The use of silver for its medical and therapeutic benefits dates back thousands of years. In fact, the Romans were the first to publish and document the “magical healing” powers of silver when used to cover wounds. Further, Cyrus the Great, in the 5th century BC, would only let his troops go to war if they carried water in silver vessels—something he knew would keep the water supply clean and safe. It is somewhat humbling to know that a Persian King touted the benefits of the active ingredient used in X-STATIC®.

Roman intuition proved to be correct. Modern Western medicine recognizes silver as the most effective antimicrobial agent, natural or otherwise. At the turn of the century, silver was actually considered the first antibiotic—silver foil was used as a wound dressing. Today, silver is used for its broad-spectrum antimicrobial properties in healthcare products ranging from bandages to burn care treatments to catheters—almost any product where infection control is critical. Silver is also widely used for industrial applications, most notably in drinking water filters and swimming pool filtration systems.

**X-STATIC® - The Silver Fiber™**


Made with 99.9% pure silver, X-STATIC® enhances products with permanent anti-odor and antimicrobial performance. It naturally inhibits the growth of bacteria in apparel and textiles, keeping odors in check and gear smelling fresher. X-STATIC® also has natural temperature regulating properties, reflecting heat back to keep you warm and evaporating moisture faster to keep you cool.

**Product Benefits**

- Antimicrobial - Inhibits the growth of odor-causing bacteria in the product
- Eliminates Odor in the product
- Regulates Temperature
- Minimizes Static
- Permanent Performance

Any public health claims related to X-STATIC® products are expressly limited to products regulated by the FDA.

EPA regulated products containing X-STATIC® solely protect the finished product itself from microbial growth.
The antimicrobial performance of X-STATIC® has been validated by prestigious institutions throughout the world. In addition to independent laboratory and field tests, X-STATIC® was the focus of numerous medical abstracts published over the past several years. A synopsis of these studies has been included in this document—all show that X-STATIC® provides unparalleled antibacterial performance. When you compare X-STATIC® to other antimicrobial products, there are several distinct performance advantages:

- **Catalysts:** The hotter and wetter the environment, the more effective X-STATIC® becomes. This is perfect, because bacteria are more prevalent in these environments.

- **Permanent:** X-STATIC® is not a surface treatment. Silver is irreversibly bound to a polymer so it becomes a physical part of the fiber. X-STATIC® is permanent and performance does not diminish over time. In fact, X-STATIC® has been tested for more than 250 washes with virtually no reduction in performance.

- **99.9% Pure Silver:** X-STATIC® uses pure metallic silver as the active ingredient. Not nanotechnology or a complex chemical formula, just silver.

- **100% Surface Area:** The entire surface area of X-STATIC® fiber is permanently coated with pure silver. Surface area = performance.

- **Flexible:** X-STATIC® delivers silver on flexible substrates, including fibers, fabrics and foam.

**Anti-odor Performance**

Antimicrobial is not always synonymous with anti-odor. X-STATIC® offers both antimicrobial and anti-odor performance.
ANTI-ODOR

bacteria

ammonia
denatured proteins

ODOR

regulates temperature

bacteria

X-STATIC WORKING
odor
silver ions
The biophysics of clothing has become an area of significant interest in recent years. It represents the marriage of physiology, physics, textile science and clothing design. The specific area of thermal performance has been the primary focus of this burgeoning area of study. Given the proper materials and constructions, it is now possible to use the existing energy of the body and the environment to actively regulate temperature through heat transfer. Because of the inherent properties of silver, X-STATIC® is perfectly suited to this task.

Body heat is transferred by four basic mechanisms:

1. **Radiation**: the primary heat transfer mechanism in cold weather, contributing to approximately 90% of body heat loss. (In warm weather, heat loss due to radiation will be very low or none.) In order to increase body temperature in cold weather, it is critical to actively use the radiative energy generated by the body. The most efficient means of using this energy is to reflect it back to its source and/or to store it.

2. **Conduction**: the primary heat transfer mechanism in warm weather (because radiation contributes to little or no heat transfer). In order to transfer heat and reduce body temperature, it is necessary to actively move, or conduct, heat from the skin to the outside environment.

3. **Evaporation**: the change of a liquid into a gas. When the body can’t dissipate enough heat through conduction or convection, it will use evaporation, the result of which is sweat. Evaporation is active in warm and cold weather, depending on activity levels. In order to remain comfortable, the moisture generated by the body must be transported efficiently away from the skin.

4. **Convection**: the movement of heat between a solid and a liquid or gas. Convection is noticeable in cold and warm weather. For example, wind will cool your skin, making you more comfortable in hot weather and less comfortable in cold weather. Convective heat transfer can be discouraged or encouraged by using or not using insulation and wind barriers.
**X-STATIC®—The Cold Weather Solution**

Any cold weather solution must address radiation, evaporation and convection. X-STATIC® addresses these heat transfer mechanisms using the following principles:

**Reflectivity:** Silver has an Infrared (IR) Reflectivity rating of greater than 95%, the highest of any element. In other words, 95% of the radiative energy that contacts silver will be reflected back to its source. As a result, X-STATIC® minimizes radiative heat loss by actively reflecting the body’s energy back to the skin. X-STATIC® apparel designed for cold weather will therefore be significantly warmer than apparel without X-STATIC®.

**Emissivity:** Silver has one of the lowest emissivity ratings of any element, which means that it radiates thermal energy very slowly. Silver will remain warm for a very long period of time (as opposed to other elements, which would remain hot for a very short period of time). With X-STATIC® apparel designed for cold weather, any heat not reflected back to the body by the fiber will be absorbed and stored in the fiber for an extended period of time. As a result, the X-STATIC® product will keep the wearer warmer longer than a passive fiber system.

**Moisture Transfer:** X-STATIC® enhances the natural movement of moisture through hydrophobic materials the same way the body does—by using evaporation. When X-STATIC® is placed in a moist environment with another hydrophobic material, the conductivity of X-STATIC® will act to accelerate the evaporation of moisture. As moisture is evaporated, a correspondingly greater amount of moisture can be drawn through the hydrophobic yarn system for subsequent evaporation. As a result, X-STATIC® apparel will transport moisture away from the body faster, allowing for a more comfortable environment and less potential for convective heat loss.

**X-STATIC®—The Warm Weather Solution**

As the temperature warms, radiation is no longer the primary cause of heat transfer. Any warm weather solution must address conduction, evaporation and convection. X-STATIC® addresses conduction and evaporation (convection must be built into the fabric design) using the following principles:

**Thermal Conductivity:** Silver is the most thermally conductive element on the planet. X-STATIC®, therefore, works to quickly and evenly distribute and transfer heat throughout a product. In warm weather, when conduction is the primary means of heat transfer, X-STATIC® enhances the body’s natural actions by accelerating the conduction of heat from the skin (a fabric without X-STATIC® would simply be a barrier to heat conduction). Much like a silver spoon in a cup of hot tea, X-STATIC® will conduct the heat from the skin to the ambient air, thereby cooling the body.

**Moisture Transfer:** As described above, X-STATIC® accelerates the movement of moisture through evaporation. As a result, X-STATIC® apparel allows for increased comfort in warm weather by minimizing moisture contact with the skin.
Everyone has experienced the effects of static electricity. Receiving a static shock or feeling static cling is a simple annoyance for most of us; however, it can be extremely hazardous in many industrial settings. X-STATIC® is known worldwide as the premier anti-static yarn for consumer and industrial applications.

Static electricity is a phenomenon called static discharge, or triboelectric charging. Walking across your carpet in regular socks, which causes two non-conductive materials to rub together, can create charges in excess of 50,000 volts. Dry conditions, such as those that exist during the winter months, and synthetic materials amplify the problem. The only way to minimize or eliminate the problem is to dissipate the electrical charges through a conductive material.

Silver has the highest electrical conductivity rating of any element. Therefore, X-STATIC®, which is coated with pure silver, conducts electricity readily. X-STATIC® in apparel or socks will instantly dissipate triboelectric charges, resulting in static-free, comfortable products.
Pennsylvania State University, ©1987
Silver-Coated Nylon Fiber as an Antibacterial Agent
Antimicrobial Agents and Chemotherapy
American Society of Microbiology
This published and peer reviewed study definitively proved the antibacterial properties of X-STATIC®. This analysis also verified that an extract derived from the fiber was bactericidal. This attribute explains the disinfecting quality witnessed by the wearing of hosiery containing X-STATIC®. Of particular interest, the efficacy of X-STATIC® was demonstrated to be more bactericidal than silver nitrate.

Cornell University, ©1987
Newly Made Antibacterial Braided Sutures: In Vitro and In Vivo Biocompatibility Study
Journal of Biomedical Materials Research
This published and peer reviewed study demonstrates antibacterial properties toward new and established bacterial colonies. Additionally, the biocompatibility data suggested that the X-STATIC® fiber implanted into gluteal muscle caused less of an inflammatory reaction than that of ordinary nylon. This study reaffirms the intrinsic safety of X-STATIC®.

United States Army Institute of Surgical Research, ©1995
Enhanced Survival of Autoepidermal-Allodermal Composite Grafts
The Journal of Trauma, Injury, Infection and Critical Care
“We have previously described antimicrobial effects and enhanced wound healing in experimental burns and grafts treated with silver/nylon dressings, either with or without application of direct current. The results show as previously described for primary grafts, that silver/nylon with direct current shortens the time of reepithelization when compared to silver/nylon without DC or VG controls”.

NAMSA
Independent Third Party Testing
United States
NAMSA is one of the most well respected independent laboratories in the United States. It is both EPA and FDA certified. These numerous tests verify the exceptional performance of X-STATIC®. Of note in these studies is that they indicate that X-STATIC® is a broad-spectrum antibacterial agent. NAMSA testing also indicates the exceptional performance of X-STATIC® as an anti-fungal; specifically against T. Mengatrophyes the fungus which causes Athlete’s Foot.

Dermatology, 2003
Silver-Coated Textiles Reduce Staphylococcus aureus Colonization in Patients with Atopic Eczema

Current Medical Research and Opinion
Efficacy and Safety of Silver Textile in the Treatment of Atopic Dermatitis (AD)

Wounds 2006
Reducing Bacterial Bioburden in Infected Wounds with Vacuum Assisted Closure and a New Silver Dressing - A Pilot Study

Wounds 2006
The Use of Silver-Impregnated Packing Strips in the Treatment of Osteomyelitis: A Case Report
Is X-STATIC® safe for human contact?

- Third party studies have been conducted based on the requirements of the International Organization for Standardization 10993: Biological Evaluation of Medical Devices, Part 10: Test for Irritation and Sensitization. The results show no evidence of significant irritation.
- X-STATIC® has earned the Oeko-Tex Standard 100 accreditation, which certifies that it supports human ecology through bio-compatibility and the absence of harmful substances in the manufacturing process.

Is X-STATIC® safe for the environment?

- X-STATIC® is a registered antimicrobial agent with the U.S. Environmental Protection Agency.
- X-STATIC® does not release a significant amount of silver into the environment. Test results show that washing an average X-STATIC® garment in a home washing machine will release less silver ions than a single sterling silver teaspoon in a dishwasher.
- Up to 50% of the silver used in the manufacturing process of X-STATIC® is recycled.
- It is possible to close the environmental loop when fabrics are recycled at the end of their lifecycle to recover the silver content.

How does Noble process waste from its manufacturing operations?

- **Air Waste** - Pennsylvania State DEP has determined that our process air is not hazardous
- **Solid Waste** - We reclaim all waste that contains silver and recycle the silver component. We recycle the plastic, aluminum, laboratory glass and pallets. We track, collect and control all remaining non-silver containing solid waste to send to a local landfill.
- **Water Waste** - Silver-containing water is treated, measured against permit limits and sent to the local sewer authority. Non silver-containing water is pH adjusted, measured against permit limits, and sent to the local sewer authority.

Is the water processing clean and safe for the environment?

- **Water Handling** - Two types of process waters are used to make X-STATIC®, silver containing water and water that does not contain silver. All silver-containing water is isolated, collected and treated to remove the silver before it leaves the facility.
- **Water Filtration and Certification** - The Scranton Sewer Authority (Scranton, PA) permits us to use industry standard treatment processes in order to remove the silver from the wastewater stream. We verify that our water is silver-free by testing composite samples daily using industry standard methods.
- **Silver in the Water Supply** - Noble’s processes do not leach silver into the water supply. TCLP testing (Toxic Characteristic Leaching Procedure) demonstrates that the method used to remove the silver from our process water does not allow silver to leach into the environment. Phase I environmental assessments have been performed to verify that ground samples from our premises do not contain silver. We collect all X-STATIC® product scrap and waste in order to recycle the silver component.
X-STATIC® delivers unmatched performance and comfort, for the life of the product.

99.9% PURE SILVER
CORE FIBER

100% Polyester Fiberfill

90% Polyester Fiberfill

More warmth less weight

99.9% PURE SILVER

Pure silver.
Pure performance.

Core fiber

Antimicrobial

Skin Surface

Eliminates Static

Eliminates Odor

Temperature Regulates

Antimicrobial

99.9% PURE SILVER

Core Fiber

Antimicrobial

X-STATIC® delivers unmatched performance and comfort, for the life of the product.