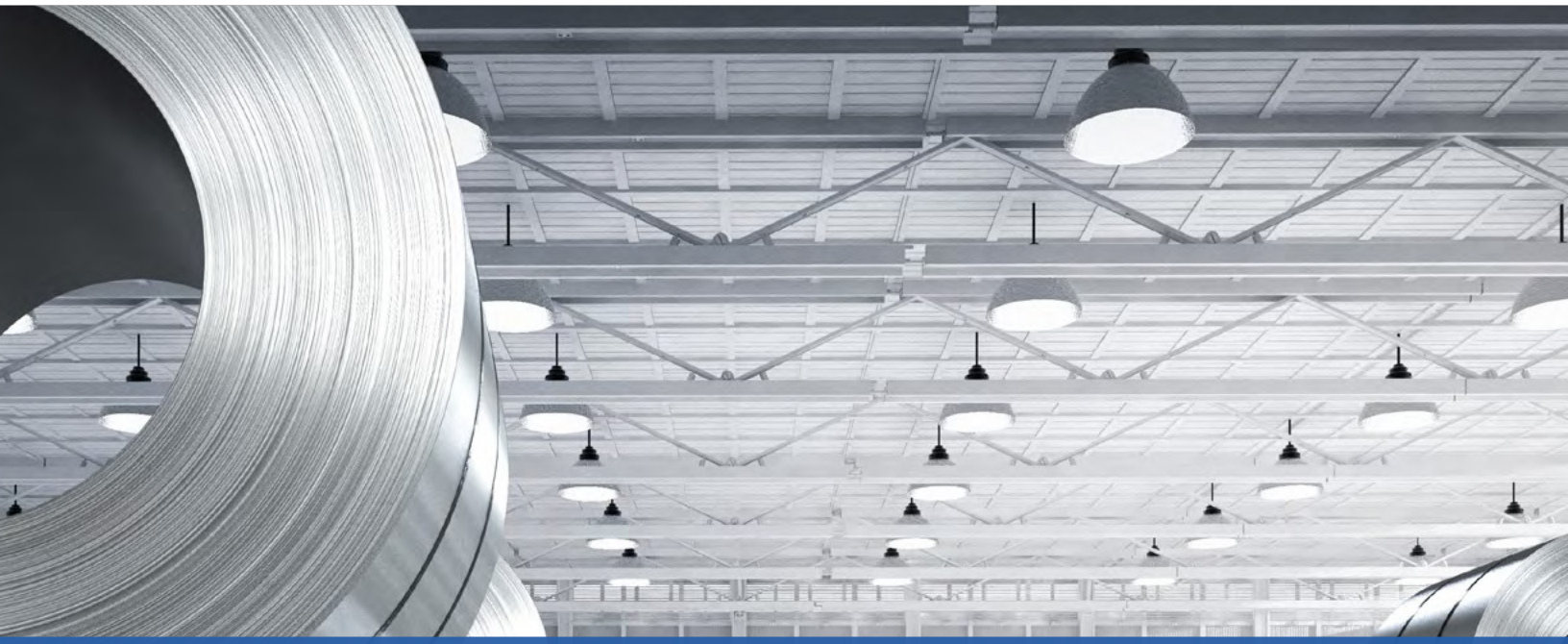
HUDSON DEEP DRAW

A PRECISION GROUP Company



Choosing the Right Material for Your Project

Metal is an incredibly versatile option for building material, but the range of options is so broad that selecting the appropriate material for your unique application can be challenging. Considering its four properties – tensile strength, weldability, machinability, and ductility/formability – will help you determine what kind of metal will be the most suitable choice for your particular project.

Tensile strength refers to the amount of force required to snap a metal, so depending upon your project, you may need to choose a metal with higher tensile strength.

A material's range of weldability will determine the level of expertise required of the welder as well as the amount of time needed to prepare the material. Materials that are easier to weld demand less time for preparation and less skill for the welder, whereas a material that is more difficult to weld may require a more experienced welder and special attention to prime the material.

Machinability speaks to a metal's ability to be cut with a blade. Metals with high machinability can be cut at high speeds with more affordable band saw blades, drill bits, or milling tools.

Ductility and formability define whether a metal can be fashioned into different shapes or pulled into a wire. Some tools bend metal, developing its formability, which would be unattainable with metal with little to no formability.

Cold Rolled Steel

Cold rolled steel's adaptability enables it to work well in a variety of circumstances, anywhere from modest application requirements to the most challenging deep draws. This material is often found in the automotive, industrial, and home-building industries.

More so than hot rolled steel, the process of cold rolling steel produces exact dimensions since the material is already close to its final shape after undergoing the cooling process. Available in high strength grades with high load-bearing properties, cold rolled steel generates opportunities for controlled surface quality.

Some of the diverse applications of cold rolled steel include small appliance parts, tool boxes, metal furniture, automobile parts, shelving, lighting, and garages. Cold rolled steels 1008-1010 maintain exceptional versatility for various coatings, good drawability and strength, and all at a cost-effective price.

Stainless Steel

The biggest benefit of using stainless steel is its range of resistances, not only to high and low temperatures but to corrosion as well. The material also offers easy manufacturing, an attractive aesthetic appeal, and dependable strength.

Applications for stainless steel are mainly in the automotive, chemical, and food and beverage industries, specifically involving petrochemicals, heat exchanges, furnaces, appliances, food equipment, and automotive exhaust systems.

Hudson Technologies works with stainless steel grades 304L, 316L, 347, and 350. 300 Series stainless steels are classified as austenitic, which means they are comprised of 16–26% chromium and up to 35% nickel.

Aluminum 1100-0, 3003-0, 5052-0, and 6061-0

Available at a low cost, aluminum resists corrosion and offers reliable drawability. The material is soft and lightweight in addition to being easily recyclable, reflective of heat and light, and highly sustainable. The material is widely recognized for its durability, malleability, and ductility. For increased versatility and strength, other metals are often alloyed with aluminum.

This characteristic aptly supports the manufacture of batteries, beverage containers, power storage, consumer electronics, and packaging design.

A model material for use in the pharmaceutical and food industries, aluminum resists leaking toxins or taste during packaging. A variety of other industries also employ aluminum, including aerospace, automotive, medical, electronic, and construction.

While uses of aluminum are incredibly diverse, a few typical applications include cooking utensils, furniture, marine hardware, mechanical components for aircraft, sheet metal ductwork, and chemical equipment.

Copper

Receptive to precision tooling, copper is ductile and malleable. It deftly resists a range of corrosives, including alkalis, non-oxidizing acids, neutral saline solutions, industrial atmospheres, and water. Copper also boasts a cost-effective design and appealing patina finish.

Widely utilized in the electronics, medical, construction, aerospace, and automotive industries, copper applications are featured in solar heat collectors, air conditioning components, plumbing and roofing materials, electrical stamped parts, medical devices, transformers, motors, and cables. Because of its antimicrobial properties, copper is also very useful in the food and beverage industry.

Brass

Brass is not only malleable but also resists both corrosion and fresh water. Often selected for projects where aesthetic appeal is an important factor, brass is a soft alloy of zinc and copper. Brass' softness, chemical reactivity, surface regularity, and corrosion resistance fluctuates dependent upon its ratio of zinc to copper.

Brass 70/30 (yellow cartridge brass) and Brass 85/15 (red brass) maintain sound solderability and drawability, rendering them an excellent substrate for tin plates or hot solders.

The material is often chosen for use in the medical, marine, electronics, and aerospace industries, namely in bearings and fasteners, electrical applications, and valves.

Hastelloy

Made of wrought alloys of mostly molybdenum, chromium, and nickel, Hastelloy metals maintain respectable drawing properties, distinct versatility, and resistance to heat and chemicals, specifically acid catalysts and halide.

Monel®

Made of nickel-cobalt alloys, Monel metals display reliable strength and resistance to corrosion in a variety of environmental and temperature settings.

Monel metal applications include musical instruments, chemical processing, and oil and gas products. In the aerospace industry, Monel metals are employed in safety wiring to prevent fasteners from coming loose. The marine industry utilizes Monel metals in their seawater valves, trolling wire, piping systems, and strainer baskets.

Because of its high cost, Monel metals are typically only used for projects in which no other metal option would meet all job requirements.

Titanium

Titanium, a low-density metal, resists corrosion while maintaining strength. Slightly heavier than aluminum, titanium is the preferred choice for the military and defense industries. Though a far narrower use, titanium can also be found in luxury consumer items such as watches, jewelry, and golf clubs.

The marine, medical, architectural, and aerospace industries also employ titanium for projects that demand reliable strength-to-weight ratios. These applications often include landing gear components, critical fasteners, and springs, hydraulic tubing, turbine blades, aerospace wing structures, shafts and casings for aircraft engines, implantable medical devices, and manned spacecrafts.

Titanium alloy grades one and two are available from Hudson Technologies.

Kovar

Composed of iron, nickel, and cobalt, Kovar is a low-expansion, vacuum-melted alloy. When manufacturing Kovar, extreme quality controls are enforced to guarantee consistency in both its mechanical and physical properties. This consistency allows for virtually effortless stamping, machining, and deep drawing.

In the medical industry, Kovar is used in the generation of laser tubes, fiber-optic telecommunications, hermetic seals, X-ray tube components, and microwave devices.

HY-MU 80

HyMu 80 is an 80% nickel-iron-molybdenum alloy most often employed as a shielding material against electromagnetic impulses (EMI). Frequently used for magnetic shielding purposes, HyMu 80 separates electronic components and insulates them from magnetic interference, thus achieving peak performance.

The aviation, medical, military, and aerospace industries use HyMu 80 in their applications for electronic equipment, transformer cores, tape-wound toroids, laminations, and military shielding.

Cupronickel 715

The benefits of Cupronickel 715 include its high resistance to corrosion in seawater, reliable tensile strength, impressive ductility, and dependable drawability. An alloy made of copper and nickel, Cupronickel is reinforced with elements such as manganese and iron.

Cupronickel is often utilized in the coin and medal minting industries as well as marine engineering, armaments manufacture, desalination material, and the electrical, chemical, and petrochemical fields.

Applications of Cupronickel include condensers, pipers, and heat exchangers in seawater systems, fishing and other working boats, marine hardware, propellers, hulls, and crankshafts.

Nickel Silver Alloy 2 (Comprised of Nickel, Copper, and Zinc)

Nickel silver alloys are nonmagnetic, malleable, and ductile. Resistance to electrical stimulations establishes the nickel silver alloy as a prime material for heating coils. Nickel silver alloys can be rolled, machined, or wrought.

Because of its elevated electrical and thermal conductivity, excellent resistance to corrosion, and impressive mechanical properties, nickel silver alloys are typically used for electronic applications in lead wires, anodes, battery casings, fuel cells, packaging, and lids.

Other applications of the alloy include musical instrument components, screws, plumbing fixtures, side fasteners, jewelry, and marine fittings.

Nickel

For applications that demand resistance to corrosion and heat as well as elevated strength, nickel makes an excellent choice.

The aerospace industry often utilizes nickel in the production of jet engines , fasteners, and superchargers.

Haynes 242

Haynes 242 features dependable resistance to oxidation, low thermal expansion characteristic, and notable strength in high temperatures. A nickel-molybdenum-chromium alloy, Haynes 242 fortifies as it ages due to a long-range-ordering reaction. Easily formable in cold processes, Haynes 242 can also be shaped by traditional methods or hot-worked.

The aerospace industry prefers Haynes 242 when manufacturing containment rings, seal rings, pumps, and rocket nozzles, among others.

17-7 PH

Delivering superior hardness and strength, 17-7 Precipitation-Hardening Stainless Steel, or 17-7 PH, features reliable resistance to corrosion, easy formability, exceptional fatigue properties, and minimal deformation from heat processes.

When employed in the aerospace industry, 17-7 PH stainless steel is used for heat exchangers, power boilers, chemical processing equipment, and various washers and springs. Other applications include metalworking, oil and petroleum refining equipment, and food processing equipment.

Inconel®

Inconel, a nickel-based alloy, maintains beneficial drawing properties and consistent resistance to corrosion and high temperatures.

A variety of industries employ Inconel in the manufacturing of their products, including the electronics, medical, chemical, automotive, and marine sectors. The aerospace industry utilizes Inconel in the creation of such products as propeller blades, turbocharger rotors, heat exchanger tubing, and pressure vessels.

Inconel in grades 625 and 718 is available from Hudson Technologies.

Selecting the Appropriate Material

Each material offers significant strengths, but many can also present possible drawbacks. These unique properties help differentiate the materials and make the selection process more straightforward depending on specific needs on a per-project basis.