Matrix
specialty lubricants

# NEAT METALWORKING FLUIDS

## Matrix Specialty Lubricants

Matrix Specialty Lubricants is a company based in The Netherlands, producing and marketing specialty lubricants and greases.

Matrix Specialty Lubricants was created by a nucleus of industry specialists with a collective experience of many years working for major oil companies. Our vision is to harness new technology and, with the expertise of our chemists, provide the correct lubricant for each application. It is just a matter of knowledge.

Specific product information is available in our brochures and most of the technical data sheets can be found on our website;
www.matrix-lubricants.com. Our main products are divided into groups with the most common being presented in our brochures. The most up to date information can always be found on our website.


ISO 21469:2006 ISO 9001:2015 ISO 14001:2020

## Bio Lubricants

This group of products includes biodegradable hydraulic, gear, and other lubricants as well as a range of greases and concrete mould release agents. High performance, long life, low toxicity and biodegradabilty are key factors within this product group.

## Compressor, Vacuum and Refrigeration Fluids

A comprehensive range of gas and refrigeration compressor fluids providing long life and low maintenance costs in combination with high efficiency. The range consists of mineral, and synthetic (hydro treated, PAO, POE, Alkyl Benzenes, Di-Ester, Ester, PAG, PFPE) based lubricants with performance up to 12.000 hour drain intervals.

## Food Grade Lubricants

A complete range of fluids, lubricants and greases for applications whenever a food grade lubricant is required. The high performance Foodmax® line is NSF and InS approved and includes a range of spray cans.

## Industrial Specialty Products

This product group includes a range of specialty chain lubricants, gear oils, transformer oils and many more products. All the products exceed performance expectations contributing to lower maintenance costs.

## Greases and Pastes

An extensive range of specialty greases and pastes, including polyurea, calcium sulphonate, aluminium, barium, silicon, inorganic and PFPE. By using the latest technology and materials we are able to provide high performance and problem solving products.

## Metal Working Fluids and Rust Preventatives

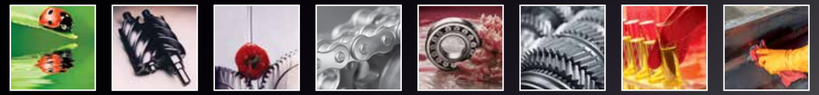
This line of products includes the latest technology soluble metal working fluids, neat cutting oils, cold and hot forging, quenching, drawing and stamping products.

## Specialty Base Oils and Dispersions

These base oils are used in the formulation of metalworking fluids, biodegradable hydraulic fluids, top tier 2 stroke engine oils, mould release agents and many more. They include DTO, TOFA and various types of esters. Another range includes both technical and pharmaceutical white oils. The Matrix line of D-MAX colloidal dispersions contains products based on graphite, MoS2, PTFE and Boron Nitride (hBn). These can be used as additives, lubricants and processing products.

## Cleaners

A range of process and workplace cleaners, both for the industry as well as for food processing plants. The cleaners for the Food Industry are NSF H-1, C-1 and K-1 approved.





## Neat Metalworking

Matrix has an extensive range of neat metal working oils, utilizing the very latest additive technology leading to increased efficiency, improved surface finish and reduced consumption. In the application-product selection table our line of main products are summarised. However, since every application has its own specific requirement, we can customize the fluids according to your needs.

## Selection Table Neat Cutting Oils By Application- Material

| | Viscosity at 40° | Chlorine Content | Steel | Stainless Steel | Aluminium | Copper Brass | Titanium | Copper Corrosion | Grinding | Lapping Honing | General Machining | Medium Severity Machining | High-severity Machining | Broaching | Deep Drilling | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cut ELX | 2 | N | ■ | | | | | N | ■ | | | | | | | Dielectric fluid for electrosparking |
| Cut 103 | 6 | N | ■ | ■ | ■ | ■ | | N | ■ | ■ | ■ | ■ | | | | General machining aluminium, brass and steel |
| Cut 14 | 17-20 | Y | ■ | ■ | | | | Y | ■ | ■ | ■ | ■ | ■ | ■ | ■ | Broaching, threading, milling |
| Cut ADE | 62-70 | Y | ■ | ■ | ■ | | ■ | Y | | | ■ | ■ | ■ | ■ | ■ | Manual operations, Additive on cutting oils |
| Cut 01 AM | 12 | N | ■ | ■ | ■ | ■ | | N | ■ | ■ | ■ | ■ | ■ | | ■ | Anti-mist properties |
| Cut 51 A | 6-8 | N | ■ | ■ | | | | Y | ■ | ■ | | | | | | Lapping, honing, finishing operations |
| Cut 10 M | 10-12 | N | ■ | ■ | | | | N | ■ | ■ | ■ | ■ | ■ | | | HT based for grinding and sharpening |
| Cut 10 | 19 | N | ■ | ■ | ■ | ■ | ■ | N | ■ | | ■ | ■ | ■ | | | General machining, Precision turning |
| Cut 60 AT | 5-6 | N | ■ | ■ | ■ | ■ | ■ | N | ■ | ■ | ■ | ■ | ■ | | | PAO based for sharping and machining tools |
| Cut 17 MI | 18 | N | ■ | ■ | | | ■ | Y | ■ | ■ | ■ | ■ | ■ | ■ | ■ | Stainless steel, aloyed steels |
| Cut 148 | 18-22 | N | ■ | ■ | ■ | ■ | ■ | N | ■ | | ■ | ■ | ■ | ■ | ■ | General machining muti-metals |
| Cut 154 | 18-22 | N | ■ | ■ | | | ■ | Y | ■ | ■ | ■ | ■ | ■ | ■ | ■ | Broaching, gun-drilling, hard operations |
| Cut 05 MT | 29-35 | N | ■ | ■ | ■ | ■ | ■ | N | | | ■ | ■ | ■ | ■ | | Anti-mist properties, Multimetal, good EP |
| Cut Bio A | 12 | N | ■ | ■ | ■ | ■ | ■ | N | | ■ | ■ | ■ | ■ | ■ | | Synthetic oil for MQL system |
| Cut Bio L | 19-24 | N | ■ | ■ | ■ | ■ | ■ | N | | ■ | ■ | ■ | ■ | ■ | | Synthetic oil for MQL system |
| Cut Bio V | 40-46 | N | ■ | ■ | ■ | ■ | ■ | N | | ■ | ■ | ■ | ■ | ■ | | Synthetic oil for MQL system |
| Cut Bio P | 33 | N | ■ | ■ | ■ | ■ | ■ | N | | ■ | ■ | ■ | ■ | ■ | ■ | Synthetic oil for MQL system |

■ Very Suitable
■ Suitable
■ Possible
MQL (Minimum Quantity Lubrication)

## Selection Table - Metalworking Fluids Forming

| | Viscosity at 40ºC | Evaporable Oil | Type | MATERIALS Chlorine | Copper | Steel | Stainless Steel | Aluminium | Application |
|---|---|---|---|---|---|---|---|---|---|
| FDX 11 | 1 | x | Neat | | x | x | x | x | Hobbing and piercing |
| FDX 12 | 1 | x | Neat | | x | x | x | x | Stamping, hobbing and light drawing |
| FDX 18 | 1 | x | Neat | | | x | x | | Stamping, and drawing with EP properties |
| FDX 59 | 10-12 | x | Neat | x | | x | x | | Fine cutting and steel drawing |
| FDX 1001 AM | 1 | x | Neat | | | | | x | Evaporable stamping + forming oil |
| Foodmax® 1001 HE-2 | 2 | x | Neat | | | | | x | Stamping, piercing and forming of metal plates, Kosher, Halal & NSF approved (H1) |
| Foodmax® 1001 HE-3 | 2.1 | x | Neat | | | | | x | Stamping, piercing and forming of metal plates, Kosher, Halal & NSF approved (H1) |
| Foodmax® Cut 30 | 31 | | Neat | | x | x | x | x | Food grade neat cutting fluid, multi-metal, for MQL applications |
| FDX 240 A | 44-52 | | Neat | | | | | x | Drawing and wire drawing |
| FDX 410 A | 100-110 | | Neat | | | x | | x | Wire drawing |
| FDX 7006 | 64-76 | | Neat | | | x | | | Drawing of bathtubs |
| FDX 411 | 185-210 | | Neat | | | x | | | Stamping, hobbing and drawing, water-washable |
| FDX 7050 | 55-65 | | Neat | | | x | x | | Hobbing and drawing of alloyed and stainless steels- sheet cutting |
| FDX 7110 | 90-110 | | Neat | | | x | | | Medium and deep drawing, cutting and extrusion |
| FDX 1030 CU | 31 | | Neat | | x | | | x | Tube drawing fluid, also suitable for bronze |
| FDX 3110 | 100-110 | | Neat | x | | x | x | | Severe drawing |
| FDX 3020 INOX | 270 | | Neat | x | | x | x | | Severe drawing |
| FDX 30 CU | N/A | | Soluble | | x | | | | Copper wire drawing |
| FDX 600 | N/A | | Soluble | | | x | | | Steel cold rolling |
| FDX 580 | N/A | | Soluble | | | x | | | Tube drawing of steel and galvanized steel |
| FDX 20 AC | N/A | | Soluble | | x | x | x | x | Alternative to chlorine-based oils, no degreasing necessary |

## Selection Table - Metalworking Fluids Quenching

| Quenching | Viscosity at 40ºC | Flash Point ºC | Application |
|---|---|---|---|
| FDX 20 R | 15-20 | 180 | General quenching of steel |
| FDX 20 RL | 15-20 | 180 | General quenching steel, water-washable |
| FDX S2-RV | 12-18 | 175 | Fast quenching of steel |
| FDX S3-RV | 32-38 | 200 | Fast quenching of steel |
| FDX S4-RV | 80-90 | 230 | Fast quenching of steel |



## Pastes

### Paste ADE
Cut ADE is a cutting paste for direct application specially formulated for drilling, threading, reaming and severe machining of steel in severe working conditions. It contains EP additives that avoid welding of tool and part and built-up edge formation thanks to the anti-seize properties.

### Foodmax Assembly Paste
Thanks to its' versatility, Foodmax Assembly Paste is also very suitable as a metal working cutting, drilling and tapping paste to extend the tool life. Available in 125 gram tubes and Aeropack with brush for easy application.

### Paste X
For metal forming processes. Paste with a specific chlorine free additives package for drawing operations of aluminum, light alloys, alloyed steels and stainless steel. Paste X is used pure or mixed with water, depending on the operation.

### Paste X700
A greasy paste, specially formulated for the deep drawing of steel sheets. The product is designed for use in severe steel drawing operations including meters, rims, gas bottles and in general pieces with complicated shapes. Paste X is used pure or mixed with water, depending on the operation.

### Paste INOX 10
Cold forming paste specially formulated for stainless steel and alloys drawing operations. Contains polar compounds and chlorinated extreme pressure additives to provide enhanced performance. Paste INOX 10 is normally used for stainless steel and alloy steel drawing operations and for cold pilgering tubes.


## Sprays

### Performance ADE
High performance cutting lube in spray can for direct application specially formulated for drilling, threading, reaming and severe machining of steel in severe working conditions. It contains EP additives that avoid welding of tool and part and built-up edge formation thanks to the anti-seize properties. Gives a slightly foaming effect.

### Performance UCF
Universal economic quality oil to prevent over-heating and wear of tools and metals used in applications for in cutting, tapping and drilling activities. For more severe operations Performance ADE is the product of choice.

## Glossary of terms

### Additive
A chemical added in small quantities to a product to improve certain properties. Among the more common petroleum product additives are: oxidation inhibitors for increasing the product's resistance to oxidation and for lengthening its service life; rust and corrosion inhibitors to protect lubricated surfaces against rusting and corrosion, demulsifiers to promote oil-water, separation, VI improvers to make an oil's viscosity less sensitive to changes in temperature, pour-point depressants to lower the cold temperature fluidity of petroleum products, oiliness agents, anti-wear agents, and EP additives to prevent high friction, wear, or scoring under various conditions of boundary lubrication, detergents and dispersants to maintain cleanliness of lubricated parts, anti-foam agents to reduce foaming tendencies, and tackiness agents to increase the adhesive properties of a lubricant, improve retention, and prevent dripping or spattering.

### Anhydrous
Free of water, especially water of crystallization.

### Anti-Foam Agent
An additive that causes foam to dissipate more rapidly. It promotes the combination of small bubbles into large bubbles which burst more rapidly.

### Anti-Oxidant
A chemical added in small quantities to a petroleum product to increase its oxidative resistance in order to prolong its storage and/or service life. The additive activates in two ways: by combining with the peroxides formed initially by oxidation paralyzing their oxidizing influence, or reacting with a catalyst to coat it with an inert film.

### Anti-Wear Agent
An additive that minimizes wear caused by metal-to-metal contact by reacting chemically with the metal by forming a film on the surfaces under normal operating conditions.

### Acid Number
Also referred to as NEUT or NEUTRALIZATION number: the specific quantity of reagent required to 'neutralize" the acidity or alkalinity of a lube oil sample. In service, the oil will, in time, show increasing acidity as the result of oxidation and, in some cases, additive depletion. Though acidity is not, of itself, necessarily harmful, an increase in acidity any be indicative of oil deterioration, and NEUT number is widely used to evaluate the condition of an oil in service. The most common measurement is ACID NUMBER, the specific quantity of KOH (potassium hydroxide) required to counterbalance the acid characteristics. How high an acid number can be tolerated depends on the oil and the service conditions, and only broad experience with the individual situation can determine such a value.

### Auto-Ignition Temperature
Minimum temperature at which a combustible fluid will burst into flame without the assistance of an extraneous ignition source. This temperature is typically several hundred degrees higher than the flash and fire point.

### Base Oils
Base stocks or blends used as an inert ingredient in the manufacturing of automotive and industrial lubricants.

### Base Stocks
Refined petroleum oils that can either be blended with one another or supplemented with additives to make lubricants.

### Base Oil Viscosity in a Grease
Because oil does the lubricating in a grease, and viscosity is the most important property of the lubricant, the viscosity of the base oil needs to be designed correctly for the application.

### Boundary Lubrication
A form of lubrication effective in the absence of a full fluid film. Made possible by the inclusion of certain additives in the lubricating oil that prevent excessive friction and scoring by forming a film whose strength is greater than that of oil alone. These additives include oiliness agents, compounded oils, anti-wear agents, and extreme pressure agents.

### Carbon Residue
Coked material formed after lubricating oil has been exposed to high temperatures.

### Copper Strip Corrosion
Evaluation of a product's tendency to corrode copper or copper alloys. ASTM D130. Test results are based on the matching of corrosion stains.

### Corrosion Inhibitor
A lubricant additive for protecting surfaces against chemical attack from contaminants in the lubricant.

### Compatibility of a Grease
This is one of the most important grease properties. Whenever two incompatible thickeners are mixed, grease usually becomes soft and runs out of the bearing. When mixing different thickener types, consult supplier on compatibility. Some incompatible thickeners are aluminum and barium soaps, clay and some polyureas.

### Consistency
NLGI grade is based on amount of thickener. Consistency describes the stiffness of the grease. NLGI 2 is the most common grade.

### Demulsibility
A lubricant's ability to separate from water, an important consideration in the lubricant maintenance of many circulating systems.

### Detergent
An additive which chemically neutralizes acidic contaminants in the oil before they become insoluble and fall out of the oil forming sludge. Particles are kept finely divided so that they can remain dispersed throughout the lubricant.

### Dropping point
The temperature at which a grease changes from semi-solid to a liquid state under test conditions. It may be considered an indication of the high temperature limitation for application purposes.

### Entrainment
Describing a state of an immiscible fluid component. Minute quantities of a fluid (typically water) can be dissolved or absorbed into the oil, but excess quantities can be most harmful to equipment due to the entrainment leaving gaps in the lubricated areas.

### Emulsion
A mechanical mixture of two mutually insoluble liquids (such as oil and water).

### EP agent
An additive to improve the extreme pressure properties of a lubricant.

### Flash Point
Lowest temperature at which the air vapor from a sample of a petroleum product or other combustible fluid will "flash" in the presence of an ignition source. The flash can be seen in the form of a small spark over the liquid.

### Fire Point
Lowest temperature at which a combustible fluid will burst into flame in the presence of an extraneous ignition source. Very little additional heat is required to reach the fire point from the flash point.

### Foaming
A possible reaction of an oil when mixed with air. This entrained air can result in reduced film strength and performance reduction.

### Foam Inhibitor
An additive which causes foam to dissipate more rapidly. It promotes the combination of small bubbles into large bubbles which burst more easily.

### Four-Ball Tests
Two test procedures on the same principle. The Four Ball Wear Test is used to determine the relative wear-preventing properties of lubricants operating under boundary lubrication conditions. The Four Ball Extreme Pressure Test is designed to evaluate performance under much higher unit loads.

### Hydrocarbons
Compounds of hydrogen and carbon of which petroleum products are typically examples. Petroleum oils are generally grouped into two parts: Naphthenics, which possess a high proportion of unsaturated cyclic molecules; and paraffinic, which possess a low proportion of unsaturated cyclic molecules.



## Glossary of terms continued

### Hydro Treating
A Gulf patented process used to make lubricant base stocks. In the process, lubricant feedstocks are reacted with hydrogen in the presence of a catalyst at very high temperature (400°C) and pressure (3000 plus psi). The process displaces impurities and unsaturated hydrocarbons.

### Hydrodynamic Lubrication
A type of lubrication effected solely by the pumping action developed by the sliding of one surface over another in contact with an oil. Adhesion to the moving surface draws the oil into the high-pressure area between the surfaces, and viscosity retards the tendency to squeeze the oil out. If the pressure developed by this action is sufficient to completely separate the two surfaces, full-fluid-film lubrication is said to prevail.

### ISO
International Standard Organization

### Load Carrying Ability
Under high-load conditions, high-viscosity base stock is required and usually with an EP additive or solid additive like molybdenum disulfide.

### NLGI· classifying stiffness of a Grease
The best way to define the consistency or stiffness of the grease is set out by the NLGI (National Lubricating Grease Institute). A test method defines the following grades according to a level of penetration measured at a temperature of 25°C. The consistency of the grease will change as soon as the temperature of the application will increase or decrease. When temperature falls below 25°C, the NLGI grade rises and the grease will appear more stiff.

On the other hand, as soon as the temperature will go beyond 25°C, the NLGI grade is reduced and the grease becomes less stiff.

### Oxidation
A form of chemical deterioration to which all petroleum products are subject to, and involves the addition of oxygen atoms resulting in degradation. It is accelerated by higher temperatures above 25°C, with the rate of oxidation doubling by each 10°C increase. With fuels and lubricant oils, oxidation produces sludges, varnishes, gums, and acids, all of which are undesirable.

### Oxidation Inhibitor
A chemical added in small quantities to a petroleum product to increase its oxidation resistance in order to prolong its storage and/or service life. The additive activates in two ways: by combining with the peroxides formed initially by oxidation, paralyzing their oxidizing influence, or reacting with a catalyst to coat it with an inert film.

### Oil Separation of a Grease
For a grease to be effective, a small amount of oil must separate from the thickener (usually less than 3%).

### Pumpability of a Grease
This is an important property when pumping grease in centralized systems at low temperatures. Most common test is Lincoln Ventmeter.

### Pour Point
A widely used low temperature flow indicator, depicted as -15°C above the temperature to which a normal liquid petroleum product maintains fluidity. It is a significant factor in cold weather start-up. Paraffinic oils typically have higher pour points due to the formation of wax crystals, while many other lubricants reach their low pour points through an increase in viscosity.

### Rust Inhibitor
A lubricant additive for protecting ferrous (iron and steel) components from rusting caused by water contamination or other harmful materials from oil degradation.

### Shear Stress
A unit of frictional force overcome in sliding one layer of fluid along another. This is typically measured in pounds per square foot, with pounds representing the frictional force, and square feet representing the area of contact between the sliding layers.

### Shear Stability
Grease needs to maintain its consistency under high shear conditions. The shear stability test measures the softening of grease when sheared for 10,000 or 100,000 double strokes with a grease worker. Loss of less than one NLGI grease grade signifies a stable thickener under high shear conditions.

### Sludge
The collective name for contamination in a compressor and on parts bathed by the lubricating oil. This includes decomposition products from the fuel, oil, and particulates from sources external to the compressor.

### Solvency
The ability to dissolve into a solution producing a homogeneous physical mixture. The degree of solvency varies along with the rate of dissolution depending on the amount of heat added to the solution.

### Synthetic lubricants
Lubricants manufactured by a process, where a chemical conversion or transformation of one complex mixture of molecules into another complex mixture takes place.
Common types of synthetic base oil include: Polyalpha olefins (PAO), Hydrocracked/Hydroisomerized, Unconventional Base Oils (UCBO), Organic Esters, Polyglycols (PAG).

### Timken OK load
Measure of the extreme pressure properties of a lubricant.

### Thickener for Grease
A grease consists of a base oil, additives and a thickener. There are soap and non-soap thickeners. Each thickener type provides unique characteristics to the grease.

### Vapor Pressure
The measure of a liquid's volatility. The higher the pressure at a standard test temperature, the more volatile the sample, and the more readily it will evaporate.

### Varnish
A deposit resulting from oxidation and polymerization of fuels and lubricants. Similar to but softer than lacquer.

### Viscosity
Measure of a fluid's resistance to flow. This is typically measured as the time required for a standard quantity of fluid at a certain temperature to flow through a standard orifice. The higher the value, the more viscous the fluid. Viscosity varies inversely with temperature, so the measurements are always expressed together. Tests are typically conducted at 40°C and 100°C.

### Viscosity Index
The measure of the rate of change of viscosity with temperature. Heating tends to make lubricants thinner, cooling makes them thicker. The higher a VI is on a particular fluid, the less of a change in viscosity there will be over a given temperature range. In determining the VI, two temperatures of viscosity are taken, one at 40°C and the other at 100°C.

### Volatility
The property of a liquid that defines its evaporation characteristics. Of two liquids, the more volatile one will boil at a lower temperature and will evaporate faster when both liquids are at the same temperature. The volatility of petroleum products can be evaluated with tests for flash point, vapor pressure, distillation, and evaporation rate.

### Water Resistance
Water washout test measures ability of a thickener to remain intact in bearing when submerged in water. Water spray-off measures ability of a thickener to remain in bearing in presence of water spray. Both of these tests measure percent grease removed.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The Netherlands