



Quaker Knowledge Network

Terminology

Skill Builder

Overview

Most industries, groups and organizations have their own set of abbreviations, acronyms, phrases, and other terminology. The metalworking industry is no different. However, one can examine the industry in several key areas such as fluids, machine tools, metallurgy, tooling, regulatory and other related chemical areas. Listed below is a comprehensive list of terminology used in the metalworking industry.

We have to be careful when we discuss projects with end users when we “assume” that everyone understands what is being said. For example, the abbreviation PCB in the electronics industry means “printed circuit board” while in the chemical industry it means “polychlorinated biphenol.” Handling PCBs in one industry might cut your hand while in the other industry might kill you, as PCBs are known human carcinogens! This glossary will help you better understand the terminology of metalworking.

Metalworking Fluids - General

TERM/ ABBREVIATION	DEFINITION - Metalworking Fluids
Alkaline	Pertaining to having a pH greater than 7.0; sometimes called caustic
Ammonia	A gas (NH ₃) comprised of nitrogen (N) and hydrogen (H) that has solubility in water; can be formed when specific bacteria biodegrade certain amines into ammonia and water; the ammonia can be released into the air creating worker complaints.
Bacteria	Microorganisms that live in the air, soil, and water that can infect a metalworking fluid; the infection creates problems as the microorganisms consume various product components; bacteria are typically less than 1 micron in size.
Bactericide	A Federally controlled substance that predominantly kills bacteria.
Bioicide	A Federally controlled substance that kills both bacteria & fungi.
Biofilm	A gelatinous mass of bacteria and/or fungi that deposits a film on a solid surface.
Boundary Lubricant	A polar molecule that aligns itself with the metal surface to create a “cushion” of lubrication; esters, fatty acids and fats are common boundary lubricants.
CFU/ml	Acronym for colony forming unit per milliliter; a measure of microbiological growth.
COC	Abbreviation for Cleveland Open Cup; laboratory device used to determine the flash point of a fluid above 212°F (100°C).
Chelate	A chemical process that binds specific metals to the chelating agent; a common chelating agent is EDTA (ethylene diamine tetraacetic acid) used to bind calcium and magnesium ions in solutions to “soften” water.
Chloride	A negative ion (anion) of chlorine typically found in most water supplies; prone to creating corrosion in higher concentrations in aqueous applications.
Chlorine	A compound of chlorine atoms; typically used to provide extreme pressure lubrication in the form of a chlorinated compound like chlorinated paraffin.
Coolant	A fluid used to remove heat from an application; in metalworking, coolants are the water-soluble fluids like soluble oils, semi-synthetics and solutions.



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TERM/ ABBREVIATION	DEFINITION - Metalworking Fluids
Corrosion	The chemical process where a metal is oxidized to a different state making the metal more susceptible to rust; the metal substrate shows signs of pitting to some degree.
Cutting Fluid	A generic description for a metal removal fluid used in a machining or grinding application; this covers straight oils and all ranges of water-soluble fluids.
DI	Abbreviation for deionized, as in DI water; DI water has no hardness or conductivity because it contains no ions.
Dipslide	Any type of plastic paddle that holds a surface of agar that is dipped into a used metalworking fluid to determine the presence of microorganisms; usually one side of the paddle detects bacteria while the other detects fungi.
EP	Abbreviation for extreme pressure; EP additives are forms of sulfur, chlorine and phosphorus that are activated under extreme pressure situations where heat is created.
Emulsion	Two fluids that are immiscible (i.e. not mixable) that are intimately dispersed in one another with an "oil" particle size that is greater than 0.10 microns.
Endpoint	The completion of a titration; usually marked by reaching a specific pH (potentiometric) or color change with an indicator (colorimetric); see titration & indicator.
Ester	An organic compound that is created by a chemical reaction between an alcohol and an acid; an ester is polar and provides boundary lubrication; esters can be man-made or natural.
Exothermic	A chemical reaction, which creates and gives off heat; strong acids and bases will create exothermic reactions.
Falex "Block on Ring" Tester	A laboratory test method used to assess and compare lubrication qualities of metalworking fluids; a ring of metal is rotated while a block of metal is applied to the outer diameter of the rotating ring; a scar is produced on the block and is measured as part of the analysis.
Falex Four Ball Tester	A laboratory test method used to assess and compare lubrication qualities of metalworking fluids; four balls are configured so that one ball, under a load, bears down on three balls producing a scar; the size of the scar is measured as part of the analysis
Falex Pin & V-Block Tester	A laboratory test method used to assess and compare lubrication qualities of metalworking fluids; a vertical pin rotates against two V-shaped blocks while pressure is applied to the blocks; load and torque are measured as part of the analysis.
Fine Settling/ Handling	The capability of a metalworking fluid to disperse and permit metal fines to fall out of solution and settle to the bottom.
Filtration	A physical separation of solids from liquid; positive filtration utilizes filter media (paper, cartridges, belt, etc.) or other physical means (magnet, conveyor, etc.); passive filtration is achieved without media (centrifuge, cyclone, etc.).
Foam	Emulsified air; the result of excess turbulence or detergency with a metalworking fluid.
Fungi	A microorganism that is found in the soil and air and tends to live around the metalworking fluid; fungi consists of both yeast and mold and is larger than bacteria (about 2-10 microns); usually seen in splash areas rather than in the metalworking fluid itself.
Fungicide	A Federally controlled substance that predominantly kills fungi.
HLB	Abbreviation for hydrophile-lipophile balance; a numeric value (0-20) assigned to emulsifiers and surfactants (see hydrophilic & lipophilic for more details) to provide information regarding the emulsification properties of the chemical.



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TERM/ ABBREVIATION	DEFINITION - Metalworking Fluids
Hardness	Related to water quality and is made up of the calcium (Ca) and magnesium (Mg) content expressed as PPM of calcium carbonate (CaCO ₃); 17.8 PPM of hardness is equivalent to one grain of hardness.
Hydrodynamic	The simplest form of lubrication; a simple liquid film that provides a temporary cushion between two moving surfaces.
Hydrophilic	Having a water-loving characteristic or quality; hydrophilic compounds are more water soluble.
Indicator	A specific fluid used in very small quantities in a colorimetric titration that creates a color change when the endpoint is reached.
Invert	As in invert emulsion; this would be a water in oil emulsion (W/O) that is created when water is added to product concentrate instead of the other way around.
Lipophilic	Having an oil-loving characteristic or quality; lipophilic compounds are more oil soluble.
Lubricant	Any fluid that reduces friction between moving surfaces.
Micelle	Technical name for the grouping of surfactants; often used when describing the emulsification of the oil droplets in an emulsion.
Micron	A measurement of length designated by the Greek letter mu (μ); one micron is equal to one micrometer (μm), 0.001 millimeters or 0.000039 inches.
O/W	Oil in water emulsion; see emulsion.
PAH	Polycyclic aromatic hydrocarbon; this is the multi-ringed hydrocarbons found in base oils during the refining process; some are known to be carcinogens; PAHs are eliminated via solvent extraction or severe hydro-treatment.
PMCC	Pensky-Martens Closed Cup; laboratory device used to determine the flash point of fluids which flash below 212°F (100°C).
PNA	Poly-nuclear aromatic; see PAH.
PPB	Parts per billion; one PPB is equivalent to one milliliter in 251,000 gallons..
PPM	Parts per million; one PPM is equivalent to one milliliter in 251 gallons.
PPTH	Parts per thousand.
Particle Size (emulsion)	Size of oil droplets, or that which is being emulsified, in water usually measured in microns; this "particle" is not a hard particle, like a grain of sand, but is porous and can be disrupted or broken down.
Particle Size (solid)	Size of dirt and debris when extracted from dirty fluid via some form of positive filtration; often used in filter patch tests to describe the weight of dirt filtered at a specific micron size.
Plate Count	The microbiological method employed to assess growth of microorganisms in a used metalworking fluid; must be conducted in a laboratory under sterile conditions; individual colonies are counted (see CFU/ml) after the plates (petri dishes) are incubated.
pH	The logarithmic scale for determining acidity (less than 7.0) or alkalinity (greater than 7.0) of a water-containing fluid with 7.0 being neutral.
Polymer	A chemical compound containing a repeating unit of a particular base unit (i.e. monomer); many solution synthetics utilize this technology for lubrication; while there are some natural polymers, most of this technology is a synthetic, man-made chemical.
Premix	The action of mixing a water-soluble concentrate with water in order to create a stable mixture under controlled conditions.
r & R	Abbreviation for repeatability and Reproducibility used to asses variability within a testing process; if Analyst 1 & Analyst 2 test the same set of samples, repeatability is the variability of results for Analyst 1 or Analyst 2; reproducibility is the variability between Analyst 1 and Analyst 2,



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TERM/ ABBREVIATION	DEFINITION - Metalworking Fluids
RO	Abbreviation for reverse osmosis; RO is used to treat water to remove ions and is often used in conjunction with and after water has been passed through deionization (DI).
Rancidity	The biodegradation of coolants by microorganisms growing in the fluid typically acknowledged by strong obnoxious odors.
Refractometer	An optical device used to determine the concentration of aqueous mixtures.
SUS	Abbreviation for Saybolt Universal Seconds; a measure of viscosity.
Semi-Synthetic	A metalworking fluid that contains some oil but has a small enough fluid particle size to be considered a micro-emulsion (less than 1.0 microns); a semi-synthetic is typically translucent in appearance when diluted in water.
Soil Load	A measurement of finely dissolved dirt and particles in a metalworking fluid; this can be determined via centrifuge or via filtration of a fixed volume of fluid.
Soluble Oil	A metalworking fluid that contains oil and emulsifiers and creates an emulsion when added to water; a soluble oil is typically milky in appearance when diluted in water.
Solution	A mixture in which the fluid is immediately and completely soluble in water; a solution has no fluid particle size, contains no oil and is clear in dilution; sometimes called solution synthetic.
Stain	A chemical process similar to corrosion that produces slight imperfections of the metal surface; can typically be chemically removed without extreme damage to the metal substrate.
Straight Oil	A type of metalworking fluid that is used as received; typically contains oil with a variety of additives.
Sulfate	A negative ion (anion) typically found in most water supplies; prone to creating corrosion in higher concentrations.
Surfactant	An acronym for surface active agent; surfactants provide wetting and detergency.
TCC	Abbreviation for Tag Closed Cup; a laboratory device used to determine the flash point of fluids which flash below 212°F (100°C).
TDS	Abbreviation for total dissolved solids; a measurement of ions (dissolved chemicals) in solution usually expressed as microSiemens or micromhos.
Titration	A simple acid-base reaction conducted to determine an alkalinity or acidity of a fluid; the method is employed to determine concentration of an unknown.
Tramp Oil	A liquid contaminant that gets into a metalworking fluid and creates problems; sources are hydraulic oils, spindle oils, way lubricants, rail lubricants and gear lubricants; incoming parts can carry in corrosion preventives or cutting oils as tramp oil; these fluids can cover the surface of the metalworking fluid, cutting off the air supply, permitting bacteria to grow.
TERM/ ABBREVIATION	DEFINITION - Regulatory
ACGIH	Abbreviation for American Conference of Governmental Industrial Hygienists; an organization of professionals that develops and recommends occupational exposure limits for chemicals to OSHA and other organizations.
ANSI	Abbreviation for American National Standards Institute; private organization that identifies and coordinates standardization; for example, Quaker uses the 16-part ANSI standard for MSDSs.
ASTM	Abbreviation for American Society for Testing & Materials; an organization of suppliers and end users that work toward standardization of materials and testing.
BOD	Abbreviation for Biochemical Oxygen Demand; the amount of oxygen required by microorganisms to degrade organic material; used to assess waste treatment of compounds.



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TERM/ ABBREVIATION	DEFINITION - Regulatory
CAS Number	Abbreviation for Chemical Abstracts Services number; a unique number assigned to a chemical for the primary purpose of identification.
COD	Abbreviation for Chemical Oxygen Demand; the amount of oxygen required to oxidize organic and inorganic materials; used to assess waste treatment of compounds.
EINECS	Abbreviation for European Inventory of Existing Chemical Substances; this is the European equivalent of TSCA.
FIFRA	Abbreviation for Federal Insecticide, Fungicide & Rodenticide Act; governs the use and registration of biocides in all US industries.
Fire Point	The lowest temperature at which a flammable liquid will create sufficient vapor so that the vapor will catch fire, when exposed to a flame, and continue to burn after the flame is removed.
Flash Point	The lowest temperature at which a flammable liquid will create sufficient vapor so that the vapor will briefly catch fire (in the form of a flash), when exposed to a flame, but will not continue to burn after the flame is removed.
HAP	Abbreviation for Hazardous Air Pollutant; pollutants as defined by the clean air act.
HMIS	Abbreviation for Hazardous Materials Identification System; provides information for acute health, reactivity and flammability for chemicals.
MSDS	Abbreviation for Material Safety Data Sheet; a legal document that provides detailed information about a chemical based on guidelines established by OSHA.
NFPA	Abbreviation for National Fire Protection Agency; a volunteer organization that promotes improved fire protection and prevention.
NIOSH	Abbreviation for National Institute of Occupation Safety & Health; recommends exposure limits to OSHA.
OSHA	Abbreviation for Occupational Safety & Health Administration; Department of Labor sector that regulates and enforces health & safety in most US industries.
PEL	Abbreviation for Permissible Exposure Limit as created by OSHA; a PEL is enforceable by the law.
SARA	Abbreviation for Superfund Amendments and Reauthorization; intended to encourage and support local and state emergency planning for handling hazardous materials.
TLV	Abbreviation for Threshold Limit Value; a term used to describe an absolute value of exposure during a "normal work period" that still maintains safe/healthy working conditions.
TSCA	Abbreviation for Toxic Substances Control Act; this is a list created by the EPA containing known chemical compounds for the United States.
VOC	Abbreviation for Volatile Organic Compound; chemicals that evaporate quickly as regulated by the EPA.
TERM/ ABBREVIATION	DEFINITION - Tooling and Related Topics
Aluminum Oxide	A type of abrasive typically used in grinding wheels and represent by the chemical term Al_2O_3 .
BUE	Abbreviation for built up edge; a phenomenon that occurs when the metal being cut transfers to the edge of the tool and welds onto the tooling; this creates problems with the finish and eventually leads to degradation of the tooling as the BUE breaks off at some point.
Carbide	Compound of carbon and any number of other metals in a matrix with cobalt or nickel used to create tooling; carbide inserts are the most common application in metal removal.
CBN	Abbreviation for cubic boron nitride; CBN is like a man-made diamond and is almost as hard a diamond in its performance.
CVD	Abbreviation for chemical vapor deposition; method used to apply various coatings (like PCD) on tooling.



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TERM/ ABBREVIATION	DEFINITION - Tooling and Related Topics
Ceramic	Type of tooling made from finely powdered aluminum oxide sintered into the form of the tool; good for hard materials and high speed operations but does not stand up to shock.
Chatter	Irregularities in the cutting process, evidenced in the finished, produced by vibration.
Dressing	The removal of undesirable material from the surface of a grinding wheel in order to expose fresh "open" abrasive to improve the grinding process.
Feed	The action of moving the part into the tool or vice versa.
Grit Size	The size of particles used in abrasive tooling; the larger the number, the finer the finish.
Insert	Description of carbide tooling because it is inserted into a tool holder.
PCD	Abbreviation for poly-crystalline diamond; PCD is used to deposit a layer of diamond on tooling to provide a high degree of metal removal.
SiC	Chemical abbreviation for silicon carbide; dark or black colored coating used to provide additional wear resistance on tooling.
Speed	The rate at which the tool rotates in any metal removal process.
TiN	Chemical abbreviation for titanium nitride; gold or brass-colored coating used to provide additional wear resistance on tooling.
	DEFINITION - Machine Tools & Related Topics
Arbor	Generic description for the part of the machine tool that holds the shaft for the primary machining or grinding operation.
Bed	Generic description for the part of the machine tool that sits on the floor.
Boring	A metal removal process in which the inner diameter (ID) of an object is cut with a single point cutting tool; this can be thought of as internal turning; usually the part rotates while the tool enters the ID.
Broaching	A metal removal process in which a multi-toothed cutting tool cuts increasingly larger pieces of metal as the tool and part move past each other in a single pass.
CNC	Abbreviation for computer numerically controlled; a machine tool that is computer controlled for all axes of motion; most machine tools nowadays are CNC.
Collet	A flexible, sliding collar used to hold a tool or a workpiece.
Column	Generic description for the back of the machine tool that is perpendicular to the bed; usually holds the headstock and spindle.
Drag Chain	A conveyor belt-like device that sits in the sump and drags chips and fines out of the coolant to a holding area.
Drawing	A metal deformation process in which metal is forced between a punch and a die so that shear occurs in two dimensions so that the metal can flow.
Face Milling	A metal removal process in which a flat surface is created at right angles to the cutting tool.
Forging	A metal deformation process in which the plastic deformation of metal, at an elevated temperature, assists with the creation of the shape into a die.
Grinding	A metal removal process in which metal is removed by a rotating abrasive wheel.
Grinding, Centerless	A metal removal process in which a cylindrical part is ground between a grinding wheel and a regulating wheel while balanced on a steady rest blade.



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TERM/ ABBREVIATION	DEFINITION - Machine Tools and Related Topics
Grinding, Creep Feed	An aggressive metal removal process in which the grinding wheel is slowly fed into the part to be ground at a rate to remove all of the metal in a single pass versus multiple passes.
Gundrilling	Drilling conducted at greater depths where the depth of the cut exceeds the diameter of the drill by at least a factor of six.
Headstock	Generic description for the portion of the machine tool that holds the spindle
Hobbing	A metal removal process for making gear teeth; the tool is rotated and advanced toward the rotating blank so that they two rotate together in a synchronised manner.
Honing	A metal removal process for finishing parts using either a honing stone, or honing tool containing honing stones, to abrasively remove very minute amounts of metal
Lapping	A metal removal process used for finishing parts; fine-grained abrasive is mixed with a liquid (water soluble or straight oil) to abrade the metal.
Milling	A metal removal process in which a rotating cutter impacts the part either vertically or horizontally; in vertical milling the cutter is mounted vertically; in horizontal milling the cutter rotates opposite the direction of feed (up milling) or in the same direction as the feed (down milling).
Reaming	A metal removal process used for finishing a drilled hole by removing very small amounts of metal; some reamers (Mapal) utilize guide bars to stabilize the reaming tool.
Roll Tapping	A metal deformation process in which internal threads are created in a pre-drilled hole by the cutting of threads without the creation of chips.
Spindle	Generic description for the device or mechanism that holds the primary cutting or grinding tool.
Sump	A metal tank that typically sits under or beside the machine tool to hold the metal removal fluid.
Table	Generic description for the part of the machine tool that holds the work piece during production; the table typically has the capability to move in multiple axes.
Tapping	A metal removal process in which internal threads are created in a pre-drilled hole by cutting the inner diameter (ID) and creating threads with the creation of chips.
Turning	A metal removal process where the part is rotated and the tool moves past the part to cut the part.
Ways	Generic description for the sliding surfaces of the machine tool upon which the headstock, table and other mechanisms or devices travel.

Conclusion

This Skill Builder, like all others, is intended to increase your knowledge and your comfort with metalworking end users. Some customers understand these terms and some do not. Your goal is to be aware of them to make sure you are "on the same page" with the customer. Is it not safe to assume that everyone understands these terms. It is certainly a good place to start. **Contact Quaker at info@quakerchem.com.**