



MEDICAL DEVICE & EQUIPMENT LUBRICATION

Innovative solutions, from Damping Compounds to Antifriction Coatings,
for a wide range of applications from Electrical Connectors to Optics,
Robotics, and Drug Delivery.





Lubricants for Medical Applications



Innovations in Medical Equipment

When carefully selected, lubricants do much more than reduce friction and wear-rate. They can broaden a product's operating temperature range, reduce unwanted noise, control motion, improve touch-sensitivity and user perception, and limit design or production costs by reducing the need for extremely tight dimensional tolerances. In short, lubricants can add value to breakthrough medical technology.

Today in the Medical device and equipment industry, the lubricant is no longer considered an 'add-on' near the end of the design cycle, but a critical design component. Without it, performance — perhaps even a medical procedure, could be compromised.

Nye, now ISO 13485 certified, is your partner for tribological solutions. Nye offers custom-engineered lubricants, ultrafiltration, technical consultation, specialty packaging and cutting-edge testing capabilities in order to meet your product development needs.

The following is a partial list of applications where Nye lubricants are employed in the Medical and Dental industries.

Antifriction Coating Applications

Nye is the exclusive supplier of LIP Antifriction Coatings in the Americas. These are water-based liquid or gel dispersions that can be applied by brush, spray or felt-tip applicator to form very thin, nearly invisible, flexible dry films that greatly reduce friction between parts, especially those formed from plastics.

LIP Products	Type	Temp Range (°C)	Characteristics
AC 612/21	Water-based	-40 to 125 (dried)	<i>Semi-continuous, non-flaking dry-film lubricant</i>
AC F-27	Water-based	-20 to 125 (dried)	<i>Continuous, hard coating with good adhesion to plastic, even when handled or silicone-treated</i>

Damping Grease Applications

In medical equipment, Damping Compounds (greases or gels) can smooth operation, eliminate noise, and reduce the impact of environmental factors. These products provide appropriate viscous drag on parts while moving. This stress resistance slows motion and minimizes free-motion problems such as backlash, stick-slip, or coasting.

To achieve desired performance, engineers can select from various grease consistencies and viscosities — a light damping grease for an instrument slide or a heavier damping grease for a microscope knob, for example.

A special class of medical applications involves the development of disposable and reusable devices such as pumps, or hand-held injectors or inhalers, for drug and implant delivery. These devices rely on Nye Damping Compounds to lubricate parts, absorb shock, control dose delivery rate, and ensure complete dose delivery while optimizing the feel and sound of the device. Result? Enhancement of both quality and the user experience, leading to higher patient compliance.

To help Medical industry customers select the right product, Nye is developing the NyeMed® 7300 Series of damping products based on diverse material classes.

These products share important characteristics: carefully controlled flow properties; low oil separation, and good compatibility with plastics. These can serve as a starting point for custom-design of experimental formulations for specific customer applications.

Nye has access to a broad range of formulation technologies, and collaborates with designers and their partners in complete confidence to develop solutions.

Dental Handpiece Lubricants

For high speed and precision bearings in dental handpiece equipment, Nye offers DHL 400 and 600. These oils, tested to 150°C, are specified by OEMs and sold under private labeling to dental practices. These NSF H-1 (Food) registered products are described in our Dental Handpiece Lubricants Overview.

Food-Grade Applications

Nye offers an extensive line of nontoxic, odorless, colorless and tasteless synthetic lubricants, which have been approved and registered by NSF International for use in and around food processing areas. They meet the Nonfood Compound H-1 guidelines for incidental food contact.

Engineered Tribological Solutions for your application

Electrical Connectors and Switches

Medical device designs include an ever increasing number of microelectronics requiring an increasing number of connections. The medical environment can be harsh due to exposure to sterilizing conditions, dust, reagents, and corrosive substances. Electrical connectors and switches greatly benefit from a lubricant for protection against those environmental conditions. Nye offers a broad range of lubricants for electrical contacts and connectors in medical devices. Lubricants reduce friction, ease mating, and prevent fretting corrosion.

For sliding switch contacts in medical devices, lubricants reduce friction and offer protection from a number of potential problems by preventing wear and the accumulation of wear debris. Nye offers several families of switch lubricants: general purpose, lubricants for arcing contacts, lubricants for switch gears, and non-burning switch lubricants. [A partial list:](#)

Nye Products	Type	Temperature Range (°C)	Characteristics
NyeTact® 502J-20-UV	PAO	-40 to 120	<i>A 20% dispersion of a synthetic hydrocarbon lubricant in an isoparaffinic solvent intended for electrical connectors. UV tracer</i>
Rheolube® 731	Polyglycol	-30 to 100	<i>Intended for arcing and non-arcing switch mechanisms; fortified with a novel additive in order to reduce contact resistance by scavenging surface oxides</i>
NyoGel® 760G	PAO	-40 to 125	<i>Protection of electrical contacts in connectors, good water resistance, UV tracer, copper deactivator, good plastic compatibility</i>
UniFlor™ 8917	PFPE	-70 to 225	<i>Intended for electrical connectors that might be exposed to harsh environment or high temperature conditions; excellent insertion force reduction</i>

Optics in Medical Equipment

In Medical device applications, Nye's optical coupling materials are used in laser treatment systems, blood glucometry and other applications where light absorption or sensitivity is measured.

Nye's optical gels and fluids are designed to serve as a "bridge" for light signals. When applied between two solid materials, such as transparent plastics and glasses, they minimize internal reflection of light by matching the refractive index of the mating materials, thereby optimizing light transmission.

Also known as "index-matching" gels and fluids, these optical couplants offer other advantages. Unlike optical epoxies, Nye's optical gels allow pliable mechanical connections between rigid parts. They are viscoelastic and can absorb the differential thermal expansion of precision optical parts without inducing excessive stresses or delamination.

Nye Products	Type	Refractive Index	Characteristics
SmartGel OC-431A-LVP	Thixotropic gel	1.46	<i>Ready-to-use, non-migrating, viscoelastic material with a high apparent viscosity</i>
SmartGel OCF-463	Optical fluid	1.63	<i>Clear optical fluid with high refractive index</i>

Nye's optical gels and fluids are clear, non-yellowing, and unaffected by sunlight (UV) exposure under normal conditions of use. They have extremely low outgassing and volatility characteristics, and are free from light-absorbing microscopic particulates. Formulated with chemically stable, non-toxic, wide-temperature synthetic materials, Nye's optical products are designed for reliability and long service life.

Robotics in Medical Equipment

Nye offers a wide range of **bearing** lubrication solutions, from impregnating oils for sintered bearings to ultrafiltered greases for rolling element bearings. The grease provides the elastohydrodynamic lubricating film needed to reduce friction and wear. Greases can also serve as effective seals to protect bearings from contaminants and moisture.

Utilizing various synthetic base oils and gellants, Nye's lubricants not only minimize friction in **gear motors and gear boxes** but can inhibit wear and corrosion, dampen noise and control free motion. Gear lubricants meet broad temperature requirements without oxidizing or evaporating. They can provide manufacturers of today and tomorrow's medical equipment with an "edge" that will increase the performance and life of their products.

Sliding parts in medical applications require a lubricant able to minimize friction; inhibit wear, rust, and corrosion; stay in place; enhance lubricity; dampen noise; control free motion; meet broad temperature requirements without oxidizing or evaporating — or any combination of these qualities.

Operating load, speed, accuracy, environment, and power requirements all play major roles in the design decision of a linear positioning device. Whether the engineer selects **a lead screw, a ball screw, or even a precision ground ball screw**, the lubricant should also be carefully considered. A properly selected lubricant minimizes friction, reduces torque, increases the screw's efficiency, and extends performance life.

Following is a **partial list** of Nye lubricants that have a proven record of success for lubricating and enhancing performance of robotics in the medical equipment industry.

Nye Products	Type	Temperature Range (°C)	Characteristics
Rheolube® 363HT	PAO	-50 to 125	<i>Rust inhibited light viscosity grease intended for bearings, sliding surfaces, gear trains, and switch gear</i>
Rheolube® 368AX-1	PAO	-20 to 125	<i>Rust inhibited, tackifier, EP fortified, intended for highly loaded gears and lead screws</i>
Rheotemp™ 500	Ester	-54 to 175	<i>Intended for high speed ball bearings</i>
NyeClean® 5011A	PAO	-54 to 125	<i>A PTFE thickened grease intended for ball screws and linear guides in clean room environment; benefits include very low particle generation and excellent wear resistance</i>
NyoGel® 741E	Silicone	-50 to 200	<i>Heavy viscosity grease intended for instruments operating over a wide temperature range</i>
NyoGel® 744F-MS	PAO	-40 to 125	<i>EP and PTFE fortified, rust inhibited, good water resistance, intended for slides and rails</i>
UniFlor™ 8771	PFPE	-50 to 250	<i>Wide temperature bearings in extreme environments</i>
UniFlor™ 8981	PFPE	-65 to 250	<i>Wide temperature capability, excellent plastic and elastomer compatibility, resistance to aggressive chemicals, intended for gear motors and gear boxes</i>

Additional oils, greases and dispersions are available to meet a wide range of application requirements in the medical industry. For technical specifications, evaluation samples, questions about any Nye products, or to discuss a lubricant custom-designed for your application — contact a Nye engineer.

Nye Lubricants, Inc.

12 Howland Road
Fairhaven, MA 02719 USA

Ph: +1.508.996.6721

Email: medical@nyelubricants.com



ISO 9001:2008
ISO 13485:2003
ISO 14001:2004
ISO/TS-16949:2009