



Case Study

Engineering Precision in Flex Matt Assembly for Automotive Applications



Project Overview: Acme Mills, a trusted name in textile and materials solutions, successfully partnered with a leading global automotive seat and interior systems manufacturer to produce lightweight Dymetrol Flex Matt Assemblies. Applicable across the automotive seating market, these components are critical for ensuring durability, comfort, and structural integrity in vehicle seating systems.

This project focused on meeting stringent industry specifications, delivering on-time production, and adhering to rigorous quality control standards. These assemblies are intended for use in luxury SUVs, aligning with the client's commitment to high-performance materials in automotive interiors.

Project Specifications

- ⚙️ **Material:** Dymetrol, a lightweight, high-strength elastomeric suspension fabric.
- ⚙️ **Dimensions:** 520.70 mm x 419.10 mm x 209.55 mm.
- ⚙️ **Weight:** 0.104 kg per part.
- ⚙️ **Use Case:** Automotive seat suspension for premium SUVs.
- ⚙️ **Production Start:** December 2023.
- ⚙️ **Expected Lifespan:** 9-year production cycle (2023–2032).



Manufacturing Details

1. MATERIAL PREPARATION:

Material Standards: All incoming Dymetrol fabric rolls underwent certification checks to comply with FMVSS-302 flammability and FAR 25.853 standards.

Cutting: Advanced die-cutting machines (ATOM 2) were used for precise dimensions, ensuring tolerances of ± 3 mm for cut lengths and widths.

2. ASSEMBLY PROCESS:

Sewing Operations: Double-needle walking foot machines (4 mm and 6 mm gauges) were employed to ensure seam accuracy and strength.

Thread and Needle Selection: Ball-point needles marked with "SES" and FP4098 thread were specified to avoid fabric damage and ensure durability.

Positioning and Alignment: T-gauge fixtures verified the placement of retainers and fabric alignment perpendicular to structural components.

3. PACKAGING:

Primary Container: Custom corrugated boxes designed for optimal protection and storage efficiency.

Unit Load Efficiency: 76.32% trailer utilization was achieved using standardized wood pallets and stretch-wrapped unit loads.



Quality Control Steps

To ensure the Dymetrol Flex Matt Assemblies met the highest quality and regulatory standards, Acme Mills leveraged its robust quality control framework, underpinned by relevant certifications and industry best practices.

Certifications Supporting Quality Control

-  **ISO 9001:** Acme Mills operates under an ISO 9001-certified quality management system, ensuring systematic and consistent approaches to process control, continuous improvement, and customer satisfaction.
-  **FMVSS-302 Compliance:** All materials were tested and certified for flammability resistance under FMVSS-302, a critical requirement for automotive interior components.
-  **FAR 25.853 Compliance:** Materials were also certified to meet FAR 25.853 standards, showcasing Acme Mills' capability to meet stringent aerospace-grade flammability requirements.
-  **CQI-23 Molding System Assessment:** Annual audits verified compliance with CQI-23 standards, ensuring that all molded components adhered to robust manufacturing and process control systems.

Incoming Material Inspection:

- Lot certifications verified tensile strength, elongation, and flammability performance.
- Bond strength and dimensional consistency checks were conducted on each shipment.

In-Process Checks:

- Dimensional accuracy of cut pieces confirmed with calibrated yardage counters and templates.
- Regular inspections (first-piece, hourly, and last-piece) ensured seam consistency and compliance with tolerances.
- Operator verification ensured that all labels, including "D" marking for Dymetrol components, adhered to industry and client specifications.

Final Inspection:

- Comprehensive checks verified all parts against dimensional, material, and performance standards.
- Finished good labels and packaging were inspected for compliance with automotive labeling requirements and weight limits to ensure regulatory and client-specific conformity.



Annual Validation and Audits:

- Third-party laboratory testing confirmed ongoing compliance with FMVSS-302 and FAR 25.853 standards.
- Internal and supplier audits, managed through the Plex system, ensured alignment with CQI-23 and other relevant quality frameworks.

By integrating these certifications and quality practices, Acme Mills not only delivered precision-engineered assemblies but also instilled confidence in their ability to meet the exacting standards of the automotive industry.

Project Highlights

- ✓ **Precision and Efficiency:** The project maintained tight tolerances on material dimensions and sewing specifications, ensuring seamless integration into automotive seating systems of all types.
- ✓ **Compliance:** All assemblies passed regulatory requirements, including FMVSS-302 and FAR 25.853 standards.
- ✓ **Operational Excellence:** Continuous monitoring via the Plex system ensured real-time tracking and error prevention at each production stage.
- ✓ **Sustainability:** By optimizing packaging and transport, the project minimized environmental impact, achieving high trailer utilization rates.
- ✓ **Lightweight Material Advantage:** Dymetrol's lightweight nature provides significant advantages across the automotive seating market, from standard models to luxury SUVs. By reducing the weight of seating systems, Dymetrol contributes to improved fuel efficiency, lower emissions, and enhanced vehicle performance. Additionally, its lightweight properties simplify handling and installation, making it an excellent choice for both efficiency-driven production environments and high-performance luxury vehicles.

Acme Mills' ability to capitalize on Dymetrol's versatility and lightweight benefits highlights its expertise in delivering innovative solutions across a wide spectrum of automotive applications.



Acme Mills' collaboration with the automotive manufacturer exemplifies its ability to meet complex manufacturing challenges with precision and reliability. The meticulous attention to material integrity, precision manufacturing, and quality assurance underscores Acme Mills' position as a trusted partner in advanced automotive solutions.

Dymetrol's lightweight and versatile properties make it an exceptional choice for automotive seating across all vehicle classes, offering unique advantages for efficiency and performance in both standard and luxury applications. The project not only achieved technical excellence but also supported broader industry goals of sustainability and innovation. This case study demonstrates how Acme Mills combines cutting-edge material solutions with stringent quality standards to drive success in demanding manufacturing environments.

Contact Acme Mills

Need assistance in maximizing manufacturing efficiencies to ensure quality and optimize costs? Call or email us today and one of our skilled team members will lead the way. (800) 521-8565 ~ info@acmemills.com