

# Robotic Protection in Harsh Operating Environments

## Mid-Mountain Materials, Inc.

The robotics industry is looking into a very bright future as new manufacturing technologies have generated excitement about the Fourth Industrial Revolution – Industry 4.0. Technological improvements in robotics, industrial automation, Augmented Reality (AR), the Internet of Things (IoT), Artificial Intelligence (AI) and Digital Lean will boost productivity and efficiency, implying significant economic gains for companies. Robots can assist in manufacturing environments by taking over dangerous, tedious and dirty jobs that are not possible or safe for humans to perform. In addition, robots are becoming more essential as manufacturing companies face very serious labor shortages that will continue in the coming years.

Extreme operating environments can put robotic equipment in jeopardy of failure. As the initial investment for robots and accessories can be very high, there is a definite need for robust protective covers for robotic systems in manufacturing plants. Robot covers can be fabricated as different components including sleeves for robot arms, jackets, and full robot covers. By prohibiting dust, pollutants, corrosive chemicals and blast media from infiltrating a robot, you can reduce maintenance costs and down time, and increase productivity (which improves the bottom line). With protective covers, the ROI for robotics is often improved as the robot can work much longer before maintenance due to damage is required. Robot covers provide tailored protection for motors, displays, wiring and pneumatic elements that could be compromised while the robot is operating. End-of-arm tooling is especially important as the robot arm typically has the greatest exposure to hazards. To extend the life of a robot the covers need to be designed for the type of protection needed within the robot's environment, whether it be blast media, temperature extremes (high or low), splatter, dust, humidity, corrosive chemicals, or other environmental factors. In addition, for a robot cover to perform successfully on a robot with repetitive motion, the cover needs to have a high level of flexural failure resistance, and ease of use. Robot covers that are cumbersome to remove and replace are not ideal in today's fast-paced manufacturing environments. Mid-Mountain is dedicated to protecting robots as they become more common across various industries. ARMATEX® SBN 13-602 ROBOTEX is a fabric we developed to fabricate our THERMOPAK® ROBOT COVERS. Both coating the fabric and fabricating the cover provides a very vertically integrated solution which provides a high level of quality control throughout the manufacturing process.

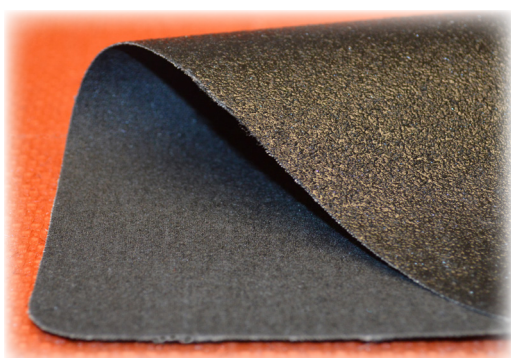


### **ARMATEX® SBN 13-602 ROBOTEX**

Mid-Mountain's ARMATEX® SBN 13-602 ROBOTEX was developed to combine flexibility with high strength and high resistance to extreme conditions for use in industries such as Aluminum, Welding, Steel, Automotive, Aerospace and Petrochemical. A very high strength, aromatic poly-amide woven base fabric is used which has a higher strength than most meta-aramid fibres. The strength of the woven fabric allows for very high flexural failure resistance and has high crystallinity. The coating is a highly specialized, high performance silicone elastomer which can be coated in various colors to designate a robot's function or department of operation. Once coated, the fabric exhibits high tensile properties as well as very high chemical and thermal stability.

ARMATEX® SBN 13-602 ROBOTEX is a very unique, technical protective fabric that can be used in many other industries and applications to improve safety in the workplace.

- Protection from high temperatures, burns, flame, convective and radiant heat (firefighting)
- Electric arc flash discharge (plasma explosion, electric companies)
- Molten metal impacts, forging (foundries)
- Metal sparks (welding)
- Acid environment (petrochemical, gas, refineries, chemical)
- Cut resistant (gloves, glass industry)
- Surface treatment – sand blasting
- Welding gun grippers
- Hose protection
- Machining



#### TECHNICAL SPECIFICATIONS FOR ARMATEX SBN 13-602

Weight, oz/sy • gm/sm, nominal	13 • 441
Thickness, inches • mm, nominal	0.026 • 0.66
Tensile Strength, lbs/in, nominal	100 x 50 (warp x weft)
Elongation, %	90 x 73 (warp x weft)
MOE (Elastic Modulus)	11,454 x 6,917 (warp x weft)

#### THERMOPAK® ROBOT COVERS

For over 45 years Mid-Mountain has been fabricating blankets, curtains, seals and covers as thermal barriers and environmental protection products. Following the development of ARMATEX® SBN 13-602 ROBOTEX, Mid-Mountain fabricated its first robot cover for ALCOA® in Australia. Aluminum smelters are one of the most extreme operating environments a robot can endure, and our THERMOPAK® ROBOT COVER performed exceptionally. Mid-Mountain has the capability to manufacture robot covers to any drawing, and additional reinforcement can be fabricated on the cover for transformational robots that kneel as well as stand. In addition, covers can be made for autonomous mobile robots that are exposed to various conditions throughout a manufacturing plant.

#### PROPERTIES OF THERMOPAK® ROBOT COVERS

- High flexural resistance – the flexibility is virtually unaffected by temperature
- High tensile and tear resistance after thermal exposure
- Abrasion resistant
- Excellent thermal stability
- Excellent high/low temperature performance capability
- Ozone and UV resistant
- Excellent electrical insulating properties
- High thermal conductivity
- Resistant to a wide range of fluids and chemicals
- Weatherproof
- Easy to install and remove for maintenance



Mid-Mountain has continued to work closely in partnership with Plant, Process and Maintenance Engineers, as well as Managers and Supervisors to determine the optimal robot cover solution to protect a company's investment and keep automation initiatives on track. While ARMATEX® SBN 13-602 ROBOTEX provides the highest flexural properties, other coating and fabrics can be used to protect robotics. By studying a robot's movements, the environment they are working in and the chemicals used in the manufacturing process, we can determine which cover design and materials will be best suited for the application. We can also help to determine if a reusable or disposable cover is more appropriate for your application and take into consideration OSHA and/or EPA requirements.

In summary, robots are becoming more popular in manufacturing companies due to the benefits they provide:

- » Robots can perform the repetitive, monotonous and dangerous tasks humans do not want to perform.
- » With Industry 4.0, robots are propelling manufacturing companies into higher tech operations.
- » Automation reduces manufacturing costs, allowing U.S. companies to be more competitive.
- » Robots increase automation uptime.
- » As robots take on more functional tasks, humans can then use their intelligence to monitor the data the robots provide to improve processes.

After making the investment in a robot, it is imperative to take the next step to protect your investment. Robot covers are essential in harsh operating environments, and will make your automation journey much smoother.

Mid-Mountain is an ISO 9001:2015 certified company. We take great pride in our innovation and craftsmanship, and look forward to helping you protect your robot and industrial automation products.



Mid-Mountain Materials, Inc.  
5602 - 2nd Ave South  
PO Box 80266  
Seattle, WA 98108 USA  
(+1) 206.762.7600  
info@mid-mountain.com  
www.mid-mountain.com

ENVIRONMENTAL PROTECTION PRODUCTS  
AND THERMAL BARRIERS For A Green World