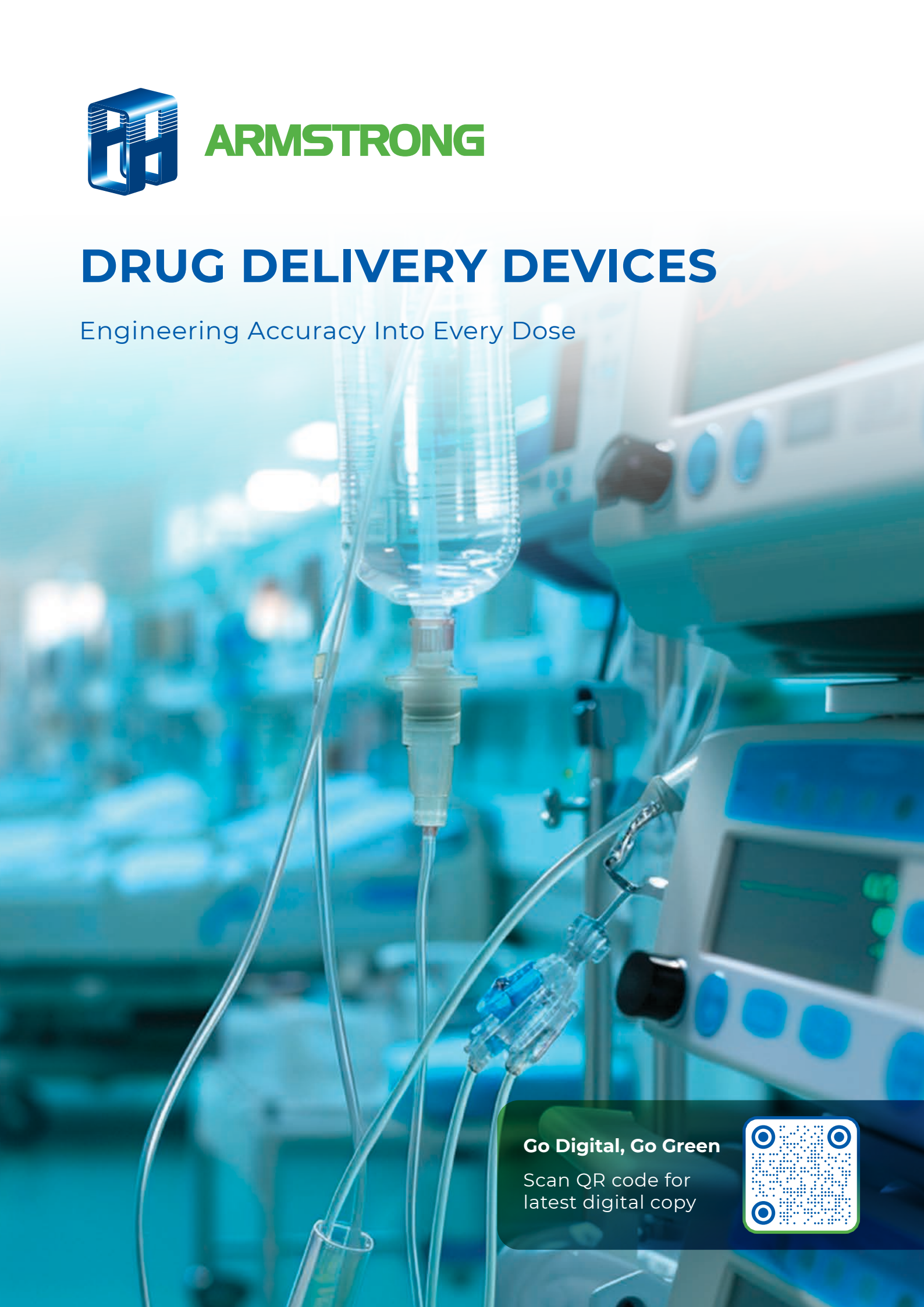
ARMSTRONG

DRUG DELIVERY DEVICES

Engineering Accuracy Into Every Dose



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Drug Delivery Device Challenges & **ARMSTRONG SOLUTIONS**

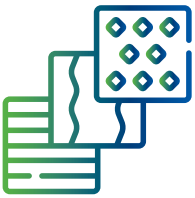
Drug delivery technologies demand uncompromising precision and reliability. From infusion pumps and insulin systems to wearable injectors and microneedle patches, every component plays a critical role in ensuring safe and accurate dosing. But success requires more than meeting technical specifications — it also means addressing the real-world challenges OEMs face when designing these devices. Pumps and injectors must function reliably not only in the lab, but also in hospitals, at home, and on the move. Patients expect comfort, clinicians demand safety, and regulators require proof of compliance at every stage, and together these expectations present unique challenges in design, materials, and manufacturing. This is where Armstrong makes a difference — helping OEMs bridge the gap between concept and reality.

CHALLENGES		ARMSTRONG SOLUTIONS
1 **Ensuring precise micro-dosing in pumps**	 Leaks or misaligned seals can disrupt micro-dosing and risk patient safety. Reliable sealing is essential for accurate, consistent drug delivery in pumps.	**Armstrong provides precision die-cut and elastomer-moulded seals and gaskets from ISO 13485 cleanrooms, ensuring tight tolerances and consistent micro-dosing performance over time.**
2 **Ensuring materials are safe for long-term drug contact**	 Drugs like insulin or biologic can degrade materials, causing swelling, leaching, or contamination that impacts patient safety and device reliability.	**Armstrong sources and converts ISO 10993-tested elastomers and adhesives proven for long-term stability with sensitive therapies, protecting drug integrity and patient safety.**
3 **Keeping wearable injectors comfortable**	 Wearable injectors must stay on skin for days without irritation. Poor comfort or adhesion can reduce compliance and risk therapy failure.	**Armstrong provides breathable adhesives and thermoformed foam solutions that flex with the body, supporting long wear, reducing irritation, and improving patient comfort.**
4 **Adding smart features without extra bulk**	 Devices need smart features like counters or connectivity but must remain compact and light. Integrating electronics without bulk is difficult.	**Armstrong supplies functional printing solutions on flexible substrates, integrating circuits, indicators, and smart labels without bulk while reducing parts and saving space.**
5 **Protecting devices in real-world use**	 Wearable injectors face drops, vibration, and travel stress. Without protection, electronics or drug reservoirs may be damaged, disrupting therapy.	**Armstrong provides lightweight foam solutions that absorb impact and damp vibration, protecting devices daily without adding unnecessary weight or bulk.**
6 **Meeting lifetime durability demands**	 Infusion pumps must endure hundreds of thousands of cycles. Friction, wear, and fatigue risk dosing accuracy, safety, and device reliability.	**Armstrong works with leading suppliers to source or co-develop certified high-performance materials, conducts in-house performance testing, and converts them into durable components.**

Why Choose Armstrong?

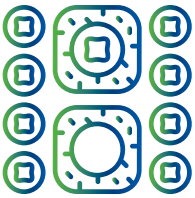
Armstrong stands apart not only for our technical expertise but also for our ability to scale innovation into reliable, compliant, and patient-friendly solutions. With decades of experience in materials science and precision converting, and backed by ISO 13485-certified cleanroom manufacturing, we provide a trusted pathway from prototype to high-volume production.

Our regional cleanroom footprint across Asia, strong global partner ecosystem, and robust quality systems give OEMs and Tier 1 suppliers the confidence to bring safe and effective drug delivery devices to market—faster and with fewer risks. At the same time, Armstrong drives sustainability by minimizing scrap, offering recyclable foams and films, and delivering reusable particle-foam carriers—helping customers achieve both performance and responsibility.



Material Expertise

Armstrong collaborates with leading suppliers to source and co-develop drug-contact materials that resist leaching, swelling, and fatigue over repeated use. We convert these into stable, compliant components that ensure dosing accuracy and patient safety across critical therapies.

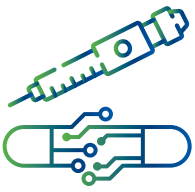


Custom Sealing Solutions

Using die-cutting, lamination, and elastomer moulding, Armstrong supplies seals and gaskets for infusion sets, cartridges, and reservoirs. Produced in ISO 13485-certified cleanrooms, these ensure leak-free dosing and consistent performance at scale.

Wearable Comfort Engineering

Breathable foams, skin-safe adhesives, and contoured backings are supplied and engineered into wearable injectors and pumps. These solutions reduce irritation, support long-term adhesion, and improve patient compliance in daily use.



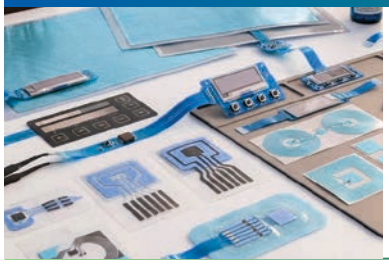
Functional Printing For Smarter Therapies

By applying printed circuits, indicators, and biosensors onto flexible substrates, Armstrong enables compact, connected devices such as smart pens and injectors. This reduces part count, supports miniaturization, and integrates digital features without added bulk.

Certified Cleanroom Production & Traceability

Our ISO 13485-certified cleanroom facilities ensure validated processes, batch-level traceability, and strict material controls. This simplifies regulatory approval and provides reliable scalability from prototype through high-volume production.

Armstrong's Capabilities

PROCESS	WHAT WE DO	BEST USED FOR
PRECISION DIE-CUTTING		
	High-precision cutting of foams, films, foils, adhesives, and laminates into complex shapes, with multi-layer lamination, cleanroom-ready and kiss-cutting available.	Seals and gaskets, On-Body Injector (OBI) liners, microneedle adhesives, transdermal patches, vent membranes, pull-tabs, tamper seals, dressings.
FOAM THERMOFORMING		
	Forming medical-grade open or closed-cell foams into custom-contoured parts for ergonomic fit, pressure distribution, and user comfort.	Pads, liners, cushions, carriers, trays, acoustic foams, comfort layers, protective underlays.
ELASTOMER MOULDING		
	Injection and compression moulding of medical elastomers — such as silicone, EPDM, fluorosilicone, or nitrile rubber — for biocompatible, stretchable parts.	Reservoir seals, syringe gaskets, tubing connectors, valves, OBI seals, cartridge gaskets, inhaler membranes, sealing rings.
REACTION INJECTION MOULDING (RIM)		
	High- or Low-pressure moulding of semi-rigid and flexible PUR foams for soft-touch, ergonomic, or shock-absorbing components with integrated design flexibility.	Soft-touch grips, vibration-damping layers, overlays/ sleeves on housings, comfort pads/ cushions, shock carriers, docking cradle bumpers, strain-relief boots.
PARTICLE FOAM MOULDING		
	Moulding of Expanded Polypropylene (EPP) for high-strength, impact-resistant, and insulated components that need to be lightweight, durable, and reusable.	Cold-chain trays, lightweight housing structures, reusable carriers, injector packaging, protective device shells & cases.
FUNCTIONAL PRINTING		
	Printed circuitry, heating elements, membrane switches, user interface graphics, conductive paths, and traceable labels on flexible or rigid substrates.	Printed heaters, conductive circuits, biosensors, RFID/NFC antennas, digital dose/therapy counters, touch controls, shielding layers, smart packaging sensors.

Armstrong's Role In Enabling Drug Delivery Devices

Each category of drug delivery devices — whether infusion therapy, injectables, insulin management, or wearable on-body systems — carries its own unique design, material, and regulatory demands. Meeting these requirements calls for precise engineering, reliable supply, and proven manufacturing expertise. Armstrong's broad capabilities, from precision die-cutting and elastomer moulding to cleanroom assembly and functional printing, align directly with these needs, helping OEMs move from concept through validation to commercialization with speed, confidence, and reduced risk.

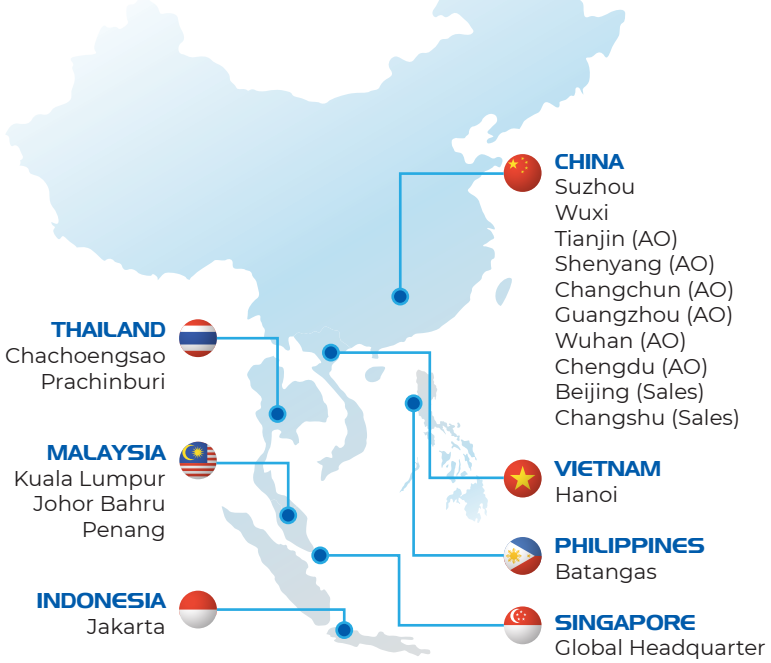
CATEGORY	KEY REQUIREMENTS	DEVICE TYPES	ARMSTRONG'S CONTRIBUTIONS
Micro-Dosing Accuracy	Devices must deliver precise, leak-proof dosing that remains stable at micro-liter volumes.	Infusion pumps, syringe pumps, insulin pumps	• Precision die-cut and elastomer-moulded seals for reservoirs and cartridges. • ISO 13485-certified cleanroom converting and lamination of leak-prevention layers.
Drug Compatibility	Devices must use biocompatible materials that maintain chemical stability and resist biologic degradation.	Cartridges, reservoirs, infusion sets, prefilled syringes	• Sourcing of ISO 10993-tested adhesives, elastomers, and barrier films. • Lamination of drug-contact layers that protect against leachables and degradation.
Wearability	Devices must remain comfortable and breathable while adhering securely for extended wear.	On-body injectors (OBIs), patch pumps, microneedle patches, wearable injectors	• Sourcing of skin-safe adhesives, breathable foams, and low-trauma release layers. • Thermoforming of contoured backings and die-cut comfort pads for prolonged wear.
Smart Integration	Devices must integrate digital indicators, counters, and connectivity features without compromising reliability.	Smart pens, OBIs, connected autoinjectors, inhalers	• Functional printing of circuits, sensors, and conductive traces on flexible substrates • Production of smart labels with QR/NFC features and printed indicators for digital dose and therapy counting.
Durability	Devices must withstand drops, vibration, and sterilization cycles, and long-term wear across hundreds of thousands of pump cycles.	Infusion pumps, portable pumps, reusable injectors, OBIs	• Sourcing and co-development of certified high-performance materials with leading suppliers, conversion into durable components, and in-house performance testing. • Manufacturing of moulded EPP housing structures, cushioning foams, and reinforced elastomers for impact/vibration resistance • Production of protective packaging carriers and trays compatible with sterilization processes.
Compliance & Scale	Manufacturing must meet ISO standards, ensure traceability, and support high-volume production.	All drug delivery devices	• ISO 13485-certified cleanroom facilities with lot-level traceability systems. • Validated converting and moulding processes supported by a regional manufacturing footprint.
Sustainability	Devices must reduce waste and incorporate recyclable, eco-friendly materials and processes.	Disposable injectors, infusion sets, secondary packaging	• Precision die-cutting and solvent-free lamination for material efficiency and waste reduction. • Use of recyclable foams, films, and particle-foam carriers for reusable eco-packaging solutions.

Who We Are

Armstrong Industrial Corporation (Armstrong) is Asia's trusted partner in innovative foam, film and elastomer solutions for Noise, Vibration, Heat and Safety Management. Established in 1974, Armstrong today has a strategic, consolidated presence in seven countries in Asia.

Our extensive network of global partners provides us access to a comprehensive range of innovative materials and solutions, providing our customers more choice and better cost control.

Our key sites are ISO & IATF certified, underscoring our commitment to ensuring that the products we manufacture meet your highest quality standards.



ISO 9001: 2015 | 14001:2015 | 22301:2019 | 13485:2016
45001:2018 | 14064-1:2018 | IATF 16949:2016

Key Highlights

Core Expertise: We are the only fabricator in Asia offering over 12 core precision engineering technologies to design and manufacture 2D and 3D foam, film, and elastomer products for dampening, insulating, sealing, and cushioning.

Regional Presence: Our 16 factories and 2 sales offices across seven countries in Asia ensure close proximity to major production hubs, allowing us to mitigate long-term geographic risks and serve customers efficiently.

Supply Chain & Collaboration: With over 50 years of experience, we have established a global network of more than 800 suppliers and access to over 6,400 material types, enabling us to meet a broad range of application needs while maintaining strong partnerships with international partners in Europe, the USA, and Asia

Customer Commitment: We are dedicated to being a collaborative and innovative partner, providing quieter, cooler, lighter, and safer solutions that meet the evolving technical and business needs of our customers.

Manufacturing Capabilities

Armstrong is a leading material converter, specializing in films, foams, and elastomers, serving global OEM customers across a wide range of industries. Armed with advanced processing technologies, we specialize in precision die-cutting, elastomer moulding, foam thermoforming, particle foam moulding, reaction injection moulding, and functional printing to produce custom 2D and 3D foam, film, and elastomer products. Our precision engineering technologies enable us to customise solutions and products for dampening, insulating, sealing, and cushioning, addressing challenges related to noise, vibration, heat, and safety management.

Our Automotive OEM Customers

BMW, Mercedes-Benz, Audi, Volkswagen, Toyota, Honda, Tesla, Ford, Volvo, Nissan, Suzuki, Mazda, FAW Group, Geely, 红旗, GAC Group, GWM, BYD, SAIC, Peugeot, Perodua, Proton, JAC, Yamaha, GM, Mitsubishi Motors, Isuzu, Subaru, Jaguar, Land Rover

Our Lifestyle, Industrial & Medical OEM Customers

dyson, Bosch, Roland, Mitsubishi Electric, muRata, Sony, Swarovski, Scientific Games, Seagate, Western Digital, Daikin, Lexmark, Yamaha, Sharp, Panasonic, Epson, Bose, Schneider Electric, Toshiba, TDK, TOTO, Philips, logitech, Bioptimal, Mölnlycke, Bio-Rad, Hillrom, Péters Surgical, Leica

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