BOELUBE®

A BOEING DEVELOPED LUBRICANT

BOELUBE LIQUID

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BOELUBE 切削液
由波音管理公司的授权许可下生产，BOELUBE是波音公司所拥有的商标之一。凭借波音飞机的制造工艺要求和润滑经验发展而来的系列润滑剂

The Orelube Corporation holds an exclusive worldwide license from Boeing Management Company to manufacture and market the **BOELUBE®** series of lubricants.

Orelube公司从波音管理公司获得全球独家许可，生产和销售BOELUBE系列润滑剂。

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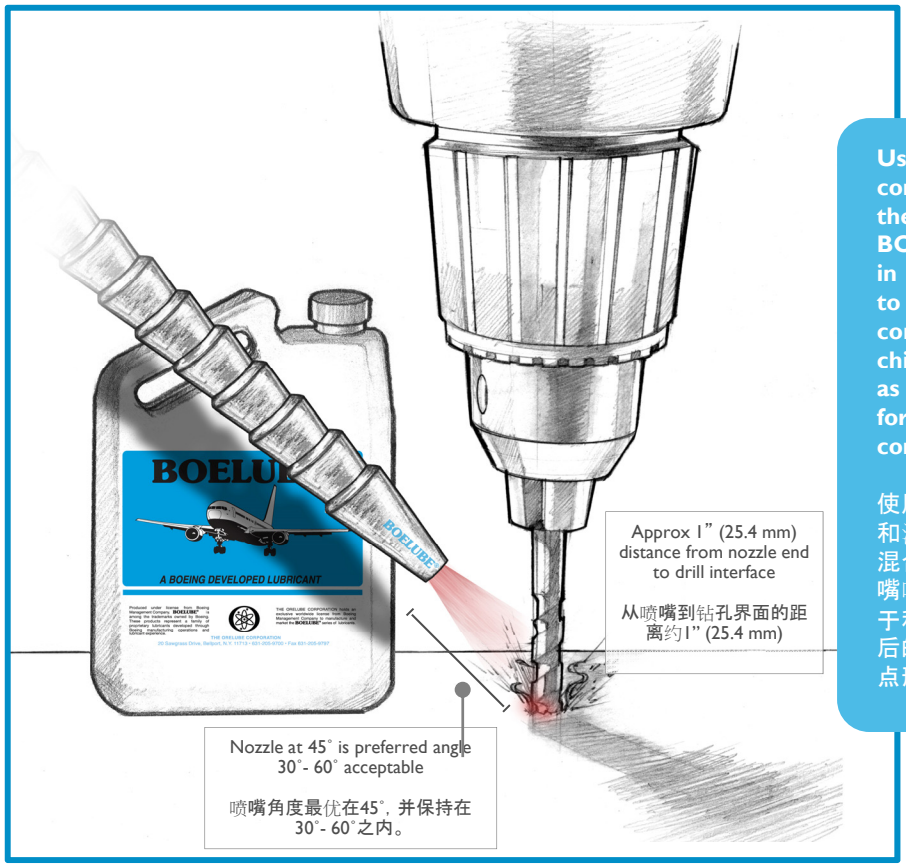
In the near dry machining process, **BOELUBE®** Liquid can be delivered as fine droplets or spray through one or more nozzles positioned accordingly around the cutting tool. Delivering the **BOELUBE®** Liquid as fine droplets to the cutting edge is necessary in order to reduce friction between the chip, tool, and workpiece, and prevent chips from adhering to the tool cutting edge.

在干式机加工中，BOELUBE®切削液可以通过一个或多个喷嘴以滴液或喷射的形式被输送到在切削刀具上。使用被雾化的BOELUBE®切削液,是为了减少金属屑，工具，工件之间的摩擦以及防止金属屑在刀刃上粘结。

The near dry machining processes using **BOELUBE®** requires continual reapplication of lubricant to the tool cutting edge and wear surfaces. This can be accomplished externally on shallow drilling, reaming and tapping operations, on milling cutters, and on band and circular saws.

在干式加工的过程中需要BOELUBE®切削液连断地润滑刀具和的磨损表面。BOELUBE®切削液在钻，铰孔和攻丝，铣削，圆锯等加工中有极优异的表现。



Using a coaxial supply of compressed air and lubricant to the nozzle, the nozzle directs BOELUBE® lubricant droplets in the compressed air directly to the cutting edge. The compressed air will help move chips from the tool cutting edge as the fine lubricant droplets form a thin film at the point of contact to reduce friction.

使用一个中央供应系统将压缩空气和润滑剂输送到喷嘴，与压缩空气混合后的BOELUBE®润滑液通过喷嘴喷射在刀刃口。压缩空气将有助于移除切削刀具上的金属屑。混合后的油雾作为优良的润滑剂在接触点形成油膜，以减少摩擦，

In near dry machining the goal is high efficiency, which is achieved as a result of using a minimal quantity of lubricant. Typical **BOELUBE®** Liquid usage is about 1 oz (30 ml) per hour of machining time, which is best determined by the particular machining process and workpiece composition. Because minimal quantities are used and consumed for the most part in the machining process, **BOELUBE®** Liquid produces near dry workpieces and chips with little or no clean-up or related costs and no disposal costs.

使用微量润滑的干式加工可以极大的提高加工效率，，典型的BOELUBE®切削液使用方法是每1加工小时使用约1盎司(30毫升)这取决于特定的加工工艺和工件的成份。因为微量使用和加工过程中的大部分消耗，BOELUBE®切削液干式加工中产生极少的金属屑，并且很少或没有清理成本，也没有废弃物处理成本

Historically, the metalworking industry has used metalworking fluids by flood application in machining operations. But because the costs associated with use, management, and disposal of flood coolants has risen over the years, in part due to increasing federal, state, and local regulations aimed at worker safety and fluid disposal, there has been a growing trend to utilize methods requiring less metalworking fluid to reduce cost, protect the environment, and improve and protect worker health, without sacrificing productivity and quality.

从历史上看，金属加工业一直使用金属加工液应用于加工。但由于金属加工液的使用，管理和处理多年来成本不断上升。出于保障工人的人身安全和安全废弃处理的目的，根据部分增加的联邦，州和地方法规，在保证生产效率和质量的前提下，使用尽可能少的金属加工液以降低成本，保护和改善工人健康的方法以成为趋势

A metalworking lubricant should impart sufficient lubricity between the tool and the workpiece to cause a significant reduction in friction to occur. **BOELUBE®** is a technologically advanced lubricant that significantly reduces friction (one of the major elements in generating heat during the material removal process).

在刀具和工件间金属加工润滑剂应充分起到润滑作用，以显著降低摩擦发生。BOELUBE拥有先进的技术，可大幅度的减少摩擦（在材料加工中一个主要产生热量的原因）

BOELUBE® Liquid can replace flood type metalworking lubricant in machining operations – being applied by positive displacement lubricant applicator in precise amounts to reduce friction at the interface of the tool cutting edge and workpiece. The reduction of friction at these surfaces minimizes heat generation and concurrent chip weld. Tools retain their cutting edge longer, leading to closer tolerances and prime chip yield.

BOELUBE® 切削液可以代替传统的金属加工液-通常被放置在容积式的供油系统中以减少刀具和工件的摩擦。摩擦减少，最大程度的减少了产生的热量和金属屑的焊接可能。 延长刀刃的使用，从而获得最小的公差以及提供成品率。

Near dry machining can be described as a process by which a minimum quantity of lubricant mixed with air is continuously applied to the tool/workpiece interface during the machining operation. The application of near dry machining lubricants, such as **BOELUBE®,** which for the most part are consumed in the machining process, yield desirable economic, employee, and environmental benefits.

干式加工可以被描述为将最少量的润滑剂与空气混合，在加工中不断喷射到刀具/工件表面的过程。干式加工润滑剂，例如BOELUBE®，在金属加工中的应用，由此可产生理想的经济，雇员和环境效益。

On a comparative basis, near dry machining can yield longer tool life than machining with flood coolant. The lubricity of **BOELUBE®** that is applied in small quantities is greater than that of high volume, water based flood coolant. Chip removal can be enhanced because a chip saturated in coolant can acquire both added weight and adhesion that make it more difficult to move away. Cleanliness is a major benefit of near dry machining as greatly reduced use of cutting fluid results in both cleaner machines and shops.

在比较的基础上，使用微量润滑的刀具比使用金属加工液的刀具寿命长。使用少量BOELUBE®则可获得极佳的润滑效果。水基金属加工液能去除金属屑，是因为加工液和金属屑接触，从而增加了彼此的重量，但因此而产生的粘性也增加了金属屑的去除难度。清洁是干式润滑的主要优点，能极大的减少切削液的使用以降低成本。

BOELUBE® LUBRICANTS FOR NEAR DRY MACHINING
用于干式加工的润滑油BOELUBE®

One of the earlier uses of near dry machining was in aircraft manufacturing. Freon® gas was used in three distinct areas of the riveting process – drilling, rivet insertion, and rivet-head milling. Because of the undesirable effects of Freon® gas on the ozone layer, Boeing manufacturing research and development engineers introduced an alternative method using **BOELUBE®** lubricant compositions to efficiently lubricate and cool tools by preventing heat buildup, while greatly reducing the reworking after drilling that had been necessary with Freon® because of exit burrs, oversized holes, and a rough finish on the inside surface of the holes.

干式加工的早期用途之一是在飞机制造上，氟里昂气体®被用在三个不同区域的铆接工艺——钻孔，铆钉插入和铆钉头铣削。因为氟里昂气体®对臭氧层有不好的影响。波音公司的研发工程师提供了一种替代方法，使用BOELUBE®润滑油有效润滑和冷却工具以防止热量积聚。从而大大减少了钻削过程中因使用氟里昂气体®造成的毛刺，超出公差范围的孔，及粗糙的制孔表面。

BOELUBE® lubricants were used in drilling, reaming, and coldworking of fastener holes in aircraft wing skins; installation of wedge-head lock bolts; lubrication of hand drills; and on machinery that automatically drill rivet holes and install rivets on large sections of airplanes. It was shown that the application of minimal quantities of **BOELUBE®** lubricant could reduce friction, speed production, increase tool life, and improve surface finish and hole quality in a number of machining operations.

BOELUBE®润滑剂被应用于钻孔，铰孔以及飞机机翼蒙皮紧固件的冷加工；锁紧螺栓的安装；手钻的润滑；自动钻取铆钉孔的润滑，大型断面的铆钉安装的润滑。结果表明，只要少量的运用BOELUBE®润滑剂就可减少摩擦，提高生产速度，延长刀具寿命，以及改善表面光洁度和加工孔的质量。

COST SAVINGS
成本的降低

- **Are derived through longer tool life, better surface finish, increased productivity, reduction in lubricant usage and subsequent cleaning and disposal costs, reduced environmental impact, improved housekeeping, and easier chip handling and recycling**
- **延长刀具寿命,更好的表面光洁度,提高生产力,降低润滑油的使用和随后产生的清洁和处理成本,减少对环境的影响，提高工作场所的整洁，更容易金属屑处理和回收利用**

ENVIRONMENTALLY NON-HAZARDOUS / WORKER FRIENDLY
环保，无害/有利于工人健康

- **Manufactured from personal care ingredients, BOELUBE® is non-irritating and biodegradable**
- **Minimal lubricant usage reduces worker exposure**
- **使用个人护理材料制造，BOELUBE®无刺激性，并可通过生物降解。**

MAJOR BENEFITS 第四页

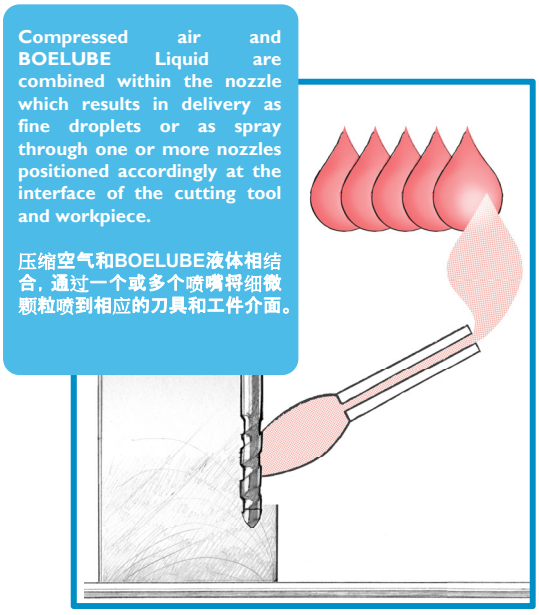
- **BOELUBE®** is non-corrosive, non-flammable, chemically stable and free of halogens, heavy metals, sulfur, phosphorus, silicone, petroleum or paraffin wax.
- 主要优点：BOELUBE®无腐蚀性、不易燃、具有化学稳定性以及不含卤素、重金属、硫、磷、硅、石油或石蜡。
- **BOELUBE®** does not contain any ingredients considered a hazardous substance by OSHA, WHMIS, IARC, NTP and State Regulatory Lists. Refer to Material Safety Data Sheets for additional information.
- BOELUBE®OES不含有任何有害物质，和OSHA,WHMIS,IARC,NTP和国家的管理列表里规定的有害物质。更多的信息，请参阅材料安全数据表。
- **BOELUBE®** will not promote dermatitis, provides a high degree of worker safety, and presents a safe effective method to machine various types of materials without special handling, fluid recycling or typical disposal issues.
- BOELUBE®不会引发皮炎,对使用者无危害，并且可以安全有效的加工各种类型的材料，不需要特别处理，回收或特别的清理。
- **BOELUBE®** can be removed from surfaces using isopropyl alcohol, denatured alcohol, MEK, or aqueous cleaner.
- BOELUBE®可使用异丙醇，工业酒精，MEK或者清洁剂从工件表面洗去。
- **BOELUBE®** has indefinite shelf life.
- BOELUBE®无限期的保质期
- **BOELUBE®** does not need to be removed prior to heat treat.
- BOELUBE®热处理时不需要去除
- **BOELUBE®** is in most cases compatible with paints and sealants (though it is highly recommended that compatibility be determined before use).
- BOELUBE®在大多数情况下，兼容涂料和密封剂(尽管如此，但强烈建议在确认兼容性后再使用)
- **BOELUBE®** provides superior lubrication when machining or forming the increasingly complex range of materials now being used in Aerospace, and a wide range of other manufacturing industries.
- 在航空航天和其他制造领域中日益复杂的材料加工和成型中，BOELUBE®提供杰出的润滑。

MACHINING PROCESSES

Drilling is one of the most widely used machining processes to produce circular holes in metallic and nonmetallic materials.

A drill is a rotary end-cutting tool, with the most common type being the twist drill. The drill, attached to either a stationary machine or hand held, is used to originate or enlarge a hole in a solid material. A drill will have cutting edges and straight or helical grooves or flutes, which allow for movement of chips and cutting fluids. Drill wear is not proportional to the number of holes drilled, but occurs at an accelerated rate.

A reamer is a rotary cutting tool (similar to a drill) with one or more cutting elements, used to enlarge to an exact size and impart a smooth finish to a previously drilled hole. Drilling can be characterized as in a rough form, whereas reaming is the exact form. Reaming is essentially a finishing operation. A reamer can be either straight or tapered. 铰刀是一种旋转刀具(类似于钻)，通常用于扩制精确度和表面光洁度要求高的预制孔。钻孔是粗加工，而铰孔是精加工，铰孔基本上是一个最后的工序，铰刀可以是直线型也可以是有锥度的。



Milling produces machined surfaces by removing metal or other material using a rotating cutter having a certain number of cutting elements or teeth. A characteristic feature of the milling process is that each tooth of the rotating cutter takes a portion of material in the form of small, individual chips.

使用铣刀铣削金属或其他材料加工表面。铣削加工的特点是铣削过程是在每个旋转的齿会粘有细小的金属屑。

BOELUBE® PRODUCT LIST

Order items by Product Code numbers

BOELUBE Solids 70200 White		Quantity
70200-00	14.5 oz. Cartridge （14.5盎司/盒）	12 per Box / 24 per Case（12/盒，24盒/箱）
70200-13	1.6 oz. Push Tube（1.6盎司/管）	50 per Box / 300 per Case（50管/盒，300盒/箱）
70200-14	4 oz. Block（4盎司/块）	30 per Box / 180 per Case（30块/盒，180盒/箱）
70200-18	2 oz. Stick（2盎司/支）	64 per Box / 192 or 384 per Case（64支/盒，192或384盒/箱）
70200-40	3.5 oz. Push Tube（3.5盎司/管）	32 per Box / 192 or 384 per Case（32管/盒，192或384盒/箱）
BOELUBE Pastes 70302 Blue (Soft) / 70305 Pink (Hard) / 70307 Blue (Medium)		**Quantity**
70307-02	2 oz. Jar（2盎司/瓶）	150 per Box（150瓶/箱）
70307-L	4 oz. Jar（4盎司/瓶）	30 per Box / 150 per Case（30瓶/盒，150/箱）
70307-05	35 lb. Pail（35英镑/桶）	1 each（独立包装）
70307-11	5 lb. Tub （5英镑/桶）	1 each / 8 per Case（8桶/箱）
70307-12	12 oz. Jar（12盎司/瓶）	12 per Box / 36 per Case（12瓶/盒，36盒/箱）
70307-07	120 lb. Drum（120英镑/桶）	1 each（独立包装）
70307-09	400 lb. Drum（400英镑/桶）	1 each（独立包装）
BOELUBE Liquids 70104 Red (100A) / 70106 Clear (100F) / 70090 Clear		**Quantity**
70104-04	1 gal. Container（1加仑/桶）	1 each / 6 per Case（6桶/箱）
70104-05	5 gal. Pail（5加仑/桶）	1 each（独立包装）
70104-07	15 gal. Drum（15加仑/桶）	1 each（独立包装）
70104-09	55 gal. Drum（55加仑/桶）	1 each（独立包装）
70104-HHL	Hand Held(手持式)	70 per Box / 140 per Case
70104-L	4 oz. Bottle（4盎司/瓶）	36 or 72 per Box / 150 per Case（36或72瓶/盒，150盒/箱）
70106-L	4 oz. Bottle（4盎司/瓶）	36 or 72 per Box / 150 per Case（36或72瓶/盒，150盒/箱）
70090-L	4 oz. Bottle（4盎司/瓶）	36 or 72 per Box / 150 per Case（36或72瓶/盒，150盒/箱）
BOELUBE Water-Soluble Fluid 70105		**Quantity**
70105-04	1 gal. Container（1加仑/桶）	6 per Case（6桶/箱）
70105-05	5 gal. Pail（5加仑/桶）	1 each（独立包装）
70105-07	15 gal. Drum（15加仑/桶）	1 each（独立包装）
70105-09	55 gal. Drum（55加仑/桶）	1 each（独立包装）

5 Gallon Pail (18.9 liter) | 12 oz. Jar (340 grams) | 1.6 oz. Push Tube (45 grams) | 14.5 oz. Push Tube (411 grams) | 4 oz. Bottle (113 ml) | 1 Gallon (3.8 liter) | 4 oz. Block (113 grams) | 2 oz. Stick (57 grams)