

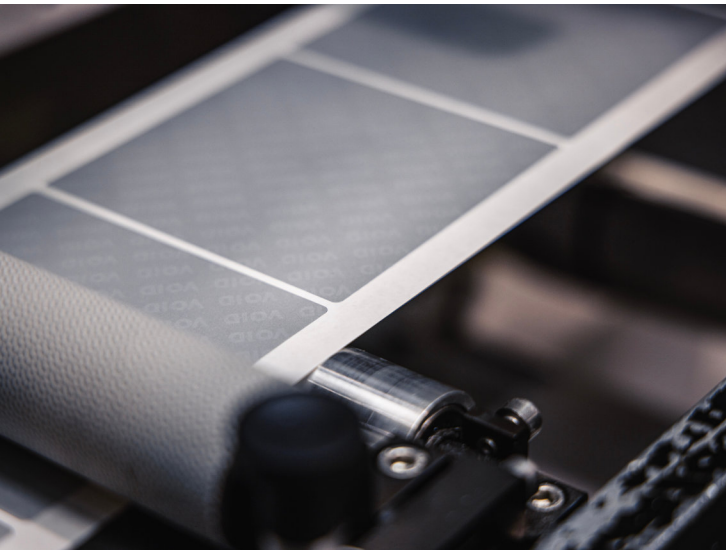


## When invisible functions become industrial risk factors

Technical labeling, adhesive solutions, and functional parts: why these invisible components are at the core of industrial reliability, compliance, and performance.

# Invisible functions, but costly when they fail

Failures of “invisible” components - adhesives, insulators, cut parts - have a significant impact on industrial profitability. Although perceived as secondary, their unsuitability for real-world conditions (vibration, humidity, temperature) is a major cause of unplanned downtime.



More than 80% of companies have experienced such interruptions in recent years. This white paper analyses these critical risk points and demonstrates how mastering these discrete functions ensures the reliability of your systems and processes.

These failures are not always due to a defect in the technology, but rather to the unsuitability of the integrated functional elements - the very ones that provide protection, insulation, fastening, sealing, or traceability - to their actual operating environment.

It is precisely these types of functions that this white paper explores: discrete elements that are present in a product or process but become risk points when they fail.

The estimated average cost of a single hour of unplanned downtime in the manufacturing sector is estimated at :

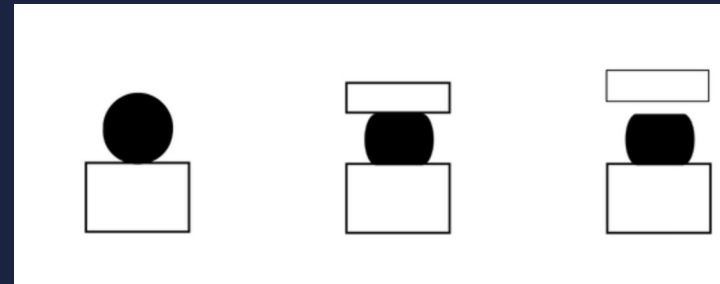
**\$ 250 000**

# Ensuring system integrity against physical and thermal stress.

The thermal interface faces the challenge of miniaturisation

Sealing must be considered a dynamic function, subject to thermal and vibration cycles. Inadequate compression set generates micro-leaks after a few months of use. Given the cost of corrosion (3% of global GDP), the integration of customised multi-layer barriers secures critical areas where conventional coatings fail.


A temperature increase of 10°C above the nominal operating point can reduce the average life of a semiconductor component by 50%.



Insufficient elastic recovery prevents the material from returning to its original shape. This loss of restoring force breaks the seal at the joint and causes micro-leaks in the long term.

Sealing must be considered a dynamic function subject to thermal and vibration cycles. Inadequate compression set causes micro-leaks after a few months of use.

- Financial impact: Corrosion represents an estimated cost of 3% of global GDP.
- Reliability: Passive multi-layer barriers secure critical areas (connectors, sensors) where varnishes have weaknesses.
- Technical precision: Sealing depends on the cellular structure matching the cutting geometry.



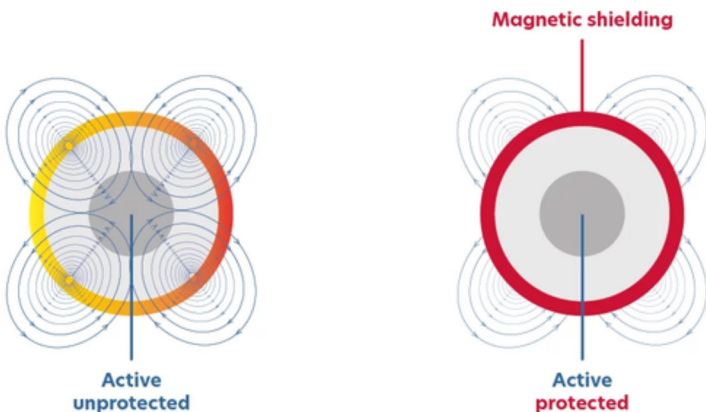
Successful integration depends on striking a balance between three inseparable variables:

1. **Material suitability:** Selecting the technical complex (adhesive, foam, insulation) that meets the chemical and physical constraints of the project.
2. **Control of the shape:** Ensure cutting precision and industrial repeatability to within a micron.
3. **Actual use and process:** Anticipate the final conditions of use and optimise the integration of the part into your production lines.

## Controlling interference and securing critical signals

### Controlling electromagnetic compatibility and isolation

The proliferation of on-board electronics requires strict EMC management to prevent data errors or system malfunctions. The use of customised conductive materials ensures perfect continuity of shielding. This precision cutting envelops sensitive components and eliminates electromagnetic leakage within complex enclosures.



The label acts as a flexible conductive barrier that seals electromagnetic leaks and protects sensitive components from interference.

### Compliance and reliability issues

- Regulatory safety and market access Non-compliance with EMC standards, such as Directive 2014/30/EU, is a critical risk that can lead to marketing bans or massive recall campaigns.
- Signal reliability and operational continuity In the healthcare and high-tech industries, a simple interference with a sensor signal can distort a vital diagnosis or cause an unjustified emergency shutdown of a production line.

In high-voltage systems, films with high dielectric strength prevent electric arcs despite miniaturisation. Laminating combines insulation and heat dissipation in a single piece, optimising space and eliminating the risks associated with multiple interfaces.

## Optimising perceived value and ensuring system traceability

At the end of the value chain, there is a dual challenge: ensuring product aesthetics and guaranteeing traceability. A neglected finish or illegible identification are not just visual defects, they are major financial risks.

In industry, the costs associated with poor quality can represent

up to **20 à 30 %** of turnover

### Aesthetics as a guarantee of engineering

The use of adhesive plugs and customised labels makes it possible to conceal fasteners without weighing down the design. These smooth surfaces limit aerodynamic noise, prevent the accumulation of residue and facilitate cleaning. An impeccable appearance is the first indicator of reliability for the end user.



### Traceability as a pillar of compliance

In critical sectors such as medical and aeronautics, altered markings — QR codes, RFID chips or labels — render the part non-compliant and require it to be scrapped. The durability of the material against UV rays and chemicals is the only guarantee against recall campaigns.

**Nearly 40%**

of industrial recall campaigns are directly attributable to labelling defects or poor traceability

Securing this medium from the design stage onwards is therefore not an aesthetic option, but a real safeguard against a major financial and reputational risk for the company.

A photograph of two men in a factory setting. The man on the left is wearing glasses and a blue shirt, looking down at a machine. The man on the right is also wearing a blue shirt and looking down at the same machine. The background shows industrial equipment and a factory floor.

## Turning technical constraints into competitive advantages.

We have explored the key principles that ensure the safety of your products. But in the reality of an industrial project, each application has its own requirements.

Between the design office and actual commissioning, there are often variables that deserve careful consideration. The aim of this section is to provide you with a pragmatic tool for reflection. It is not a question of reviewing your entire design, but of working together to identify the levers that will secure your production and the satisfaction of your end users.

We have structured the following steps to help you challenge the maturity of your developments.

- Assess the robustness of your current solutions through 5 targeted areas of focus.
- Facilitate technical and economic arbitration between your R&D, Methods and Purchasing departments.
- Anticipate non-quality risks to protect your margins and operational responsiveness.

## Securing your projects: from self-assessment to best practices.

### Self-diagnosis in 5 key points

#### Exposure

Are your components subject to environmental constraints (chemicals, UV rays, thermal cycles) that have not yet been simulated?

#### Adhesion

Has the surface energy of your substrates (plastics, oiled metals) been validated to ensure durable bonding?

#### Integration

Is it possible to combine two functions (e.g. sealing and insulation) in a single part to simplify your bill of materials?

#### Productivity

Is the part optimised for quick manual installation or automated integration into your production line?

#### Cost-effectiveness (TCO)

Does the time saved during assembly offset the cost of a custom-made part compared to a standard solution?

### Our three golden rules for effective design

- Anticipate actual use, not just testing.
- Break down barriers to decision-making.
- Think in terms of 'function' rather than 'product'.

Reliability does not cost more than failure.

By incorporating these considerations from the prototyping phase onwards, you reduce your development cycles and eliminate the risk of poor quality, which can account for up to 30% of your turnover.

## Nearly 60 %

of new labels are designed to withstand harsh weather and extreme environments. It is clear that technical finishes are no longer a luxury but a necessity for demanding industrial applications.

---

# The future of your design starts here

Tomorrow's challenges — whether massive electrification, miniaturisation of electronics or increased sustainability requirements — call for a cross-functional approach. Don't just endure your technical constraints: integrate them as levers for innovation from your very first sketches.

Our mission is to support you in this transformation by providing expertise ranging from the physical and chemical analysis of materials to the optimisation of your production lines.

## Take the next step

Do you have an ongoing project or a complex issue that deserves a fresh perspective? Don't face your technical uncertainties alone. Our experts are here to help you take the next step.

[Submit a project request](#)



ALSACE TECHNIQUES ÉTIQUETAGE



Alsace Techniques Etiquetage

31 Rue du Cerf - 67350 Val-de-Moder

+33 3 88 05 50 40 | [contact@ate.fr](mailto:contact@ate.fr)

[ate.fr](http://ate.fr)

