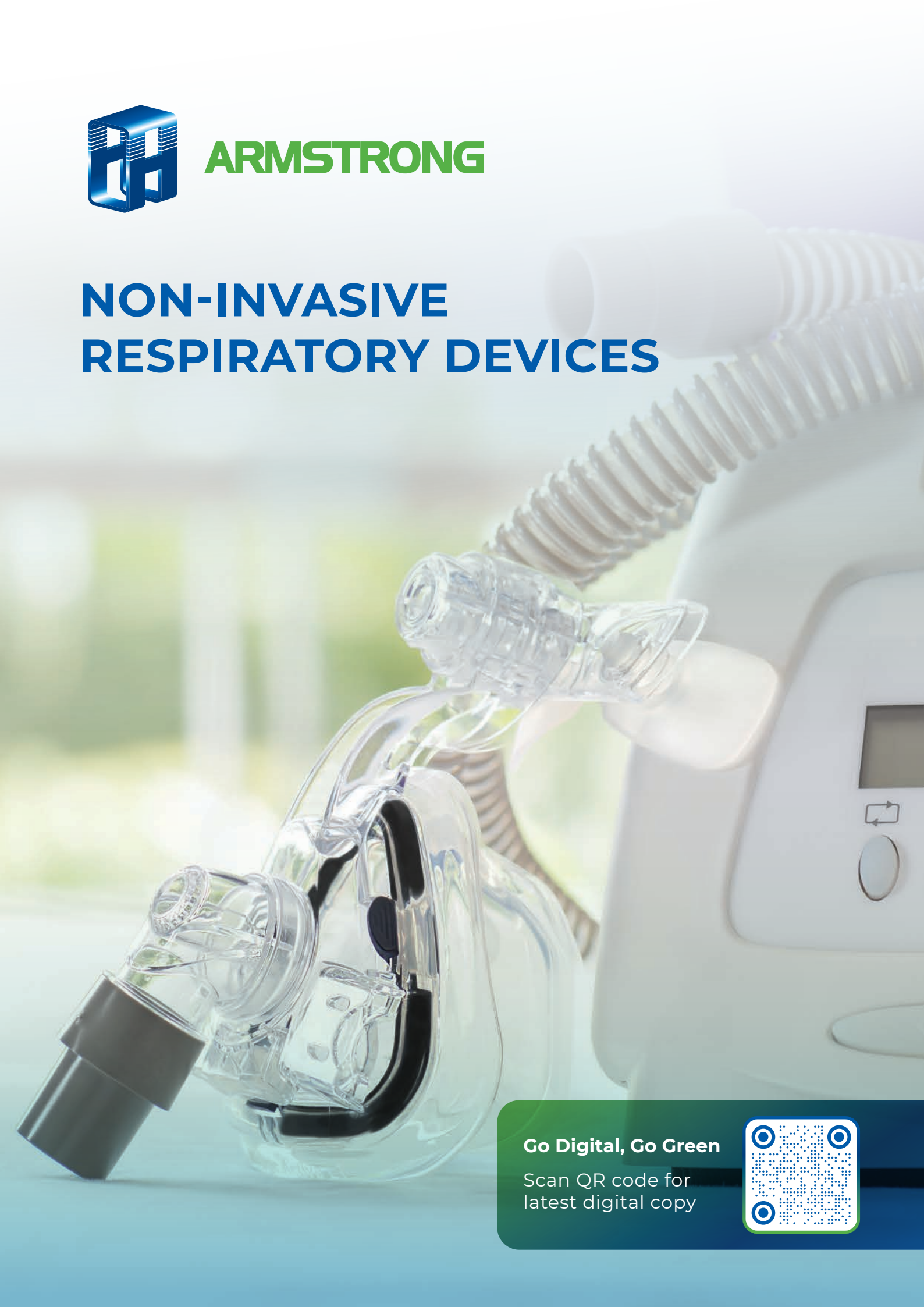
ARMSTRONG

NON-INVASIVE RESPIRATORY DEVICES



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Non-Invasive Respiratory Devices
INDUSTRY CHALLENGES

Non-invasive respiratory care is evolving quickly as patient expectations rise and care settings diversify. Growing cases of obstructive sleep apnea (OSA), chronic obstructive pulmonary disease (COPD), and acute respiratory conditions are driving demand for devices that deliver not only clinical performance but also comfort, portability, and ease of use. For OEMs, the challenge is balancing airflow management with materials and designs that enhance comfort, reduce noise, ensure durability, and meet international standards. Because requirements differ across device types, each must be addressed with tailored design and material solutions.

Key Challenges Across Device Types

Regulatory Compliance

All materials and assemblies must meet ISO 10993/18562 biocompatibility and emissions standards for global approval. Without compliance, market access is impossible.

Filtration & Sealing Integrity

Leak-free filters, gaskets, and valves are critical to therapy effectiveness and patient safety; even minor failures can compromise treatment.

Patient Comfort & Compliance

Long-term device adoption depends on soft, skin-safe, breathable materials that reduce irritation and encourage consistent use.

Noise & Vibration Control

Acoustically damped blowers and compressors are essential to reduce disturbance, support nightly use, and improve patient adherence.

Durability & Reliability

Components must endure daily handling, sterilization, and environmental stress without cracking, deforming, or degrading.

Condensation & Hygiene Management

Materials must control condensation (“rainout”), resist bacterial buildup, and enable easy cleaning to ensure patient comfort and safety.

Portability & Power Efficiency

Global demand requires high-volume production with consistent quality, compliance, and cost efficiency.

Scalability & Manufacturing

Lightweight, ergonomic housings and optimized power systems enable patient mobility and independence.

Sustainability

OEMs face mounting pressure to use recyclable materials, reduce VOC emissions, and extend component lifetimes to lower environmental impact.

Aesthetics & Color Consistency

Visible parts must maintain batch-to-batch uniformity, as cosmetic deviations can negatively impact quality perception even when functionally compliant.

Unique Priorities By Key Device Type

Sleep & Home-Care Respiratory Devices

[CPAP/APAP machines for sleep apnea and home-use BiPAP units]

- Long-term comfort and user adherence during nightly use
- Effective moisture and condensation control in humidification systems
- Quiet operation and vibration damping for better sleep quality
- Consumer-driven demand for recyclable and skin-safe mask components

Oxygen Therapy Devices

[Portable oxygen concentrators, stationary concentrators, delivery systems]

- Long-term comfort and adherence in nightly use
- Moisture management in humidification systems
- Effective sealing and filtration to ensure clean, consistent airflow
- Consumer-driven demand for recyclable mask components

Non-Invasive Ventilators

[Hospital-grade BiPAP/CPAP ventilators, portable transport ventilators, hybrid ICU/home units]

- Sterilization-resistant materials suitable for repeated hospital use
- Reliable sealing and airtight performance under clinical conditions
- Biocompatibility and low-VOC compliance to meet global regulatory standards
- Acoustic and vibration damping to support patient comfort and ICU use

Why Choose Armstrong?

Armstrong is a trusted materials converter that partners with leading global suppliers to source, co-develop, and convert certified foams, films, elastomers, and adhesives into high-performance medical components. With decades of expertise in materials science and precision converting, we understand the unique requirements of respiratory care—from patient comfort and acoustic control to sealing integrity and sterilization resistance.

Our ISO 13485-certified cleanroom footprint across Asia, complemented by strong European partners and a robust global ecosystem, gives OEMs and Tier 1 suppliers the confidence to bring safe, effective respiratory devices to market faster and with fewer risks. At the same time, Armstrong drives sustainability by reducing scrap, enabling recyclable foams, films, and elastomers, and delivering reusable carriers that help customers achieve both performance and responsibility.

COMFORT & HYGIENE

Armstrong co-develops and converts biocompatible foams, elastomers, films, and laminates into comfort layers, seals, and straps that enhance wearability, minimize condensation (“rainout”), support easier cleaning, and improve long-term patient compliance.

NOISE & VIBRATION CONTROL

Leveraging deep NVH (Noise, Vibration & Harshness) expertise, Armstrong converts foams, films, and polyurethane (PUR) materials into acoustic liners that suppress blower noise and vibration, improving comfort for patients and caregivers while encouraging therapy acceptance.

DURABILITY & RELIABILITY

Armstrong sources and co-develops sterilization-resistant elastomers and foams, converting them into gaskets, housings, and seals that resist powdering, cracking, and degradation under repeated hospital use and disinfection cycles.

REGULATORY & SCALE-UP

With ISO 13485-certified cleanrooms across Asia and complementary European partner sites, Armstrong helps OEMs source for ISO 10993/18562 materials, then converts and scales these solutions seamlessly from prototyping to validated high-volume production.

GLOBAL SUPPLY CONFIDENCE

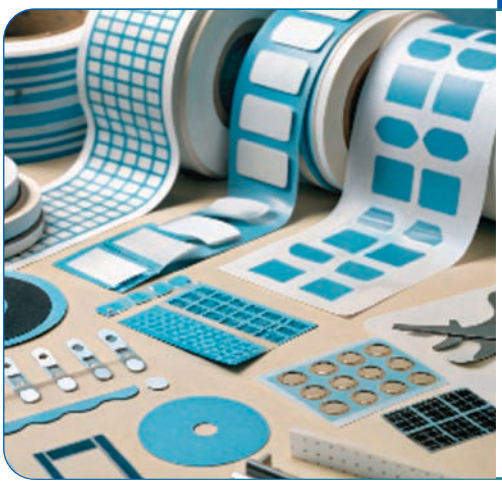
Supported by strong Asian operations, European collaboration, and disciplined quality governance, Armstrong ensures compliant, reliable, and risk-free supply chains that empower OEMs to deliver respiratory devices with confidence.

SUSTAINABILITY

Armstrong supports environmental goals by reducing scrap, converting recyclable foams and films, and supplying reusable particle-foam carriers—delivering solutions that balance device performance with sustainability.

Armstrong's Solutions

Non-invasive respiratory devices demand a balance of patient comfort, acoustic management, impact protection, and regulatory compliance. Armstrong supports OEMs and Tier 1 suppliers with a full portfolio of foam, film, elastomer, and particle foam solutions, enabling designs that are lightweight, quiet, and reliable for both home-care and hospital settings. From mask liners and housings to thermal pads and cleanroom seals, Armstrong delivers material innovation that enhances performance, safety, and patient adoption.



CUSTOM PRECISION DIE-CUT PARTS

Precision die-cutting integrates foams, films, elastomers, and adhesive layers into high-tolerance components. These parts are essential for airtight sealing, thermal management, and filtration in CPAP, BiPAP, and oxygen concentrators.

Materials	Medical-grade elastomers, breathable liners, filter media, sealing films, pressure-sensitive adhesives
Functions	Airtight sealing, particulate filtration, thermal management, noise/vibration isolation, precision alignment
Applications	Mask seals and gaskets, filter assemblies, tubing connections, disposable liners, thermal interface pads

THERMOFORMED FOAM PARTS

Thermoformed foams provide contoured, ergonomic components that enhance patient comfort and reduce device noise. They adapt naturally to mask frames, housings, and support pads in home-care and hospital ventilators.

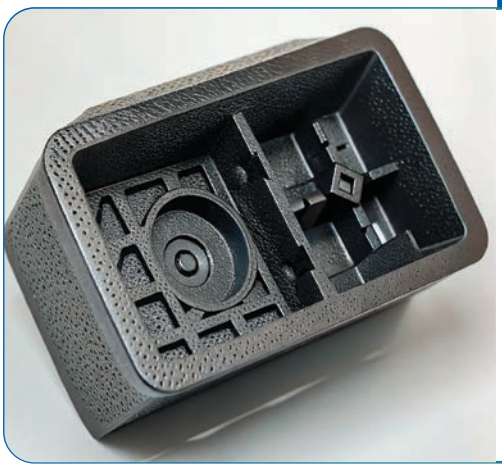
Materials	PU foam, PE foam, laminated comfort foams, breathable backings
Functions	Cushioning, contoured sealing, acoustic absorption, thermal insulation, ergonomic fit, vibration damping, patient comfort
Applications	Mask cushions, strap liners, blower insulation panels, support pads, interface gaskets, noise-reducing liners for CPAP/Non-Invasive Ventilation (NIV) devices

CUSTOM RUBBER-MOULDED PARTS

Rubber-moulded elastomer components provide airtight sealing, flexible connectors, and durable gaskets that ensure safe, reliable operation in respiratory systems. Designed for precision and compliance, these parts maintain performance under repeated sterilization and long-term use.

Materials	Medical-grade silicone rubber, fluoroelastomers, EPDM blends
Functions	Air and fluid sealing, flexible connections, vibration damping, chemical and heat resistance, regulatory compliance
Applications	Mask valves, tubing connectors, diaphragm seals, O_2 regulator seals, elastomeric gaskets for NIV circuits, flexible interfaces in humidifiers and concentrators

PARTICLE FOAM MOULDED PARTS



Expanded particle foams (EPP) deliver lightweight impact protection and structural support for portable respiratory devices. They combine durability with formability, allowing compact, ergonomic housings and protective trays.

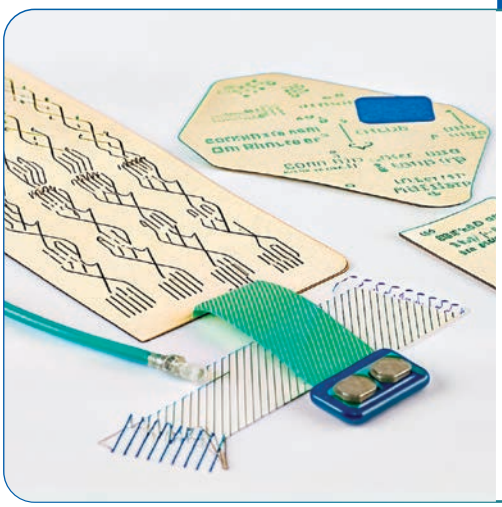
Materials	Expanded polypropylene (EPP) with laminated films or barrier coatings
Functions	Impact protection, lightweight housings, thermal insulation, vibration damping, structural reinforcement
Applications	Portable oxygen concentrator housings, device trays, transport cradles, protective enclosures

REACTION INJECTION MOULDED POLYURETHANE (PUR) PARTS

Flexible and semi-rigid PUR components provide soft-touch housings, acoustic dampers, and vibration isolators. Their resilience enhances both patient comfort and device durability in NIV systems.

Materials	Flexible polyurethane, biocompatible PUR blends
Functions	Shock absorption, vibration isolation, acoustic noise reduction, structural support, ergonomic shaping
Applications	NIV ventilator housings, cushioning bumpers, soft-touch surrounds, compressor mounts, vibration dampers, internal padding

FUNCTIONAL PRINTING PARTS



Printed electronic components enable smart features in respiratory devices by embedding conductive, sensing, and indicator elements directly into flexible substrates. This simplifies assembly while improving usability, safety, and performance.

Materials	Conductive inks, printable PET films, flexible substrates, indicator coatings, adhesive carriers
Functions	Signal transmission, printed sensors, visual status indicators, circuit integration, smart labeling
Applications	Digital pressure/flow indicators, printed heater films in humidifiers, RFID/NFC labels for consumables, compliance indicators for CPAP masks, smart packaging for oxygen concentrators

Armstrong's Role In Non-invasive Respiratory Devices

Respiratory care is evolving rapidly as rising cases of OSA, COPD, and acute respiratory conditions drive demand for devices that are comfortable, portable, and reliable. For OEMs, success depends not only on airflow management but also on patient comfort, acoustic control, portability, and material reliability—factors critical to compliance and outcomes. Armstrong supports these needs with precision converting, foams, elastomers, particle foams, and ISO 13485-certified cleanroom manufacturing.

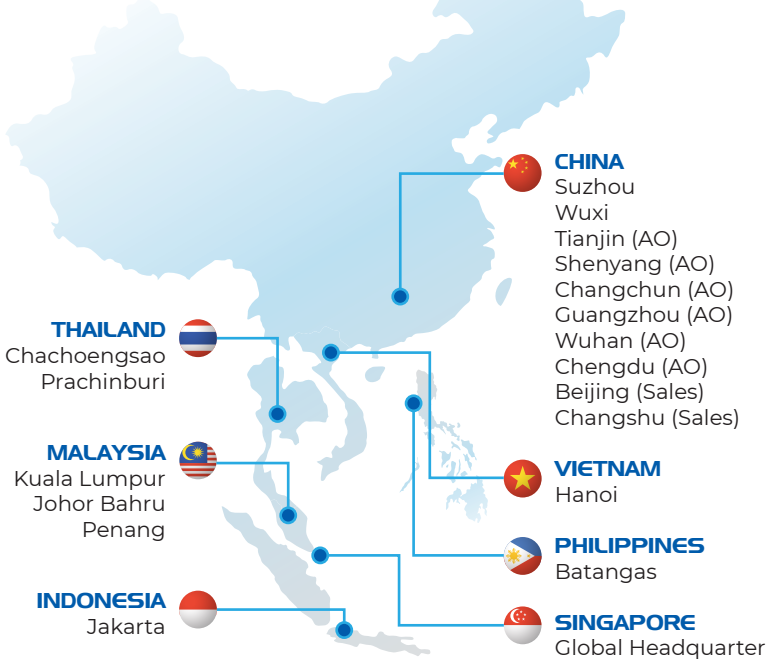
CATEGORY	KEY REQUIREMENTS	DEVICE TYPES	ARMSTRONG'S CONTRIBUTIONS
Skin Contact & Wearability	Devices must provide skin-safe comfort and ergonomic fit to support long-term patient compliance.	CPAP masks, BiPAP masks, headgear straps	• Precision converting of foam cushions, strap liners, and comfort pads using ISO 10993-tested materials for extended wear comfort. • Sourcing and lamination of breathable, skin-friendly adhesives and fabrics that ensure gentle adhesion and effective moisture control.
Noise & Vibration Control	Devices must operate with minimal noise and vibration to enhance patient comfort and acceptance.	CPAP/BiPAP ventilators, portable NIV units	• Conversion and thermoforming of acoustic foams and liners to reduce blower and airflow noise. • Precision moulding of flexible PUR dampers and isolators to absorb compressor vibration and mechanical resonance.
Lightweight Portability	Devices must be lightweight, compact, and durable for daily mobility and reliable transport.	Portable oxygen concentrators, travel CPAP	• Moulding of EPP structural components and trays that deliver lightweight protection and impact resistance. • Conversion of foam inserts and carriers to optimize strength-to-weight balance for portable units.
Sealing & Reliability	Devices must deliver airtight, leak-free connections that endure pressure, vibration, and repeated clinical use.	All non-invasive respiratory devices	• Precision die-cutting and moulding of elastomer gaskets and valves for consistent, leak-free sealing. • Lamination of multi-layer foam, film, and adhesive composites engineered to maintain seal integrity under pressure and vibration. • ISO 13485 cleanroom converting and validation ensuring long-term reliability in clinical environments.
Regulatory & Scale-Up	Devices must meet ISO 13485 requirements and support a seamless, scalable transition from prototype to high-volume production.	All non-invasive respiratory devices	• ISO 13485-certified cleanroom converting using ISO 10993-tested foams, films, and adhesives. • Integrated prototyping-to-production workflows and regional footprint enabling rapid scale-up and secure, multi-site supply.
Regional Supply Confidence	Manufacturers must ensure reliable, uninterrupted component supply across regions to avoid production or delivery disruptions.	All non-invasive respiratory devices	• Coordinated Asian manufacturing footprint and logistics network ensuring secure, multi-region supply assurance. • Quality and traceability systems that maintain consistent batch performance and minimize OEM supply risk.
Sustainability	Devices must use eco–friendly materials and support recyclability with fewer components.	All non-invasive respiratory devices	• Sourcing and converting of recyclable foams, films, and particle foams to enable greener device design. • Process optimization to reduce scrap and part count in material converting. • Integration of reusable EPP carriers to minimize single-use packaging in logistics and storage.

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, Hongqi, 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, Hoya, Daikin, Lexmark, Yamaha, Sharp, Panasonic, Epson, Bose, Schneider Electric, Toshiba, TDK, Toto, Philips, logitech, Bioptimal, Mölnlycke, Bio-Rad, Hillrom, Péters Surgical, Leica

Armstrong Global Footprint & Technology Partners

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