Safety

How DuPont Weaves Sustainability into PPE for Machining, Metalworking

James Langford | Jun 29, 2023

Choosing the best protective gear for manufacturing workers and machinists requires considering a variety of factors: job type, potential hazards, flexibility and fit.

And, increasingly, sustainability.

DuPont, one of the leading U.S. producers of personal protective equipment, or PPE, weaves that quality into its lineup with recycling programs for both DuPont™ Tyvek® and Tyvek IsoClean® garments, an initiative that jibes with the company's ***2030 Sustainability Goals program***.

Set three years ago, the Wilmington, Delaware-based company's nine targets include advancing sustainable chemistry in the design of its products.

"We've firmly embedded sustainability into our business strategy to drive long-term growth and to bring value to our stakeholders," Chief Technology and Sustainability Officer Alexa Dembek wrote in DuPont's annual ***sustainability report***, published earlier this year.

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"The world is facing some of the most pressing sustainability challenges of our time—climate change, circularity, natural resource conservation and waste reduction, to name a few—and answers are needed faster than ever before," she added.

DuPont's recycling services for Tyvek® and Tyvek IsoClean® protective garments are available across the continental U.S., subject to restrictions including a requirement to collect at least 3,000 pounds (about 300 cases of Tyvek® coveralls) per site. No items exposed to hazardous materials are accepted.

For every case of 25 Tyvek® coveralls recycled, the company estimates, about 10 pounds of Tyvek® is diverted from the waste stream and reused in products from containers to lumber pallets and park benches.

On an annualized usage basis, "the savings really add up," according to DuPont, which makes safety garments providing a range of protective capabilities, from ProShield—which is flame-resistant and offers shielding from non-hazardous particles and aerosols—to the more advanced Tyvek® and top-of-the-line Tychem®, designed to safeguard wearers from heavy chemical exposure.

Each of the brands is identified with a color-coded badge in the shape of a stop sign: ProShield is gray, Tyvek® is blue and Tychem® is orange.

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The coding system helps employers comply with standards set by the U.S. Occupational Safety and Health Administration, the nation's top workplace safety regulator.

The *agency requires* that businesses provide appropriate PPE to workers whose duties expose them to hazards including flying debris, chemicals and toxic substances, and failure to comply can be costly.

In the year through September 2022, the agency *issued 497 citations* and imposed $1.19 million in penalties for violations.

OSHA rules also make employers responsible for maintaining PPE, training employees to use it correctly and identifying the most appropriate items for each job.

With chemical protective gear, in particular, important considerations in selection include fabric technology, fabric testing and seam construction, DuPont says. Here's a more detailed look at each, according to the company:

Fabric Technologies

Protective clothing today is often made from one of five materials. In descending order of protective capabilities, DuPont says, those are:

- **DuPont™ Tychem®:** Fabrics exclusive to DuPont that protect wearers from a broad range of hazards including heavy chemical exposure.
- **DuPont™ Tyvek®:** Also exclusive to DuPont, Tyvek features high-density polyethylene fibers entangled into a protective material, with no filters or thin films that can wear away and reduce effectiveness, the company says.
- **Microporous films (MPF):** Bi-laminate with a thin microporous layer atop a spunbonded polypropylene nonwoven. The protective barrier is lost when the film layer wears away.
- **Spunbond-meltblown-spunbond (SMS):** Fabrics made with this technology rely on the meltblown polypropylene layer in the middle of the open tri-laminate polypropylene structure to act as the main filter against particles.
- **Spunbond polypropylene (SBPP):** With a highly open structure, this breathable tear-resistant fabric offers limited barrier protection.

Fabric Testing

The two primary categories of tests for protective garments are for penetration, which gauges vulnerability to particles that might get through a pore, hole or other defect; and permeation, which measures movement through the suit on a molecular level, the company says.

The latter method is critical for fabrics used in areas containing hazardous liquids, vapors or gases.

Seam Construction

Seams are key to the protective capabilities of chemical PPE, so determining whether they can stand up to the demands of particular jobs is crucial. Otherwise, a loose thread or gap can allow hazards to penetrate the barrier. Common types of seams, according to DuPont, include:

- **Serged or sewn:** Three threads interlocked around the raw edges of two pieces of fabric for a strong, stress-resistant connection.
- **Bound:** Tightly sewn with a reinforced outer binding to increase the strength of the seam and its barrier against hazards. This method guards against misting of non-hazardous liquids and particle penetration.
- **Taped:** In addition to being sewn together, seams are taped to provide strong protection from chemicals in heavy liquid splashes as well as tough resistance.
- **Double-taped:** Seams are sewn together, then taped on both the inside and outside for a very strong chemical- and stress-resistant connection.

For PPE buyers unsure about which gear is best suited to particular jobs, DuPont offers assistance through its web-based ***SafeSPEC™ tool***.

Available on desktop browsers as well as mobile apps, SafeSPEC™ provides information on the complete range of DuPont PPE garments and accessories, including Tyvek®, Tychem®, Kevlar® and Nomex®.

The tool can analyze up to five chemicals or other hazards simultaneously and allows users to search not only by hazard but by industry or pre-saved scenarios. To shop DuPont products, click ***here***.

How could using recyclable PPE help your business reduce waste? Tell us in the comments below.

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