or bar-shaped pieces that can be further processed to fulfill various applications. Many machine and equipment parts, such as rivets, nails, screws and bolts, are made from rod. Aluminium wire is used extensively in electrical transmission applications due to its excellent conductivity, light weight and non-corrosive nature. Every-day products produced from wire and rod include: chain-link fence material, aluminium antennas, zippers and those handy re-twistable twist-ties used to keep food fresh.

PRODUCING ROD

One method to produce aluminium rod is similar to rolling sheet. A continuous trapezoidal hot bar is

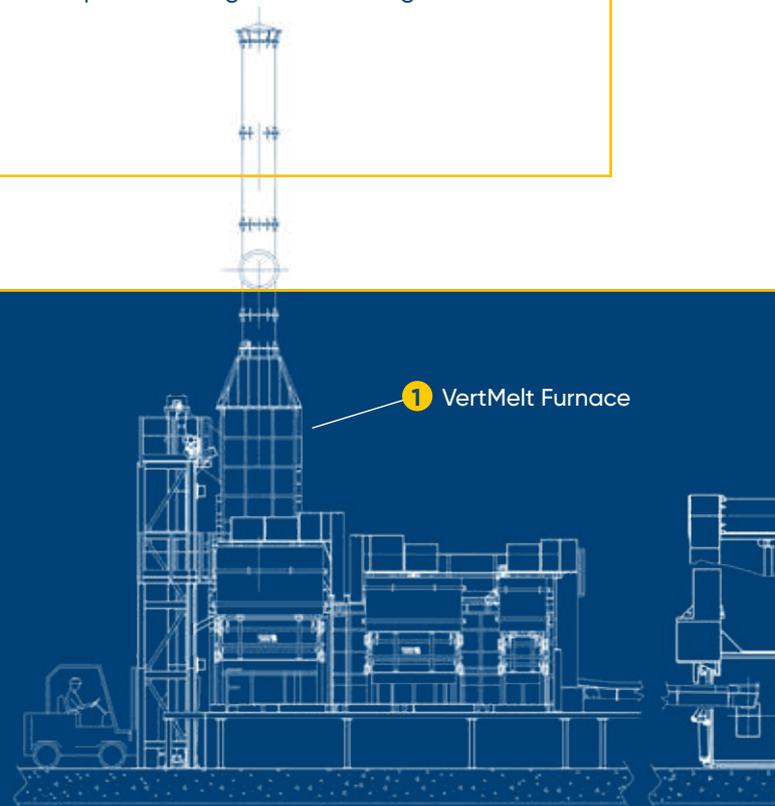


APPLICATIONS

Electrical transmission lines are by far the largest application for aluminium rod products. This is a market in which aluminium has virtually no competition from other metals. Aluminium is simply the most economical way to deliver electrical power. Aluminium wire and cable are also used almost anywhere there is an electrical impulse to conduct: in commercial buildings, machinery and equipment, transportation and consumer durables. Wire and cable are used for little jobs we seldom think about, such as the non-rusting staples in tea bags and re-twisting twist-ties.

EXAMPLE OF ELECTRICAL APPLICATIONS

Alluminium Alloys casting line layout



progressively reduced in cross-section by passing it through a series of rolls, and then coiled. The coils of rod are further processed into wire through subsequent rolling or drawing operations. The major families of rod and wire production can be divided by application as follows:

- Electrical applications
- Mechanical applications
- Welding applications
- Harness applications

ELECTRICAL APPLICATIONS

They include insulated cables for low, medium and high voltage distribution networks, conductors for overhead transmission lines, flexible cables for robotics, welding and railway engineering,

THE ALUMINIUM ALLOYS SERIES

Alloy	AA
Al > 99%	1000
Al+Cu Al+Cu+Mg	2000
Al+Mn	3000
Al+Si	4000
Al+Mg	5000
Al+Mg+Si	6000
Al+Zn+Mg Al+Zn+Mg+Cu	7000
Al+other	8000

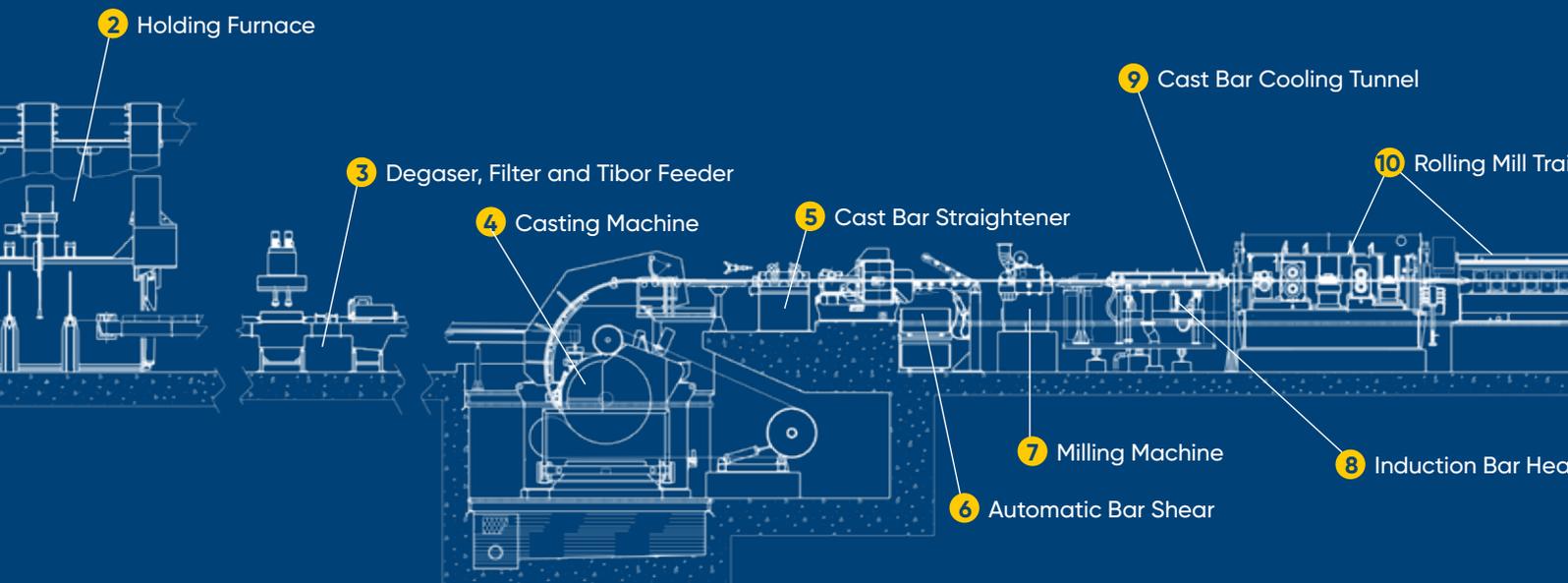


EXAMPLE OF MECHANICAL APPLICATIONS

MECHANICAL APPLICATIONS

The mechanical applications include: rivets, bolts, screws or forged parts. The future for these applications will increase in particular for the automotive and transportation industries to reduce the weight and consequently the emission of CO₂. In particular:

- AA2011: for screw machining
- AA2017: die-forgings, nuts and bolts and screw machining
- AA2024: rivets, bicycle nipples, screws, balls
- AA3103: impact extrusion of cartridge cases, tube extrusion by the PRO-FORM (rotary extrusion) process
- AA5019: cold heading (rivets, nails, miscellaneous), zip fasteners, metal screening and wire fencing, staples
- AA5051: wire fencing
- AA5052: cold heading, zip fasteners, wire fencings, tea bag staples
- AA5154: cold heading, wire fencings, staples
- AA6056: screws, nuts and bolts, fittings
- AA6082: cold heading, knitting needles, die-forgings



cables using nickel-plated wire for aeronautical engineering, enameled wire for windings, etc. The Electrical alloys are: AA1120, AA1310, AA1350, AA1370, AA6101, AA6201, AA8030, TAL alloys.

WELDING APPLICATIONS

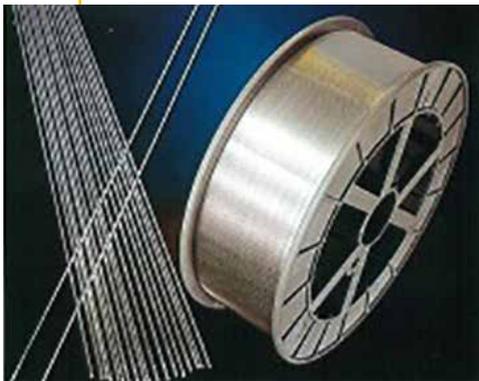
This application is in continuous increment due to the growing use of aluminium in the automotive and transportation fields. The major families are 4000 and 5000 series.

These alloys, which mainly contain Si as an alloying element, are used as welding filler materials. The range is from 5% (AA4043) to 12% (AA4047) silicon. They have excellent fluidity due to their low melting point and are also widely used as soldering alloys. If structural parts need to be

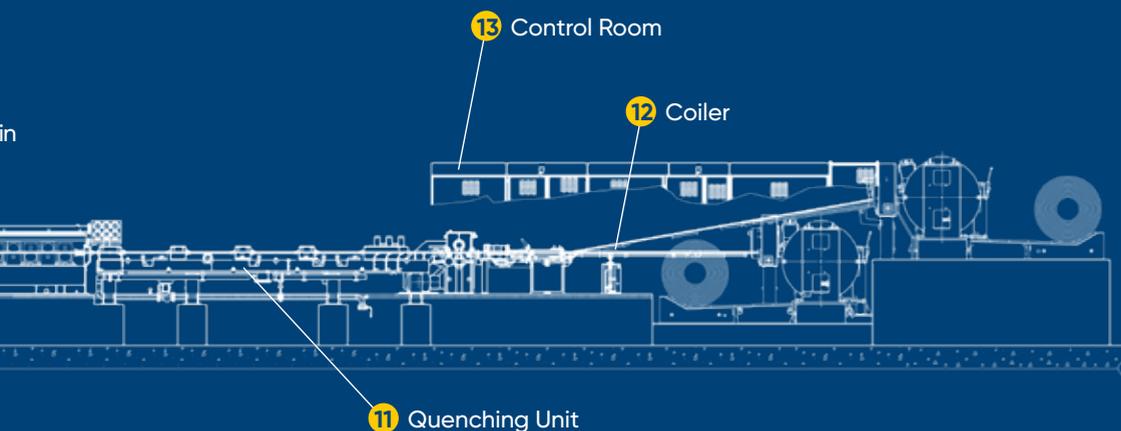
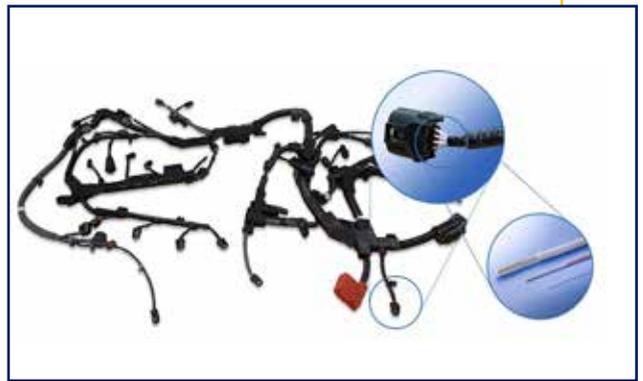
anodized after welding the joint forms a natural dark grey anodic coating. Major applications are MIG, TIG and Laser.

AA5183 and AA5356 are the best choice if high mechanical properties in the welded structure are required. AA5183 has even higher mechanical properties than AA5356. They produce welds with higher ductility than those using 4xxx series filler materials but are not as easy to use as the 4xxx series alloys. However, they should not be used with high Si content alloys (i.e. castings) because excessive magnesium-silicide (Mg_2Si) develops in the weld structure and will decrease ductility and increase crack sensitivity.

These welding fillers are mainly used for automotive components, bicycle frames, body panels, shipbuilding, the railway industry, the offshore industry, the trailer industry, tanks, containers, etc.



EXAMPLES OF WELDING AND HARNESSES APPLICATIONS



HARNESSES APPLICATIONS

In the automobile industry the need for weight reduction has increased as CO₂ emission regulations have become more stringent. To develop a lightweight and low cost wiring harness, many companies, initially in Japan, have examined the replacement of copper wires with aluminium wires.

Aluminium wires have been used mainly in overhead power lines and automobile battery cables, where the cross sectional area of the conductor is large to support high current. Both tensile strength and electrical conductivity are required for automobile aluminium wires. The purpose of this application was to achieve tensile strength of 110 MPa or more and conductivity of 58% IACS or more, assuming that the conventional 0.5 mm² copper wire generally used in a low-voltage power cable could be replaced by a 0.75 mm² aluminium wire.

CONCLUSION

World aluminium wire rod usage is estimated to have increased from 5.87 million tons in 2014 to about 6.45 million tonnes in 2018. Owing to its properties, aluminium cables and conductors have successfully replaced copper as the principal medium for carrying electricity over the last five decades. Owing to quick urbanization and faster growth of the building and construction sector, electrical transmission and distribution networks have grown over the years driving demand for aluminium products like wire rod, wire, cable and overhead conductor.

The PROPERZI CCR (Continuous Casting & Rolling) Lines are considered the worldwide best and simplest system to produce rod. Couple the CCR system with the PROPERZI cold Microrolling® Mill and you have the most economical method to produce wire. The advantages of the PROPERZI technologies include:



- Easy to maintain consistent rod and wire parameters
- High productivity and overall equipment efficiency
- Precision automation
- Reliable and convenient packaging
- Readily available technical support and customer service
- Unparalleled customer satisfaction

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