FUNCTIONAL PRODUCTS INC.

Innovative Chemistry for Lubricants

Metalworking Additives

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QMS Certified to ISO 9001:2015 (With Design) REACH and GHS Compliant

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FUNCTIONAL PRODUCTS INC.

Since 1985, Functional Products Inc. has been a leading supplier of innovative polymer additives for lubricants and grease.

Functional Products Inc. manufactures market general components as well as unique, tailor-made additive solutions through development projects with clients. FPI produces over 300 standard or custom products from one drum to tanker batches.

All clients – from small blenders to multi-national corporations – receive world-class support on the necessary technologies, formulations, and regulations from experts on staff to succeed on their projects.

FPI's headquarters, offices, labs, and production are located in Macedonia, Ohio, USA. For global sales and warehousing, contact **sales@functionalproducts.com** or refer to page 2 of the **Applications Chart**.

Mission Statement

"Functional Products Inc. is committed to providing our customers with quality products and services that meet or exceed their expectations through the use of continuous improvement."

FPI is proud to maintain an ISO 9001:2015 (with design) quality management system and complies with all REACH and CLP regulations, including the Globally Harmonized System (GHS) for labeling.

Health and Safety

The product descriptions, labels, and datasheets (TDS) are not intended to take the place of a Safety Data Sheet (SDS).

SDS are available online or requested at: **sds@functionalproducts.com**

Metalworking Additives

Metalworking fluids are a diverse class of lubricants used in extreme conditions to shape and form metal.

Functional Products Inc. offers a wide range of sulfur, phosphorus, and solid based chemistries for boundary lubrication conditions. We do not carry chlorine or halogen based components.

Excellence in Lubrication

Functional Products Inc. is an active member or participant in the following professional technical organizations:

STLE • ILMA • NLGI • ELGI • NLGI-IC • CLGI • K-STLE • AOCS •UEIL • Lube Expo

and supporter of university programs in lubrication and tribology.

Functional Products Inc. has received best technical paper awards at:

ELGI (Paris, 2011)
NLGI (Coeur d'Alene, 2018)
NLGI-IC (Amritsar, 2018)
CLGI (Wuyishan, 2011)

Functional Products Inc. was noted as an 'HPM Valuable Contributor' for the NLGI High Performance Multiuse Grease Specification (2020).

Scientists from FPI authored the chapter "Tackifiers and Antimisting Additives" in *Lubricant Additives: Chemistry and Applications*, 2nd ed. (2009) and 3rd ed. (2017), edited by Leslie R. Rudnick; and helped edit the *NLGI Lubricating Grease Guide*, 7th ed. (2022).

Sulfur Carriers

Sulfur is a key component of heavy duty metal forming operations.

Product	% Total Sulfur	% Active / % Inactive	Feedstock Chemistry	Copper Corrosion	Color	Core Chemistry	Note
EP-203	38%	34% / <5%	Olefin	1B	Red/Brown	Olefin Sulfide	Passivated

Phosphorus Carriers

Phosphorus helps in cutting operations, provides low friction, and can act as a rust inhibitor.

Product	wt% P	Form	Core Chemistry	Note
CI-426EP	3.6%	Liquid	Amine Phosphate; Neutral	2.0% Sulfur
AW-354	5.3%	Liquid	Fatty Phosphate; Neutral	-
CI-426	5.5%	Liquid	Amine Phosphate; Neutral	-
CI-427	6.4%	Liquid	Amine Phosphate; Neutral	CAS# 80939-62-4
AW-116	9.0%	Liquid	Amine Phosphate; Acidic	-

Solid Lubricants

Solid lubricants are critical for boundary lubrication conditions to prevent metal-metal contact and galling.

Product	Suggested wt%	Form	Core Chemistry	Note
Ceramax	1wt%	Powder	Boron Nitride	Micronized powder; NSF HX-1
Ceramax Paste	5wt%	Paste	Boron Nitride	Opaque paste of Ceramax powder (20wt%); NSF HX-1
Ceramax Liquid	5wt%	Liquid	Boron Nitride	Clear and stable boron nitride dispersion (20wt%)

FUNCTIONAL CERAMAX boron nitride technology offers exceedingly high operating temperatures and performance in a wide range of conditions versus graphite or other solid lubricants.

Viscosity Modifiers

Viscosity modifiers provide a convenient means of increasing the viscosity of an oil to provide greater film thickness and load carrying capability.

Product	Suggested wt%	Form or Viscosity, 100°C, cSt	Chemistry	Soluble In	Note
V-158FN	10wt%	Liquid, 1400 cSt	OCP	Petroleum/PAO	Economical thickener, adds film strength
V-731	5wt%	Liquid, 1100 cSt	EPO	Petroleum/PAO	Very high flashpoint and shear stability
V-739	5wt%	Liquid, 60000 cSt	EPO	Petroleum/PAO	Very high flashpoint and shear stability
V-508M	10wt%	Liquid, 2500 cSt	Biobased	Esters	Soluble in biobased and synthetic esters
V-830	2wt%	Powder	Proprietary	Water/Glycol	Soluble in water/glycol MWF, lubes, coolant

Tackifiers

Tackifiers are used to improve the cling and prevent fling-off of lubricants on high speed workpieces. These additives also produce higher surface film thickness even in low viscosity oils.

Product	Suggested wt%	Form or Viscosity, 100°C, cSt	Soluble In	Note
V-178	0.1wt%	Liquid, cSt	Petroleum	PIB based tackifier for machining oils
V-584	0.1wt%	Liquid, 2500 @ 40°C	Ester	Biobased tackifier for esters and vegetable oils
V-802	0.1wt%	Liquid, 60000 cSt @ 40°C	Water	Aqueous tackifier/antimist for water-based lubricants

Antimisting Additives

Low viscosity products like cutting and grinding oils can provide high levels of fine mist which pose a risk of inhalation or combustion. Antimisting additives are highly effective at reducing the occurrence of mist and create larger oil droplet sizes for safer operation.

Product	Suggested wt%	Form or Viscosity, 40°C, cSt	Soluble In	Note
V-162	0.1wt%	Liquid, 750 cSt @ 40C	Petroleum	Petroleum based antimisting additive
MW-612	0.1wt%	Liquid, Emulsion	Emulsions	Emulsion based antimisting additive
V-802	0.5wt%	Liquid, 60000 cSt @ 40C	Water	Aqueous tackifier/antimist for water-based lubricants

Quench Oil Packages

Quench oils are used to rapid cool high temperature parts to induce the desired level of hardness to the metal.

Product	Suggested wt%	Chemistry	Application Note
Q-145	2-3%	Sulfonate	Economic quench oil package for oil-based quench oil
Q-249	2-3%	Sulfonate	Premium quench oil package for oil-based quench oil
V-731	2%	EPO	Quench oil accelerator (1100 cSt @ 100°C)

Use 2wt% **FUNCTIONAL V-731** viscosity modifier as a quench accelerator top treat when faster quench speed is required.

Slideway and Spindle Oil Packages

Slideway lubricants, way oils, and spindle oil formulations are versatile lubricants for machining equipment. **FUNCTIONAL WA-64** and **WA-60SF** are time-tested packages for formulating a wide range of products.

Product	Suggested wt%	Chemistry	Application Note
WA-64	1.75%	Ashless	GM LS-2, low color/odor
WA-60SF	1.50%	Ashless	Sulfur-free for low color and use on yellow metals

Emulsifying Additive Packages

These packages are antiwear and EP packages designed to form emulsions between the lubricant and water.

Product	Suggested wt%	Chemistry	Application Note
RD-540	2.2%	Ashless	Emulsifying EP package for pneumatic / air tool / rock drill
SGP-563	1.5%	Biobased	Low friction forestry and saw guide oil package (Ecolabel)

Rust Preventative Packages

RO packages focus on oxidation and rust protection and carry less antiwear or EP than heavy duty lubricants. These products are used to keep freshly machined parts for oxidizing.

Product	Suggested wt%	Chemistry	Application Note
RO-100	1%	Proprietary	Rust and oxidation package for R&O oils/lubricants
RO-135	50%	Proprietary	Rust preventive spray concentrate

Amine phosphates **FUNCTIONAL CI-426** and **CI-427** from the **Phosphorus Carriers** section on page 3 are also versatile and high effective ferrous corrosion inhibitors at 0.2-0.3wt%.

Defoamers and Demulsifiers

Defoamers are used to eliminate surface foam and entrained air. Demulsifiers are used to prevent or break emulsion between water or coolant and the lubricant. Functional Products supplies multiple chemistries for both categories due to the highly selective nature of surface active additives like defoamers and demulsifiers. Test at multiple wt% (0.05%, 0.10%, 0.20%) to find the ideal treat rate.

Product	Suggested wt%	Chemistry	Application Note
DF-400	0.1%	Silicone	EAL/HX-1 silicone-based defoamer, very versatile
DF-500	0.1%	Acrylate	EAL acrylate-based defoamer for fatty esters, veg oil
DM-240	0.1%	Proprietary	Highly effective demulsifier
DM-400	0.1%	Proprietary	EAL/HX-1 demulsifier