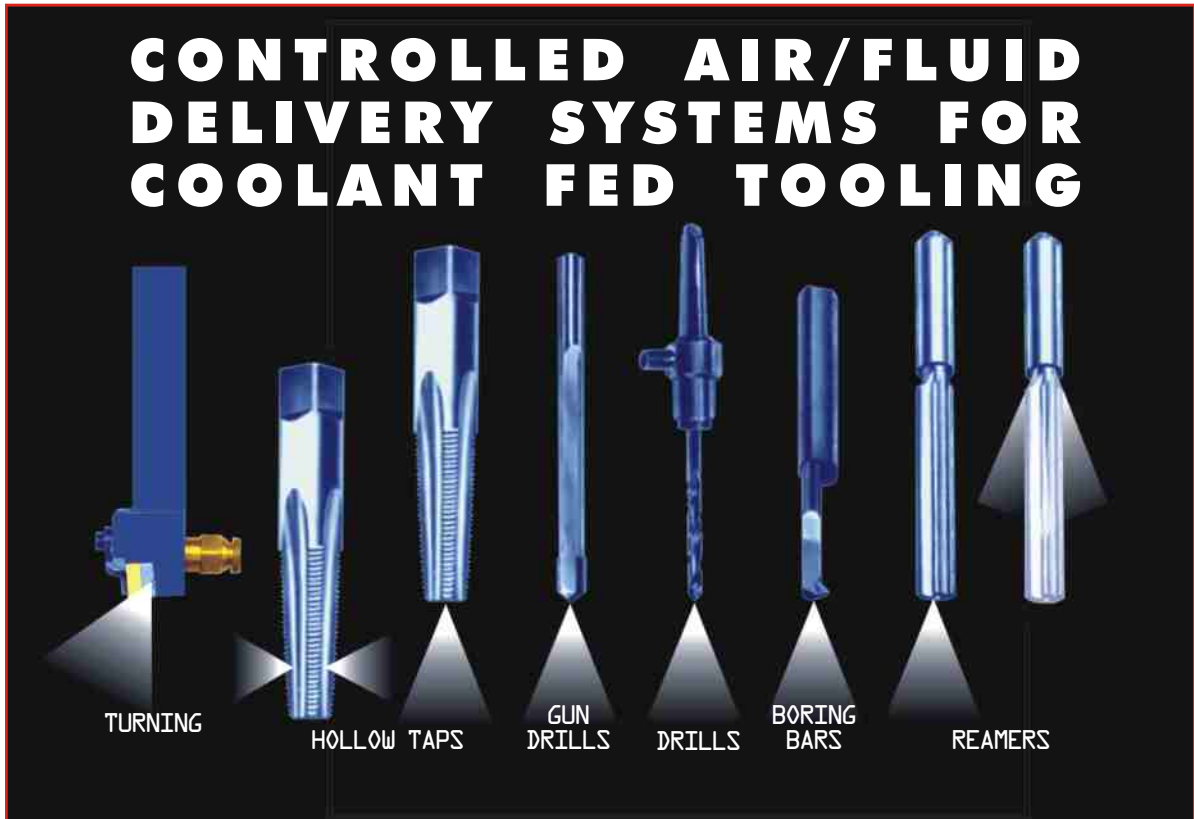


THRU THE TOOL

CONTROLLED AIR/FLUID DELIVERY SYSTEMS FOR COOLANT FED TOOLING





Some Facts About Thru-The-Tool Systems

In recent years, the range of tools with internal coolant routing has dramatically increased. The advent of high efficiency “clean” lubricants has enhanced the advantages of applying a fluid in spray form in any Thru-The-Tool coolant application. Unist is cognizant of this revolution and has been manufacturing a range of minimal fluid application systems that most effectively and inexpensively apply minute but adequate coolants and lubricants. The use of Thru-The-Tool Systems allows the coolant/lubricant to be applied directly at the tool-work interface.

All Unist systems can be directly operated by existing NC or CNC machine control.

Thru-The-Tool Systems offer benefits including:

- Improved housekeeping.
- No recycling maintenance, or costly disposal of flood coolants.
- Expanding compressed air cools tooling and helps remove chips from the cutting interface.
- Mist coolant or lubricant application “leads” the tools cutting edge throughout the cutting cycle.
- High efficiency lubricants stand up to the tremendous pressures exerted in high speed operations such as gun drilling, boring, etc.
- High efficiency lubricants cling to the cutting surface longer than ever, drastically reducing the generation of heat.
- Lubricants lubricate the flutes, holes, and chips, improving hole quality in drilling.
- Replacement of high pressure flood systems with our IN-THE-SPINDLE fluid spray system (Patent Pending)
- Often dramatic improvements in tool life, Improved surface finish with no speed or feed limits.

Water Soluble or High Efficiency Lubricant Application System?

Water soluble coolants are used:

1. To increase cooling properties due to the heat absorption of water vapor evaporation.
2. To maintain compatibility with a flood coolant that is used on the same machine.
3. For other considerations such as machined material, machining operations, subsequent processing, etc.
4. To reduce heat.

Suggested Water Soluble Systems are on page 4.

High efficiency lubricants are used:

1. On portable air tools because of the small reservoir required.
2. On aluminum, titanium, and composites primarily, but are also effective on nearly all materials in nearly every machining operation.
3. Where possible discoloration, subsequent cleaning, surface finish, and production speed are important considerations.

Suggested High Efficiency Lubricant Application Systems are on pages 5-7.

UNIST HAS THE ABILITY TO DESIGN AND BUILD ANY SIZE CENTRAL SYSTEM EMPLOYING:

- **Water Based Fluids**
- **High Efficiency Lubricants**
- **External Nozzle Mixing Systems**
- **Thru-The-Tool Systems - or any combination of the above.**

Coolant Inducers

Coolant inducers are one way of getting the fluid and air to the drill tip using a rotating spindle. The coolant inlet remains stationary while the spindle turns. Coolant inducers are very versatile in that they can be used in conjunction with drills, reamers, taps, gun drills, and many other cutting tools. Coolant inducers are available in a wide variety of sizes and shanks through a number of industrial supply houses. *Contact UNIST for a list of vendors that can supply the proper inducer for your system.*

Coolant-Fed Bushings

Coolant-fed bushings are the latest addition to Thru-The-Tool cooling systems. The coolant does not flow directly through the drill itself but surrounds it through the supporting bushing. The bushing actually serves a three-fold purpose: 1. It locates the drill - 2. It maintains drill straightness - 3. It routes and directs the mist down the drill flutes. *Coolant-fed bushings are available through a number of industrial supply outlets.*

Coolant-Fed Spindles

Unist has the ability to supply any coolant/lubricant in the "Near Dry" concept through horizontal and vertical spindles. The fluid and compressed air are always retained in separate conduits until reaching the tool. Check valve(s) in the fluid line are optional. UNIST WILL MODIFY OR SUPPLY ANY inlet rotary coupling to a co-axial configuration. There are no tool size or type limitations. A minimal fluid system thru-the-spindle will usually provide the same end results (finish, tool life, cycle time) as a high pressure flood system without the coolant maintenance, filtration floor space, power and initial system cost.

Coolant-Fed Turning Tool Holders

Because turning is one of the more difficult operations to efficiently apply coolant lubricant (flood or Near-Dry), it needs special considerations. Unist and some tool holder suppliers will modify or supply stock tool holders to continuously direct the spray directly to the insert/workpiece interface. This can be accomplished on "stand alone" machines or turret type machines designed for flood coolants. Retrofitting a machine is common and inexpensive. This method has been found very effective in all turning operations. Unist can provide a system to feed minimal fluid and compressed air thru a turret to either a coolant fed tool or spray externally as the tool changes.

The Revolutionary Metalworking Lubricant



Coolube 2210 metalworking lubricant replaces flood coolants and lubricants. You get less reworking of parts because of exit burrs, oversize holes, and rough finishes. Tools stay sharper much longer and during extreme pressure is when this product really shines. After cleaning up with a solvent or warm water and detergent, you can plate, paint or seal over a surface exposed to Coolube. Do away with costly coolant disposal charges. Use drops instead of gallons and save.

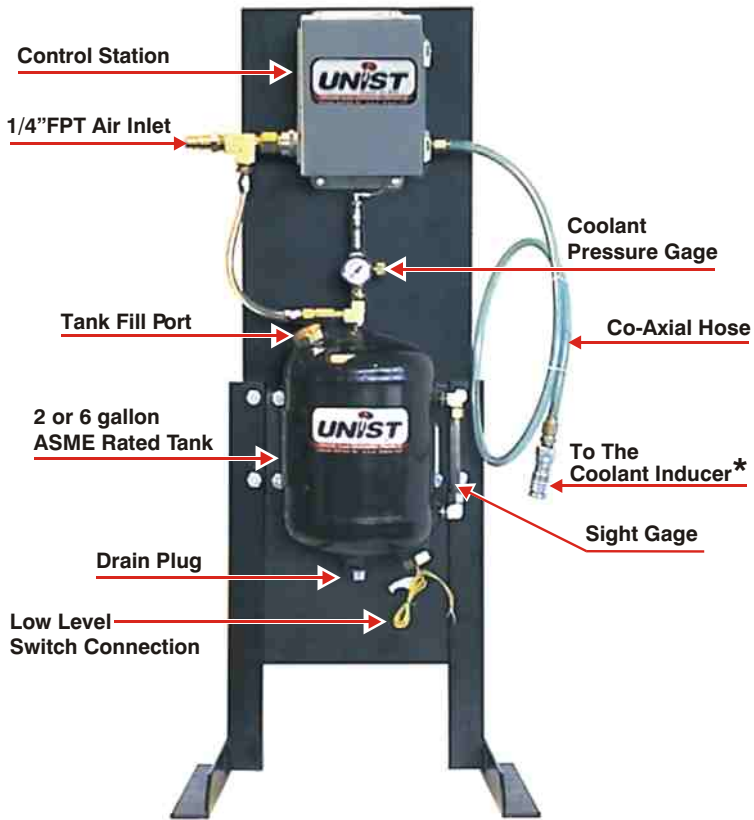
WORKS GREAT ON: Aluminum, Magnesium, Steel, Stainless Steel, Titanium, and many other exotic and nonexotic materials.

Uses:

Forming
Drilling
Tapping
Reaming
Sawing
Sanding
Grinding
Milling
Punching
Stamping
Shearing
Forging
Swaging
Broaching
Turning
Press Fitting
-And lots More-

Advantages:

Non-Toxic
Non-Polluting
Non-Drying
Non-Staining
Contains No Chlorine
Permits Plating and Painting
With No (minimal) Clean-up
Seal Compatibility
Extreme Pressure Capability
Contains No Silicones
Contains No Petroleum Products
Extremely Cost Effective
Biodegradable



9040 POWERCOOL SYSTEM

High Velocity, Thru-The-Tool System For Fixed Machine Tools using Coolant Inducers or Hollow Spindles with water based fluids

Special Features:

- System actuated by ball or sleeve valve, solenoid valve, or air pilot valve
- Tank sizes 2, 6 or 15 gallon
- Adjustable coolant flow
- Dependable and consistent mist flow
- Several mounting arrangements including: Independent-(Separate tank and control stations) Bracketed-(Tank and station bracketed together) and Free Standing-(Tank and station mounted together with leg brackets as shown).

Powercool Stands Alone

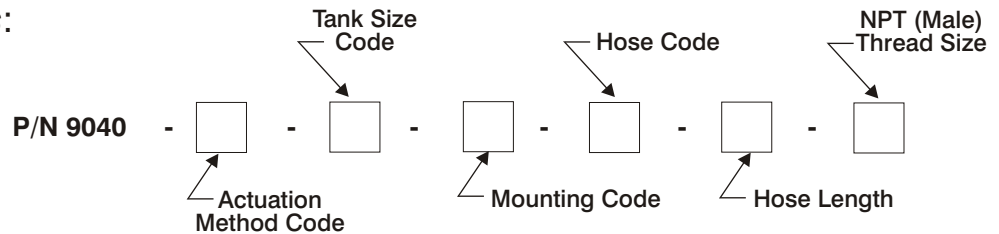
Powercool is the only mist coolant system of it's kind. The system's compact design and simple construction lends itself to virtually any coolant-fed tooling application. A single air supply source at 80-100 psi operates the system, feeding coolant from the supply tank to the control station and then in regulated amounts through a co-axial hose to the coolant inlet at the tool or spindle. An air regulator controls the system air pressure and a needle valve controls coolant output. A 3-way sleeve valve depressurizes the tank to facilitate quick and easy refilling.

*NOTE: For Thru-Spindle applications there are separate air and coolant lines.

NOTE: A central supply storage tank can feed numerous control stations. Consult factory for further information.

NOTE: Automatic operation by a flow sensing valve for use with portable air tools is also available. (Includes separate tool air hose and cutting tool mist hose).

Ordering Instructions:



Part No. Code Information

METHOD OF ACTUATION		TANK SIZE		MOUNTING		HOSE (15'-0 long) (Standard unless specified)		
Description	Code	Gal. Cap.	Code	Description	Code	Dia.	MPT	Code
Ball or Sleeve Valve	M	2	2	Free Standing**	F	1/4	1/4	4
Solenoid* Valve	S*	6	6			3/8	3/8	6
Air Pilot Valve	P	15	15	Independent	I	1/2	1/2	8

* Specify voltage **Not available with 15 gallon tank

84-4020 TORNADO SYSTEM

High Velocity, Thru-The-Tool System For Fixed Machine Tools using Coolant Inducers with high efficiency lubricants

Special Features:

- High air volume at maximum available pressure
- Cycling pulse generator or solenoid valve
- Optional magnetic mounting base
- Optional central feed capability
- Positive displacement lubricant injection
- Optional operating methods
- 3/8" I.D. Hose from unit to tool



Low Air Pressure Drop System

The Tornado System is unique in that it permits nearly unrestricted air flow and minimum pressure drop to the cutting tool. To turn the unit on and off the air supply must be interrupted by either a ball valve, solenoid valve, or air pilot valve. The unit dispenses lubricant at a rate of .2 to 1 .0 drops per cycle with 5-100 cycles per minute. This produces a total range in output of 1-100 drops/minute (.03cc to 3.3 cc per minute).

NOTE: Threaded tool connection allows for direct connection to coolant inducer or the addition of a quick connect socket (customer provided).

How To Order:

P/N=84-4020 - 2PT - M - 5 - MB

↓
Magnetic Base
↓
Hose Length in Feet
↓
M= Manual Actuation
S = Electrical Actuation**
P = Pneumatic Actuation
2PT= 1/8NPT Tool Connection
4PT= 1/4NPT Tool Connection

**Specify voltage

*For tools 3/8" and under, and coolant fed bushings, the Unist Coolubricator series should be used - See Unist Catalog No.U-996-3



WHIRLWIND Spindle Coolant/Lubricant Spray Systems

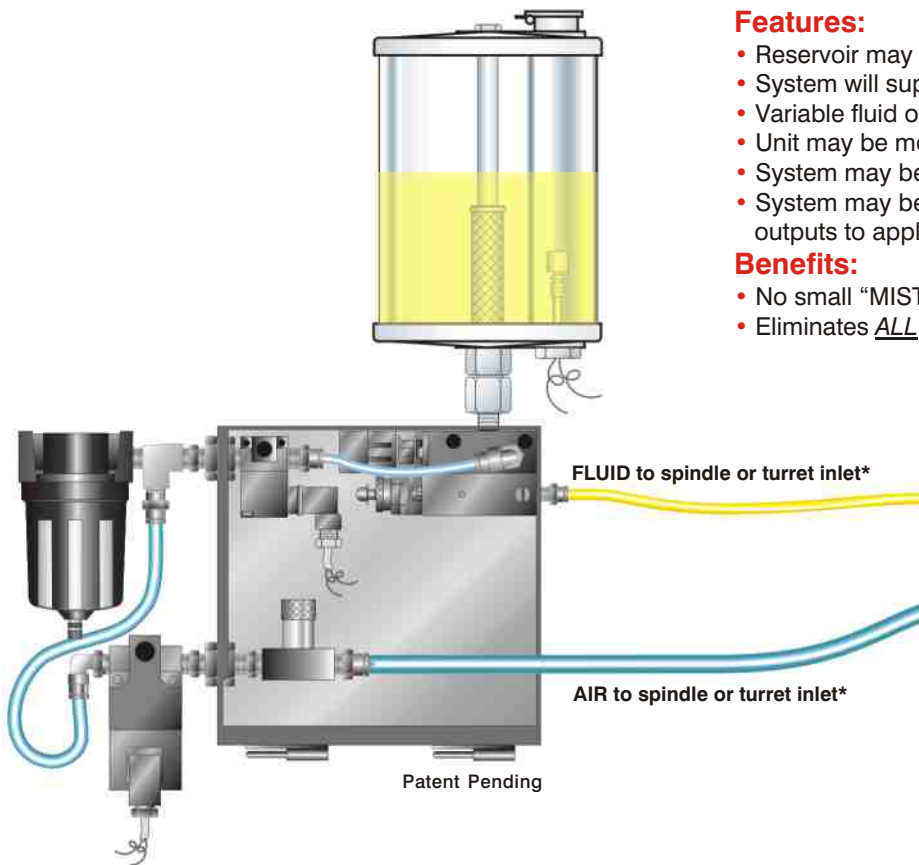
Special Features & Benefits

Features:

- Reservoir may be any size - Pressurized or Gravity
- System will supply any size tool
- Variable fluid output per tool optional feature
- Unit may be mounted at any elevation within 25 feet of tool
- System may be controlled by machine controls
- System may be combined with one or more additional outputs to apply fluid externally to nozzles

Benefits:

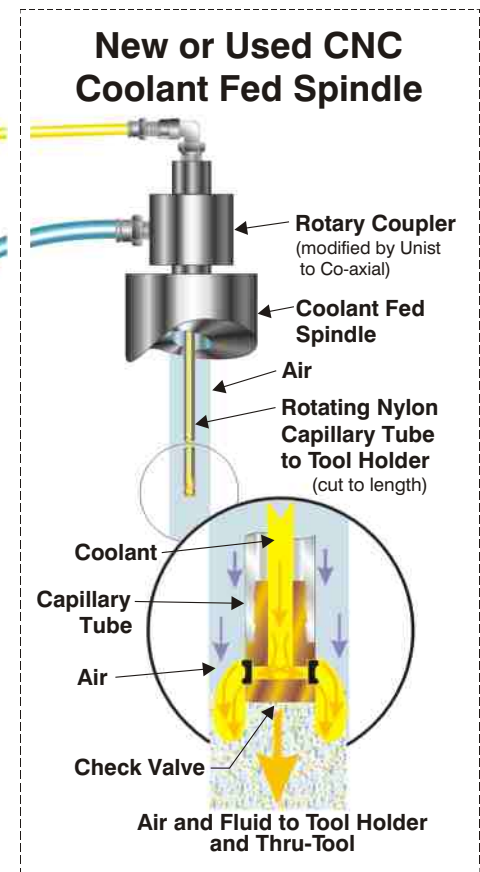
- No small "MIST" particles
- Eliminates ALL flood coolant considerations



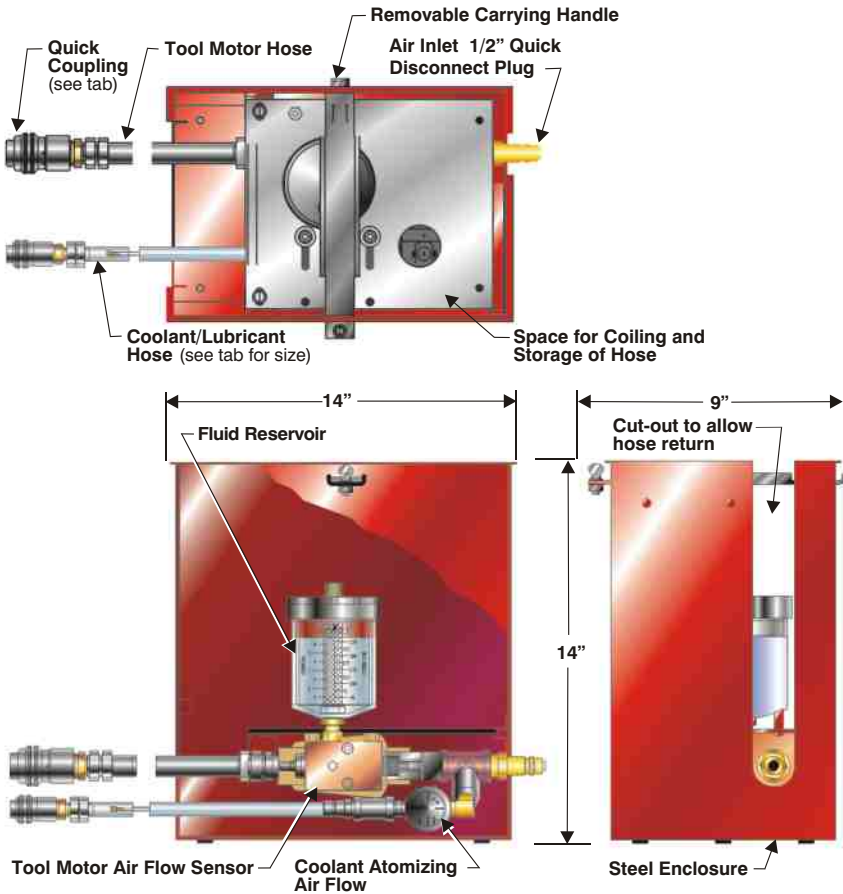
HOW THE SYSTEM WORKS

The Whirlwind System is designed primarily to be used on all makes and models of vertical and horizontal computer controlled machining centers. It may also be used on some "stand-alone" machines. This system applies fluids in minimal quantities combined with compressed air directly and consistently to the tool/workpiece interface. The Whirlwind system primarily reduces heat generation - but also absorbs heat and transfers heat out of the generated area.

This system produces fluid particles that are large enough to wet-out and penetrate the heat generating tool/workpiece interface. This reduces heat in the tool, provides better finishes, slightly lubricates chips, etc. while eliminating all flood coolant cost.



*Attachment fittings vary by machine - Consult factory for proper fittings



85-4050 TYPHOON SYSTEM

Portable, Automatic Flow Sensing System For Portable Air Tools

Special Features:

- Automatic system actuation with air tool operation
- Hoses coil inside enclosure for convenient storage
- Entire system easily removed from enclosure for adjustment and servicing
- Various Size Reservoirs
- Adjustable mist density and mist air flow rates
- Optional Air Motor Lubrication

How the System Works

The 85-4050 Typhoon System is intended for use with air tools where automatic instant on-off application of the coolant/lubricant to the cutting tool is required.

Every time the tool is triggered the system senses the air flowing to the tool and automatically starts operating. Fluid density and air flow rates are both independently adjustable. The 1/2" tool motor hose is for non-lubricated tool air only. The 3/8" lubricant hose delivers mist at rates anywhere from 1-200 drops/min. With hoses coiled inside the box, the entire unit can be hand carried to different locations, or stacked for convenient storage.

How To Order:

P/N = 85-4050 - 1

↓
See chart below for suffix

Tabulation Chart

Suffix	Mist Hose Diameter	Mist Hose Length	Mist Hose Coupling Size	Tool Motor Hose Diameter	Tool Motor Hose Length	Tool Motor Coupling Size
-1	3/8"	10'	3/8"	1/2"	10'	1/2"
-2	3/8"	10'	1/4"	1/2"	10'	1/2"
-3	3/8"	6'	3/8"	1/2"	6'	1/2"
-4	3/8"	6'	1/4"	1/2"	6'	1/2"

NOTE: Other hose lengths, sizes, or coupling sizes available. Consult factory. Contact UNIST, Inc. for numerous other models and central system capabilities.

...About Near Dry Turning

UNIST will convert any turning machine to a Near Dry operation. The system could employ Thru-The-Tool holder outlets and/or external nozzles.

Consult the factory for recommendations on your machine(s)

Pricing for items in this catalog are on quotation basis only

LOCAL REPRESENTATIVE





MICRO-FLUIDIZATION PRODUCTS FOR INDUSTRY

COOLUBE 2210 and 2210 EP **CHEAPER BY THE DROP!**

Coolube 2210's cost effectiveness is often overlooked when the price per gallon is first realized. When compared to more conventional messy flood and mist type coolants or lubricants, Coolube 2210's price per gallon may seem expensive, but this is not really the case.

COOLUBE Benefits include:



- Elimination of Air-borne mist particles
- Improved Tool Life
- Less Housekeeping
- Increased Chip Value
- Increased Production Speed
- No Employee health concerns
- No Coolant Testing
- No Coolant Filtering
- No Coolant Treatment
- No Coolant Disposal
- No Fluid Oxidation (stickiness)
- No Need for Tool Coatings
- No Need for High Pressure Systems

Non-Ferrous Cutting Applications

Coolube 2210 is a premium quality vegetable based metalcutting lubricant. It is formulated to work with non-ferrous metals. Coolube 2210 is ideally applied with Uni-MAX precise fluid applicators. Coolube 2210 is a polar lubricant and is most effective when applied sparingly. If it is applied correctly and the proper amounts are dispensed, Coolube 2210 will yield the lowest net manufacturing cost of any fluid. Cost savings will be realized through longer tool life, increased productivity, lower shop maintenance cost, clean chips, clean parts and clean machines.

Ferrous Cutting Applications

Coolube 2210EP is specifically formulated to provide superior performance on all ferrous metals. Coolube 2210EP is an environmentally acceptable vegetable based lubricant for use with the UNIST Uni-Max line of near dry machining applicators..

Coolube 2210EP exhibits superior lubricity properties which will facilitate near dry machining in heavy duty cutting operations on all CNC, automatic screw, drilling, tapping, milling, turning, and hard turning machines.

TYPICAL USAGE FOR LIGHT TO MEDIUM MACHINING OPERATIONS:

1 Drop Every 10 Seconds*
=360 drops per hour
=3.25 ounces (12 cubic centimeters or about .0245 gallons) used in an eight hour continuous operation.

At the current price for a 55 gallon drum of Coolube 2210, this works out to a cost of \$1.52 per 8 hour shift, or 19 cents per hour.

TYPICAL USAGE FOR HEAVY MACHINING OPERATIONS:

1 Drop Every 6 to 8 Seconds*

=450 to 600 drops per hour

=4.06 to 5.41 ounces (15 to 20 cubic centimeters) used in an eight hour continuous operation. This works out to \$1.90 per 8 hour shift, or 23 to 32 cents per hour.



Physical and Chemical Properties:

Appearance: Clear to Yellow Liquid

Weight Per Gallon: 7.8 +/- 0.1 pounds

Odor: Neutral

Water Solubility: Insoluble

Flashpoint: Greater than 400 degrees Fahrenheit (COC)

Coolube 2210/2210EP will not oxidize or polymerize, i.e. become sticky or build up residue.

Coolube 2210/2210EP will not stain aluminum, steel or bar stock.

It will not normally stain during aluminum heat treating, although testing is recommended.

Health, Safety and Environmental:

Coolube 2210/2210EP does not contain any ingredients currently recognized as hazardous by OSHA, IARC or NIP

Coolube 2210/2210EP is formulated from cosmetic grade raw materials and is entirely worker and environmentally safe.

Coolube 2210/2210EP does not contain any petroleum oil and therefore does not interfere with waste water discharge.



Material Safety Data Sheet-Coolube 2210

1. IDENTIFICATION OF THE SUBSTANCE/COMPANY INFORMATION 5-1-04

Commercial Name: Coolube 2210
Chemical Name: Mixed Esters of naturally occurring refined fatty acids
Chemical Family: Mixed Esters
Supplier Name: UNIST, Inc.
Address: 4134 - 36th Street SE
Grand Rapids, MI 49512
Phone no: (800) 253-5462 alternatively (616) 949-0853
Fax no: (616) 949-9503

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substance or Composition: Composition based on natural esters

Health hazardous components: None

Substances required to be listed without contributing to the classification of the composition:

<u>Hazardous components:</u>	<u>Wt %:</u>	<u>Classification, risk phrase:</u>
None	-	-

3. HAZARDS IDENTIFICATION

Health: Under intended use, the product is considered as non-toxic and safe.

Skin: Contact not expected to cause serious irritation.

Eyes: Contact not expected to cause serious irritation.

Ingesting: No evidence of adverse effects from available information

Inhalation: Vegetable oil mists are classified as "nuisance particulates" by the American Conference of Governmental Industrial Hygienists (no health effects reported)

Environment: Avoid releases to the environment.
Experiments made on this and similar products indicate that the product can be considered a low danger to the environment. However, regulations forbid the disposal of lubricants in the environment without special permit.

Physical-chemical hazards: No particular risk of ignition or explosion.

Specific risks: None

The product is considered not hazardous according to the EU Dangerous Substances/Preparations Directives classification scheme (67/548/EEG, last amended by EU Directive 1999/45/EG).

4. FIRST AID MEASURES

Inhalation: Remove to fresh air.

Skin contact: Wash with detergent and water.

Eye splashes: Flush with generous amounts of temperate water for a minimum of 15 minutes. Seek medical help if the problems remain.

Ingestion: Drink water or milk. Do not induce vomiting.

Trade name: Unist Coolube 2210

Date: 5-1-2004

5. FIRE-FIGHTING MEASURES

Extinguishing media

- recommended:** CO₂, dry powder, foam.
not recommended: Water in a jet.
-

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions:** None necessary.
Environment protection: Avoid pollution of sewers and water.
Cleaning means: Removal with inert absorbent or sand.
-

7. HANDLING AND STORAGE

Handling

- Personal protection:** Avoid prolonged and repeated contact with skin. Remove soaked clothes.

Storage

- Recommended conditions:** Storage temperature +5 to +40 °C. Store in closed container, preferably as delivered. Storage stability is at least 12 months.
-

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Technical measures:** Exposure should be minimized preferably with technical measures rather than personal protective equipment.

Personal protective equipment

- Respiratory protection:** Not necessary in normal use.
Hand protection: Impermeable gloves recommended (e.g. PVC or rubber gloves).
Eye protection: Safety goggles recommended.
Others: Not necessary.
-

9. PHYSICAL AND CHEMICAL PROPERTIES

- Physical state:** Low viscous oil
Viscosity (40°C): 10 mm²/s (cSt)
Color: Yellowish fluid
Odor: Vegetable oil related
pH value: Not applicable
Flash point (Open Cup): >200 °C, >400F(COC)
Pourability: -12 to -20 °C
Auto ignition temperature: Not applicable
Explosion range: Not applicable
Vapour pressure: Negligible under normal conditions
Density (20°C): Approx. 890 kg/m³
Solubility in water: Dispersible
Solubility in organic solvents: Soluble
-

10. STABILITY AND REACTIVITY

- Stability:** Stable product under ordinary conditions.
Hazardous reactions: None known.
Conditions to be avoided: Elevated temperatures (>>100°C), acids and strong oxidizing agents.
Hazardous decomposition products: Thermal decomposition (>>200°C) may give flammable and toxic gases such as hydrogen sulphide, sulphur oxides and carbon oxides may be formed.
-

11. TOXICOLOGICAL INFORMATION

- Trade name:** Unist Coolube 2210
Date: 5-1-2004

Acute oral toxicity (OECD 401): LD₅₀ rat >2000 mg/kg, i.e. not toxic

Skin irritation (OECD 404):Not tested.

12. ECOLOGICAL INFORMATION

Biodegradability: The product is **readily biodegradable** according to CEC L-33-A-93 (>80 % in 21 days).

13. DISPOSAL CONSIDERATIONS

Used product: As per existing regulations.

Used packaging: As per existing regulations.

14. TRANSPORT INFORMATION

The product is not classified as dangerous goods.

15. REGULATORY INFORMATION

Symbols: None

Risk phrases: None

Safety phrases: None

No labelling required according to EU Regulations.

Superfund Ammendments and Reauthorization At of 1986(SARA) Title III requires submission of annual reports of toxic chemicals that appear in 40 CFR 372(for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material. Components present in the product at a level which could require reporting under the statute are:
None

16. OTHER INFORMATION

Coolube 2210 is a neat metalworking oil with superior lubricating properties. The product is based on vegetable oils and natural esters and should be used undiluted in, for example, minimal lubrication applicators.

This product (or components, if a mixture) has not been found to be a carcinogen or potential carcinogen by IARC; is not listed in the NTP Third Annual Report; nor is it regulated by OSHA as a carcinogen.

The information presented herein has been compiled from sources considered by the company, in good faith, to be dependable and is accurate and reliable to the best of our knowledge and belief. However, the company cannot make any warranty or representation respecting the accuracy or completeness of the data and assumes no responsibility for any liability or damages relating thereto or for advising you regarding the protection of your employees, customers, or others. Users should make their own tests to determine the applicability or such information or suitability of any products for specific use.

HMIS Rating (USA):

Health:	0
Flammability:	1
Physical Hazard:	0

0=Minimal, 1= Slight, 2=Moderate,

3= Serious, 4=Severe

*=Chronic Health Hazard

Trade name: Unist Coolube 2210

Date: 5-1-2004