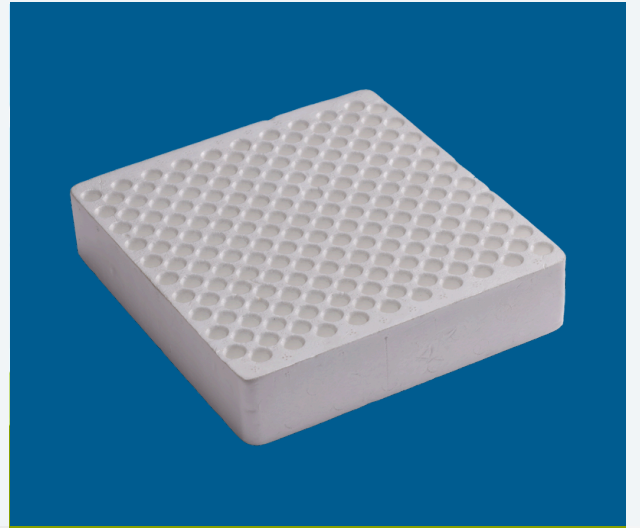


## CASE STUDY

### Tolerance Matters: Advancing Tight-Spec EPS Trays for Explosive Safety



#### ► Introduction

A leading global explosives manufacturer was facing persistent difficulties due to their dependence on imported Expanded Polystyrene (EPS) tray packaging for detonators. They partnered with us in 2023 to develop a high-quality solution that could be manufactured in India.

Previously, the EPS trays were sourced from Chile and China, which made them expensive, increased delivery time and created several logistics challenges. The company needed a reliable local alternative that could meet international standards while reducing dependence on imports.

Leveraging our extensive knowledge of EPS material properties and 60 years of moulding experience, we initiated the design and development of a customised packaging solution suitable for high-safety explosive applications.

#### ► Key Challenges

- **High-safety application:** The packaging is used for detonators in explosive environments, which demands extreme precision, strict safety compliance and zero tolerance for errors.
- **Complex two hundred pinhole design:** Each tray contains two hundred micro-pinhole cavities. The tight spacing and intricate geometry made the tool design and manufacturing process highly complex.
- **Antistatic requirement:** The trays must maintain consistent antistatic properties, which added technical challenges in both material selection and process control.
- **Critical tolerances:** The trays must align perfectly with the production line's robotic arms and rigid fixtures. Achieving this level of dimensional accuracy is critical as any mismatch disrupts the automated handling process.

- **Challenging pinhole ejection:** The pinholes are positioned at right angles which made part ejection difficult without the risk of damaging or deforming the pins.
- **Material fusion and collapse issues:** Uniform material fusion and proper cavity filling were difficult to achieve due to the thin and highly precise features.

## ► Solutions

To address these complex technical challenges, we adopted a highly engineered approach beginning with tool design tailored for explosive-grade components. Our in-house design team developed custom high-accuracy brass cavity inserts which provided optimal thermal balance and improved material flow. This enabled consistent fusion and complete filling even in the most critical thin-walled areas.

To meet the antistatic requirement, we refined the EPS processing parameters and selected suitable antistatic materials that maintained stable performance without compromising structural strength.

To support the automation process, we implemented strict dimensional control through optimised moulding conditions and frequent in-process inspections. By stabilising shrinkage behaviour and enhancing tool cooling layouts, we achieved the critical tolerances required for robotic handling and fixed fixtures on the customer's production line.

As a result, we delivered a reliable high-precision EPS tray that meets international safety standards while being entirely manufactured in India.

## ► Conclusion

This project stands as a testament to the power of indigenous engineering. By successfully localising a critical, high-safety component, we not only secured the customer's supply chain against global volatility but also established a new benchmark for precision EPS manufacturing in India. We delivered more than just a product; we provided a sustainable, long-term competitive advantage.