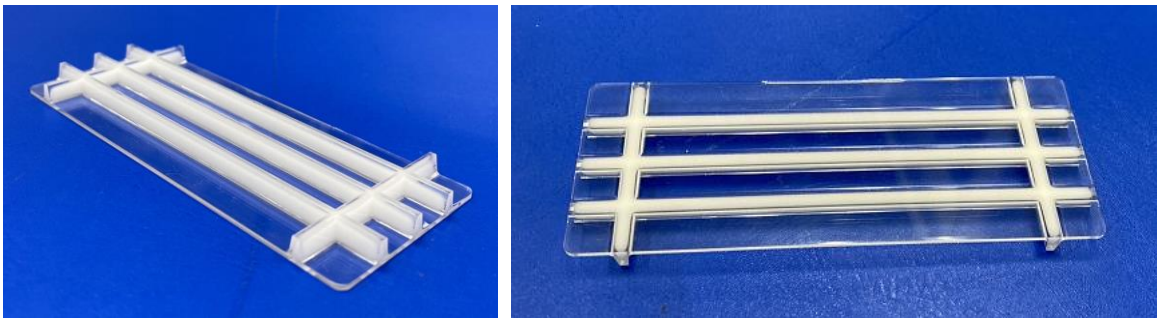


April 16, 2024  
Maxell, Ltd.

**Development of a new injection foam molding technology that selectively foams the rib portion to achieve lightweighting and strength improvement of resin components**  
**Exhibiting in CHINAPLAS 2024 -the Asia's largest and most influential connectivity event-**

Maxell, Ltd. (President and Representative Director: Keiji Nakamura / hereinafter “Maxell”) has developed a new injection foam molding technology to achieve lightweighting, deformation suppression under bending loads, and clean appearance by selectively foaming only the ribs which are reinforcing structure, applying its foam molding technology “RIC-FOAM<sup>\*1</sup>”. The samples of this technology will be exhibited for reference in CHINAPLAS 2024, Shanghai, China (April 23-26) at the Maxell Digital Products China Co., Ltd. (hereinafter “MDCN”) booth (Japan Pavilion B23 in Hall 1.1).



Demonstration sample of selectively foamed rib (White foam rib, size 3 x 8 cm, general-purpose polycarbonate)

In recent years, reducing resin usage and lightweighting have become global megatrends, particularly in the mobility sector such as electric vehicles, to achieve carbon neutrality. One of the solutions to address these challenges is “foam molding technology”, which involves resin foaming. From the perspective of recycling and environmental impact, the practical application of foam molding technology using nitrogen or carbon dioxide is progressing. The devices utilizing low pressure physical foam molding technology called “RIC-FOAM<sup>\*1</sup>” developed by Maxell in collaboration with Kyoto University in 2017 are being commercialized by injection molding machine manufacturers. Components in various fields such as automotive, household appliances, and sports are productized by using these devices, aiming for lightweighting and higher precision.

On the other hand, in foam molding technology including “RIC-FOAM<sup>\*1</sup>”, challenges, such as reduced resin strength and the deterioration of appearance due to the gas from the foaming agent have been raised as issues since before.

In order to enhance the strength of resin molded products, besides thickening the substrate, the use of reinforcing structures called ribs is widely adopted. As a solution to these challenges, Maxell has developed a selective foam molding technology that foams only the ribs. By

selectively foaming only the ribs without foaming the substrate, it is possible to balance strength and a clean appearance.

As the bending stiffness of molded products with ribs increases according to the height of the ribs, it is possible to create lightweight and strong components by forming tall ribs. However, in general resin molding without foaming, increasing the height of the ribs can result in depressions (sink marks) due to resin shrinkage caused by insufficient resin pressure at their base of the ribs. Furthermore, while sink marks can be eliminated by foam formation by conventional foam molding, it was difficult to maintain strength and appearance as the substrate also foamed. By utilizing the newly developed technology, it is possible to foam only the ribs selectively in the mold during injection molding without altering the configuration of the foam molding machine. The selective foaming technology was achieved through the evolution of “High Precision Molding & Forming” technology, which is part of Maxell’s core competence in the Analog Core Technologies i.e. “Mixing & Dispersion,” Fine Coating, and “High Precision Molding & Forming.” In the future, by refining this technology, we will contribute to the creation of new structural designs that achieve a balance of lightness, appearance, and strength, and resin components based on them.

Currently, Maxell is preparing to commercialize this foam molding technology primarily for the Chinese market, where electric vehicles are being produced in large numbers, through its group company MDCN and collaborative manufacturers.

In CHINAPLAS2024, Maxell will exhibit its foam molding technology “RIC-FOAM<sup>\*1</sup>” along with applied technologies enabling lightweighting and high-strength, as well as display multiple samples utilizing these technologies.

Maxell will continue to contribute to the realization of a sustainable society by offering new value.

\*1 RIC-FOAM is an abbreviation of Maxell’s trademark registration, “Resilient & Innovative Cellular Foam”.

#### **CHINAPLAS 2024 official site**

<https://www.chinaplasonline.com/>

#### **Trademark**

All company names and product names are trademarks or registered trademarks of their respective companies.

#### **Inquiries about products and exhibits**

New Business Producing Div., Maxell, Ltd.

[https://biz.maxell.com/ja/inquiry\\_form\\_input5.html](https://biz.maxell.com/ja/inquiry_form_input5.html)

Appendix

**Image diagrams of resin molding, conventional foam molding, and selective foam molding**

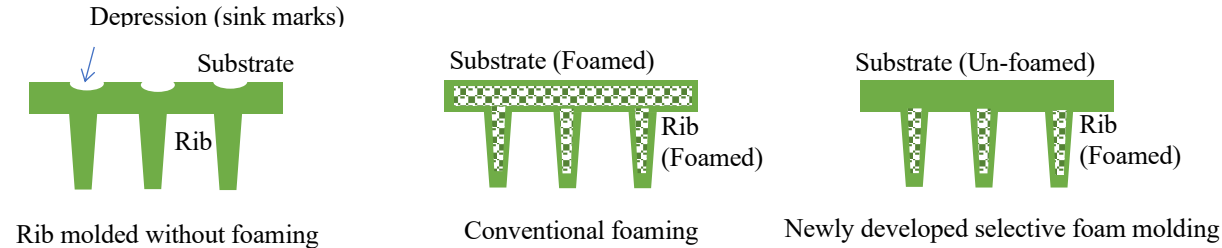
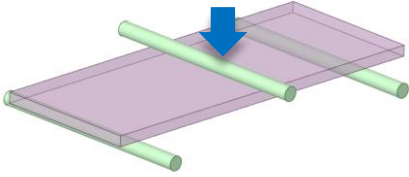
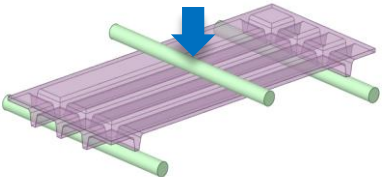


Image diagram of injection molded product - cross-sectional diagram of rib structure

**Effect of selective foaming**

Control of gas flow within the mold, product design, and simulation of mold design enable to selectively foam only the targeted areas. The sink marks and warpage of the molded products are improved, resulting in an appearance equivalent to non-foamed products. For example, when the substrate thickness is reduced to 1mm and reinforced with ribs, compared to a flat plate with a 3mm substrate thickness, 40% reduction in weight and 14% improvement in bending strength under a load of 5kg are confirmed, achieving effects similar to those observed in simulations.

**Method and results of bending tests**

Substrate thickness	3mm	1mm + Foamed ribs
Shape and testing method (Using the same polycarbonate resin)		
Mass (g)	13.9	8.2 (40% reduction)
Deformation under a load of 5kg (mm)	2.4	2.1 (14% increase in strength)