

Alloy- The mixture of any element with a pure metal. However, there are several elements regularly occurring in plain carbon steel as manufactured, such as carbon, manganese, silicon, phosphorous, sulfur, oxygen, nitrogen and hydrogen. Plain carbon steel is therefore an alloy of iron and carbon and these other elements are incidental to its manufacture. Steel does not become alloy steel until these elements are increased beyond their regular composition for a specific purpose, or until other metals are added in significant amounts for a specific purpose.

Age Hardening - Precipitation hardening; a process of aging that increases hardness and strength and ordinarily decreases ductility. Age hardening usually follows rapid cooling from solution heat treatment temperatures or cold working.

Aging - Changes in physical and mechanical properties that occur when low carbon steel is stored for some time. Aging is also accelerated by exposure of steel to elevated temperatures.

Alloy Steel - Steel is considered to be alloy steel when the maximum of the range given for the content of alloying elements exceeds one or more of the following limits: Manganese 1.650/0, silicon, .60%, copper, .600/0, or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy. Steels: Aluminum, chromium up to 3.9%, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying element added to obtain a desired alloying effect.

Annealing - A process involving high-temperature heating and cooling of the as-rolled cold rolled steel substrate to make it softer and more formable.

AR 400 Steel - This is a steel with an even higher yield strength and it is more difficult to form than hi-tensile steel. HEIL uses this steel in flat plates mainly on the floors and tailgates of custom bodies. It has a minimum yield strength of 145,000 psi and a Brinell hardness of 400.

Basic Oxygen Furnace- The process of manufacturing steel in this type of furnace is called the basic oxygen process and is the most efficient method of producing low and medium carbon and low and medium alloy steels. In this process high purity oxygen is blown onto the surface of a bath of molten iron contained in a basic lined and ladle shaped vessel. The melting cycle duration is extremely short with quality comparable to open hearth steel.

Basic Process - A steel making process either basic oxygen, open hearth or electric in which the furnace is lined with a basic refractory. A slag, rich in lime, being formed and phosphorous removed.

Billet - A solid semi-finished round or square product that has been hot worked by forging, rolling or extrusion. An iron or steel billet has a minimum width or thickness of 1 1/4 inches and the cross-sectional area varies from 2-1/4 to 36 square inches.

Blast Furnace - A vertical shaft type furnace used for reducing iron ore to pig iron when cast or hot metal for further melting. This product is used in an open hearth or basic oxygen furnaces for production of steel.

Bloom - A rolled product from an ingot generally greater than 36 square inches in area. This is considered the first operation in the production of bars or structurals.

Brinell Hardness - A value determined by testing used to compare the hardness of different materials. A material with a high Brinell number will have a higher surface hardness, and therefore resists wear better than a material with a lower Brinell number. Likewise, a higher yield strength material will normally have a higher Brinell hardness number.

Camber - The deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge.

Carbon Steel - Steel which owes its properties chiefly to carbon without substantial amounts of other alloying elements; also known as straight carbon steel or plain carbon steel.

Charpy Test - A pendulum-type single-blow impact test in which the specimen, usually notched, is supported at both ends as a simple beam and broken by a falling pendulum of given weight. The energy absorbed, as determined by the subsequent rise of the pendulum, is a measure of impact strength or notch toughness and is a measurement in foot-pounds. The test specimen is 2" or 2.165" long, .394" square and has a key hole type notch in the center made by centering a No. 47 drill .160" from one side and sawing through the hole.

Chemical Treatment - An aqueous solution of corrosion-inhibiting chemicals, typically chromates or chromate/phosphate.

Coil Breaks - Creases or ridges in sheet that appear as parallel lines across the direction of rolling, and that generally extend the full width of the sheet or strip. Also referred to as Lüder's Lines.

Cold Drawing - This is a process for finishing a hot rolled rod or bar at room temperature by pulling it through the hole of a die of the same shape but smaller in size. The bars or rods are cleaned of scale by pickling or other methods prior to cold drawing and then coated with lime which aids as a lubricant in the drawing operation.

Cold Finishing - The cold finishing of steel, generally used for bars and shafting, may be defined as the process of reducing their cross sectional area, without heating, by one of five methods: 1. Cold rolling 3. Cold drawing and grinding 5. Turning and grinding 2. Cold drawing 4. Turning and polishing

Cold Rolled Products - Flat rolled products for which the required final thickness has been obtained by rolling at room temperature.

Cold Rolling - The cold working of hot rolled material by passing it between power driven rolls. The process is generally used for flat bars of such a size that they cannot be pulled through a die and for the production of cold rolled sheets by cold reducing hot rolled and pickled sheets. Whereas wire and sheets are cold drawn and cold rolled continuously from coil, bars are individually cold drawn.

Cold Working - Plastic deformation of a metal at a temperature low enough to insure strain hardening.

Commercial Steel - Sheet of this quality is for simple bending or moderate forming. Commercial Steel sheet can be bent flat upon itself in any direction at room temperature.

Continuous Casting - A casting technique in which a cast shape is continuously withdrawn through the bottom of the mold as it solidifies, so that its length is not determined by mold dimensions.

Conversion Coating - The chemical treatment film applied to the steel or metallic coated sheet prior to painting.

Core - The center portion of a piece of steel which may be of different chemical composition than the outside, as in the case of carburized parts or which may have different mechanical properties than the outside due to the failure of penetration of heat treatment effect.

Corrosion - Gradual chemical or electrochemical attack on a metal by atmospheric moisture or other agents.

Corten Steel - This is similar in strength characteristics to the standard steel used by HEIL, but with improved resistance to corrosion. It is a low alloy high strength metal with a minimum yield strength of 50,000 psi and an approximate Brinell hardness of 150. This steel meets specification ASTM A-606, Grade E.

Critical Surface - Intended for material applied to critical exposed/painted applications where cosmetic surface imperfections are objectionable. The prime side surface will be free of repetitive type imperfections, gouges, scratches, scale and slivers. This surface can only be furnished as a pickled product.

Crown - A contour on a sheet where the thickness increases from some edge measurement to the center.

Cut Edge - Removal of the as-rolled hot mill edge. Coil ends are cropped back to gauge when cut edge is ordered.

Cut to Length - When a specific or discrete length is specified.

Decarburization - The loss of carbon from the surface of a ferrous alloy. Decarburization is a common surface condition of hot rolled steel and is produced during the heating and rolling operations when atmospheric oxygen reacts with the heated surface removing carbon.

Deep Drawing - The process of working metal blanks in dies on a press into shapes which are usually more or less cup-like in character.

Deep Drawing Steel (DDS) - Sheet of this designation should be used when Drawing Steel will not provide a sufficient degree of ductility for fabrication of parts having stringent drawing requirements, or applications that require the sheet be free from aging. This quality is made by special steelmaking and finishing practices.

Dent Resistant - BH Series - Sheet of this designation is produced from partially stabilized steel and offers a unique combination of as-received formability and final properties after fabrication. Sheet of this designation combines strength and high formability. Although this steel is non-aging at room temperature, it gains strength from work hardening during fabrication and from carbon aging during paint baking. (Sometimes referred to as "bake hardenable.")

Domex Steel - This is very unique steel. Traditionally, steel with higher yield strengths have been difficult to form without cracking. Domex material is processed with special attention given to the grain structure of the steel. This allows for a highly formable material with minimum yield strength of 100,000 psi and a Brinell hardness of 250.

Drawing - Forming recessed parts by forcing the plastic flow of metal in dies.

Drawing Steel (DS) - Sheet of this quality has a greater degree of ductility and is more consistent in performance than Commercial Steel because of higher standards in production, selection and melting of the steel.

DS Type B Steel - Product intended for applications that require particularly severe drawing and forming.

Ductility - The ability to permit change of shape without fracture. In flat rolled steel, ductility is usually measured by hardness or mechanical properties in a tensile test.

Elastic Limit - The greatest stress that a material is capable of developing without a permanent deformation remaining upon complete release of the stress.

Electric Furnace Steel - Steel made in any furnace where heat is generated almost always by arc. Because of relatively high cost, normally only tool steels and other high value steels are made by the electric furnace process.

Elongation - The amount of permanent extension in the vicinity of the fracture in the tensile or tension test; usually expressed as a percentage of the original gauge length, such as 25% in 2" or 21% in 8".

Endurance Limit - Also known as fatigue limits a limiting stress, below which metal will withstand without fracture an indefinitely large number of cycles of stress. If the term is used without qualification, the cycles of stress are usually such as to produce complete reversal of flexural stress. Above this limit failure occurs by the generation and growth of cracks until fracture results in the remaining section.

Extra Deep Drawing Steel - Sheet of this designation has superior formability and excellent uniformity. It is produced from steel having a very low carbon content with stabilizing elements added to make it interstitial free. It is a non-aging steel sheet with high resistance to thinning during drawing and is suitable for critical forming applications.

Extra Smooth Galvanized - An Extra-Smooth finish is imparted to hot-dip metallic-coated steel sheet by temper rolling after coating to decrease the surface relief that occurs when the molten coating solidifies. The spangle pattern (grain pattern) is made distinctly less visible by the matte finish imparted by the rolling operation. Most Extra-Smooth sheet is intended for either pre-painted or post painted applications.

Fatigue - The phenomenon of the progressive fracture of a metal by means of a crack which spreads under repeated cycles of stress.

Ferrous - Metals or alloys that contain appreciable amounts of iron.

File Hardness - Hardness as determined by the use of a file of standardized hardness on the assumption that a material which cannot be cut with the file is as hard as, or harder than, the file. Files covering a range of hardness's may be employed.

Finish Coat - The topcoat or exposed prime side paint film.

Flatness - Flatness is a measure of a cut length sheet's ability to conform to a flat horizontal surface. Maximum deviation from that surface is the degree to which the sheet is out of flat. Flatness is often expressed quantitatively in either Steepness or I-Units.

Flexibility - The degree to which a paint film can withstand deformation without significant change in color and appearance.

Fracture testing - Breaking a specimen and examining the fractured surface with the unaided eye or with a low-power microscope to determine such things as composition, grain size, case depth, soundness, or presence of defects.

Gloss - The property of a surface related to its ability to reflect light. The most common type of gloss of interest to appearance attributes is specular gloss. The parameters which must be specified for the determination of this property are the angles of incidence of the light source, the angle of viewing of the gloss and the angular dispersions of the measuring beams.

Harden Ability - This relates to the ability of steel to harden deeply upon quenching and takes into consideration the size of the part, the method of quenching and the analysis and grain size of the steel. Carbon steels are considered as shallow hardening and various alloy and tool steel grades are considered deep hardening or through hardening.

Hardening - Increasing the hardness by suitable heat treatment, usually involving heating and cooling. When applicable, the following more specific terms should be used: age hardening, case hardening, flame hardening, induction hardening, precipitation hardening, and quench hardening.

Hardness - The ability of a metal to resist penetration. The principal methods of hardness determination are the Brinell, Rockwell and Scleroscope tests.

Heat Treatment - An operation or combination of operations involving the heating and cooling of a metal in the solid state for the purpose of obtaining certain desirable conditions or properties. Heat treating operations would be annealing, normalizing, quenching and tempering, etc.

High Strength - Product intended for applications where greater strength is critical. High Strength typically begins at 35 ksi minimum yield strength.

High Strength Low Alloy (HSLA) - A specific group of steels in which the strength levels are achieved by the addition of moderate amounts of alloying elements. The most common are columbium, vanadium or titanium.

Hi-Tensile Steel - This is the standard steel used by HEIL. We do not build a body using any steel less than this specification. It is a low alloy high strength metal with

minimum yield strength of 45,000 psi and an approximate Brinell hardness of 150. This specification is very similar to ASTM A-570, Grade E.

Hot Rolled Sheet - Steel sheet that is processed to its final thickness by rolling at high temperatures on a specially designed hot-rolling facility. Also commonly known as hot rolled unprocessed.

Hot Rolled Sheet Non-Temper Rolled - A U. S. Steel definition for product supplied as a coil directly off the Hot Strip Mill with no additional processing.

Hot Rolled Sheet Pickled - A U. S. Steel definition for a mill edge coil that is pickled, oiled and temper rolled with coil ends cropped back to meet gauge tolerances.

Hot Rolled Sheet Pickled Non-Temper Rolled - A U. S. Steel definition for a mill edge coil that is pickled and oiled with coil ends cropped back to meet gauge tolerances.

Hot Rolled Sheet Products - Flat steel products that are brought to final thickness by rolling through a Hot Strip Mill at high temperatures.

Impact Test - A test used to determine the impact energy measured in foot pounds, to fracture a material by means of an Izod or Charpy test.

Inclusion Shape Control - The use of rare earth metals or calcium alloys to control the morphology of inclusions, in order to provide improved mechanical properties for select applications.

Inclusions - Particles of foreign material (such as oxides, sulfides or silicates) in steel as cast.

Ingot - A steel casting that is cast into a mold which when solidified will be rolled in a blooming mill to plates, slabs for sheets, or blooms and billets into structural's and bars.

Izod Test - An impact test similar to the Charpy with the difference being in the test specimen. In the Izod test the specimen is 2.953" long, .3937" square with a .45" notch located 1.1024" from the impact end. The distance from the bottom of the notch to the opposite side is .315".

Jominy Test - This is a test used to determine the hardenability of any grade of steel. It consists of water quenching, under closely controlled conditions, one end of a one inch diameter specimen of the steel under test and measuring the degree of hardness at regular distances from the quenched end along the side. The hardness's obtained at regular intervals along the bar are then either tabulated or plotted on graphs.

Killed Steel - Steel that is deoxidized by silicon or aluminum to reduce the oxygen content in the molten steel to a minimum prior to solidification of the metal. Killed steels have more uniform properties and chemical composition than other types.

Laminate - A composite construction of dissimilar materials, such as a metal and plastic film, usually made up as sheet product and intended to function as though it were a single material.

Leveling - Flattening of rolled sheet by reducing or eliminating distortions.

Machinability - The relative ease of machining a metal. Machinability index for various steels and machinability tables are available for comparing machining rates with 1212 steel as the standard for carbon and alloy steels and W-1 as a standard for tool steels.

Martensite - A microconstituent or structure in quenched steel, which has the maximum hardness of any of the structures resulting from the decomposition or transformation of austenite. Steel which is to be quenched and tempered properly must first be fully hardened in the martensitic state and then drawn or tempered back.

Mechanical Properties - The properties of a material that reveal its elastic and inelastic behavior when force is applied, thereby indicating its suitability for mechanical applications.

Mill Edge - The edge of strip, sheet or plate in the as rolled state. Un-sheared.

Modulus of Elasticity - The ratio within the limit of elasticity of the stress to corresponding strain. The stress in pounds per square inch is divided by the elongation in fractions of an inch for each inch of the original gauge length of the specimen. The modulus of elasticity for cold rolled steel is 29,500,000 psi and for other steels varies between 28,600,000 and 30,300,000 psi.

Nitriding - Adding nitrogen to iron-base alloys by heating the metal in contact with ammonia gas, or other suitable nitrogenous material. Nitriding is conducted at a temperature usually in the range of 935-1000° F. and produces surface hardening of the metal without quenching.

Non-Ferrous - Metals or alloys that contain no appreciable quantity of iron. This term is applied to such metals as aluminum, copper, magnesium, etc.

Normalizing - See heat treating definitions page 146 through 148.

Oil - Applied after pickling or temper rolling to assist customer handling by minimizing inter-wrap gouging, improve lubricity and provide a more rust resistant product.

Oiled Sheet - Sheet product that is processed with the final step being the application of oil to the surface. Usually, the oil is intended to provide protection from rusting during shipment and storage. These oils are called rust-preventative oils. The oil may also serve to assist in the subsequent fabrication process, but this is not usually the main purpose. Oils used to enhance formability are often called prelubricants or "prelubes".

Olsen Ductility Test - A cupping test in which a piece of sheet metal, restrained except for the center, is deformed by a standard steel ball until fracture occurs. The height of the cup in thousandths of an inch at time of failure is a measure of the ductility.

Open Hearth Process - One of the main methods used in the production of steel from hot metal (iron) produced in the blast furnace. The furnace can be charged with hot metal, and cold steel scrap for further refining into a carbon or alloy steel. Generally open hearth furnaces range from 75 to 450 tons of melting capacity in one heat.

Oxidation - The addition of oxygen to a compound. Exposure to atmosphere sometimes results in oxidation of the exposed surface, hence a staining or discoloration. This effect is increased with temperature increase to the point where heavy scale is formed and the steel product has a decarburized surface.

Pencil Hardness - A physical measurement of the hardness of a paint film which is based on the resistance of the film to cut-through by pencil leads of specified hardness. Pencil hardness values range between 2B and 5H.

Physical Properties - Those properties familiarly discussed in physics, exclusive of those described under mechanical properties; for example: density, electrical conductivity and coefficient of thermal expansion.

Pickling - The process of removing hot rolled mill scale from billets, bars or hot rolled sheets with sulphuric or hydrochloric acid. The scale is removed for hot rolled pickled and oiled sheets or for further processing of the hot rolled steel product into cold drawn bars and wire and cold rolled sheets and strip.

Plastic Deformation - Deformation of a material that will remain permanent after removal of the load that caused it.

Precipitation Hardening - A process of hardening an alloy in which a constituent precipitates from a supersaturated solid solution. This process is used for non-ferrous alloys to change the mechanical properties of the metal and is also called aging or age hardening.

Prelubricant - An oil coating that is applied to steel sheet to enhance formability (deep drawing). This lubricant is usually applied when the customer wishes to avoid the application of a forming lubricant in his plant.

Pressure Vessel Steel (PVS) - Product intended for pressure vessels and similar end use applications.

Primer Coat - The base coat of paint in a typical two-coat system. Primer coats are usually applied to produce a dry film thickness of approximately 0.2 mil.

Proportional Limit - Same as elastic limit.

Quality - A term used to denote the degree of perfection of the steel sheet. Often, for sheet products, relative quality refers to the degree of perfection of the surface, i.e., the lack of scratches, absence of slivers, etc. Quality can also refer to other attributes such as internal soundness, dimensional control, etc.

Quenching - In the heat-treating of steel, the step of cooling metals rapidly in order to obtain martensite by immersing or quickly cooling the steel in a quenching medium. The quenching media may be water, brine, oil, special solutions, salts or metals; and the intensity of the quench is determined by the temperature, volume and velocity of the media. In the case of air hardening tool steels the quenching medium is air at room temperatures.

Reduction of Area - The percentage difference between the original cross sectional area and that of the smallest area at the point of rupture. The percentage figure can be considered a measurement of ductility.

Reflectivity (Reflectance) - A term to indicate the percentage of reflected light from a painted surface. Considered a function of color rather than specular gloss. Reflectance percentages usually range from 80% to 90% for white colors to 5% to 15% for dark colors. Reflectivity standards vary for each industry and specific application.

Registry Printing - Printing successive colors or figures in a precise pattern and with exact superposition.

Residual Stress - Macroscopic stresses that are set up within a metal as the result of non-uniform plastic deformation or thermal gradients. Stresses of this nature are caused by cold working or by drastic gradients of temperature from quenching or welding.

Residuals - Elements present in an alloy in small quantities, but not added intentionally.

Resilience - The tendency of a material to return to its original shape after the removal of a stress that has produced elastic strain.

Rimmed Steel - Low-carbon steel in which incomplete deoxidation permits the metal to remain liquid at the top of the ingot, resulting in the formation of a bottom and side rim

of relatively pure iron of considerable thickness. Steel products such as sheets produced from this type of ingot will have a very good surface quality free of surface defects.
Rockwell Hardness Test - See hardness tests.

Roll Forming - A fabrication process whereby the metal sheet is deformed continuously in a linear manner by passing it through a consecutive series of rolls which produce a predetermined profile in it.

Rolled Edges - Finished edges, the final contours of which are produced by side or edging rolls. The edge contours most commonly used are square corners, rounded corners and a rounded edge.

Rolling Direction - The direction in which the steel product is rolled perpendicular to the axes of the rolls during rolling.

Rolling Mills - Equipment used for rolling down metal to a smaller size or to a given shape employing sets of rolls the contours of which determine or fashion the product into numerous intermediate and final shapes, e.g., blooms, slabs, rails, bars, rods, sections, plates, sheets and strip.

Rolling - A term applied to the operation of shaping and reducing metal in thickness by pressing it between rolls that compress, shape and lengthen it following the roll pattern. Steel is either hot rolled or cold rolled depending upon the product being manufactured.

Rust - A corrosion product consisting of hydrated oxides of iron. This term is only applied to ferrous alloys.

Salt Spray Test - Moisture and corrosion resistance test employing a controlled exposure of a painted sheet to a fog or mist of a salt solution, usually 5% sodium chloride, for a specified time period, say 500 or 1000 hours.

Scale - A complex iron oxide formed on the steel surface during the hot rolling operation or formed on steel parts that are heat treated in the presence of oxygen.

Scrap - Material unsuitable for direct use but usable for reprocessing by re-melting.

Segregation - Pertaining to chemical segregation that occurs during the solidification of the molten steel in the ingot mold. Rimmed and capped steels are considered to have high levels of segregation; semi-killed steels intermediate segregation; and, killed steels the minimum amount.

Semi-killed Steel - A commonly used grade of steel manufactured for low carbon bars and structurals. Steel is considered semi killed when it is produced so that it is incompletely deoxidized and it contains sufficient dissolved oxygen to react with the carbon to form carbon monoxide to offset solidification shrinkage in the ingot.

Sheet Steel - Either hot or cold rolled sheets produced on continuous sheet mill where the minimum width produced is 24". Sheet coils when slit to narrower widths is called slit sheet.

Shot Blasting - Cleaning surface of metal by air blast, using metal shot as an abrasive.

Slab - A semi finished steel product intermediate between ingot and plate, with the width at least twice the thickness for rolling down into plates or sheets.

Slit - When two or more widths are obtained from the hot rolled substrate width. The slitting operation results in a cut edge.

Solid Solution - Many metals possess the ability to dissolve certain other elements in the solid state forming solid solutions that in many ways are analogous to ordinary liquid solutions. In the case of steel the solid solution is called austinite.

Solution Heat Treatment - Heating an alloy to a suitable temperature, holding at the temperature long enough to allow one or more constituents to enter into solid solution and then cooling rapidly enough to hold the constituents in solution. The alloy is left in a supersaturated, unstable state and may subsequently exhibit quench aging.

Spangle - The spangle of a hot-dip coated sheet surface is the visual manifestation of the grains that form within the coating when it solidifies as the sheet emerges from the pot of molten coating metal. The spangle or grain varies in size, brightness and surface relief, depending upon a number of factors, most of which are related to the composition of the coating and cooling practices.

Spark Testing - This is an inspection method for quickly determining the approximate analyst of steel. It is intended primarily for the separation of mixed steel and when properly conducted, is a fast, accurate and economical method of separation. It consists in holding the sample against a high-speed grinding wheel and noting the character and color of the spark that is compared with samples of known analysis.

Stainless Steel - Corrosion resistant steel of a wide variety, but always containing a high percentage of chromium. The minimum chromium content is considered at 11% for stainless steel, although lesser amounts of chromium are found in stainless products such as those used for automobile mufflers. Stainless steels have the properties of being highly resistant to corrosion attack by organic acids, weak mineral acids, atmospheric corrosion, etc. Some standard grades of stainless steel also have 3.5 to 22% of nickel that further increases resistance to chemical and atmospheric corrosion.

Steel - An iron-base alloy, malleable in same temperature range as initially cast, and containing carbon in amounts greater than .05% and less than about 2.00%. Other

alloying elements may be present in significant quantities, but all steels contain at least small amounts of manganese and silicon.

Strain - Deformation produced on a body by an outside force.

Strip Steel (Cold Rolled) - A flat cold rolled steel product rolled to widths 2316/16” and narrower, under .250” in thickness, which has been cold reduced to desired decimal thickness and temper on single stand, single stand reversing, or tandem cold mills in coil form from coiled hot rolled pickled strip steel.

Structural Steel - When this term is applied to steel sheet, it refers to the designation that is used for steel sheet that is produced to meet a specific level of strength and formability. The formability is expressed as percent elongation in a tensile test. Structural Steel is typically used for applications where the strength of the sheet is an important design criterion, i.e., load-bearing applications.

T-1 Steel - This is steel with a higher yield strength and it is more difficult to form without cracking. HEIL uses this steel in flat plates mainly on the floors and tailgates of custom bodies. It has a minimum yield strength of 100,000 psi and an approximate Brinell hardness of 250-320.

Tandem Coating Line - A continuous coil coating line having two or more coating machines and curing or baking ovens in the line so it is capable of applying and curing two coats of paint in one pass through the line.

Tandem Mill - Arrangement of rolling mills, in direct line, allowing the metal to pass from one set of rolls to the next for the reduction of steel.

T-Bend 0-,1-,2-, etc. - A mechanical operation wherein a sheet sample is bent back upon itself with the inside bend radius specified in terms of the sheet thicknesses. Thus a 2-T Bend is a bend with an inside radius equivalent to two times the thickness of the metal sheet being tested.

Temper - The state of or condition of a metal as to its hardness or toughness produced by either thermal or heat treatment and quench or cold working or a combination of same in order to bring the metal to its specified consistency.

Temper Rolling - A light cold reduction of the sheet steel. This operation is performed to improve flatness, eliminate discontinuous yielding and to obtain a uniform surface.

Tensile Strength - This is another value determined through actual destructive testing. This value indicates the point at which a material will fail when under a tensile load (being pulled from each end of the material). This value should not be confused with

yield strength. In a dump body application, with high impact loads and highly abrasive payloads, yield strength and Brinell hardness are more important factors.

Tension Leveling - A mechanical operation wherein steel sheet, in coil form, is processed on a unit that stretches the product beyond its yield point to impart permanent deformation. The stretching operation assists to flatten the sheet. Tension leveling is considered the optimum process to achieve superior flatness characteristics.

Tint - A color modification resulting from the mixture of a white paint and colored paint such that the white is the predominant component and the resulting color is much less saturated than the pure color of the non-white pigment.

Tolerance - The specified permissible deviation from a specified nominal dimension, the permissible variation in the size of the part or the allowable variation in chemistry.

Tool Steel - Actually, any grade of steel that can be used for a tool. Generally the term tool steel as applied in the steel industry is a grade of steel characterized by high hardness and resistance to abrasion coupled in many instances with resistance to softening at elevated temperatures. These properties are attained with high carbon and high alloy contents and the steel is usually melted in electric furnaces to assure cleanliness and homogeneity of the product.

Toughness - The ability of a metal to absorb energy and deform plastically before fracturing. It is usually measured by the energy absorbed in a notch impact test such as the Charpy or Izod Impact Test. The area under the stress-strain curve in tensile testing is also a measure of toughness.

Tumbling - Cleaning articles by rotating them in a cylinder with cleaning materials.

Two-Coat System - The combination of a prime coat and a finish coat into a specified paint film. A typical 1 mil, two-coat system will have about 0.2 mil of primer coat and about 0.8 mil of finish coat.

Ultimate Strength - See Tensile Strength

Ultrasonic Testing - A method of nondestructive testing of steel bars, plates or parts with high frequency sound waves produced with electronic equipment. The test is used for locating internal or surface discontinuities or inhomogeneities in materials.

Wash Coat - A very thin paint film applied to the backside of a pre-painted sheet specified to have one finished side. The wash coat provides protection in coiling, storage, fabricating and handling.

Water Hardening - High carbon grades of tool steel, straight carbon steels and low alloy steels that are hardened by quenching in water during the heat-treating operation.

Weathering Steel - Steel using alloying elements such as copper, chromium, silicon and nickel to enhance resistance to atmospheric corrosion. (USS COR-TEN®)

Wet Film Thickness - The thickness of the paint film immediately after coating and prior to curing. The required wet film thickness is dependent on the proportion of solids and solvents in the liquid paint for producing the appropriate dry film thickness.

Work Hardening - An increase in hardness and strength caused by plastic deformation at temperatures lower than the re-crystallization range.

Yield Point - The load or stress at which a marked increase in the deformation of the sheet occurs without increasing the applied load. Yield point is one of the characteristics of low-carbon steels after they have been annealed. The yield point is usually calculated using a tensile-test specimen, and it is the load that is commensurate with the point beyond the elastic limit at which the specimen lengthens considerably without an additional increase in load.

Yield Strength - A value determined through actual destructive testing that indicates the amount of resistance to permanent deformation (bending). A material that is stressed to a point below its yield strength, will return to its original state when the stress is removed. A material that is stressed to a point beyond its yield strength will NOT return to its original state when the stress is removed. The higher the yield strength, the more resistance to bending a material exhibits.

Young's Modulus - Same as modulus of elasticity.