

Improve impact strength and hinge flexibility of food container lids

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Ningbo Lisi Houseware Co., Ltd. (Lisi), a leading manufacturer of food containers based in Zhejiang Province, China, has turned to Vistamaxx™ performance polymers from ExxonMobil Chemical to improve the impact strength of its food containers made from random copolymer polypropylene (RCP). Vistamaxx polymers also provide better lid hinge flexibility and maintain clarity.

RCP strength an issue

Lisi used RCP to manufacture food containers because it offers good clarity and is odorless. The company discovered, however, that RCP lacked the impact strength, especially at low temperatures, and flexibility required by many of its customers. Also, when RCP is used for the container lid hinge, stress whitening could be an issue. As the company used the industry standard 0.3-0.6 mm thickness for the hinge, it tested strengthening additives to modify the RCP. While impact strength could be increased, clarity could not be maintained and the hinge continued to display stress whitening.

Key advantages

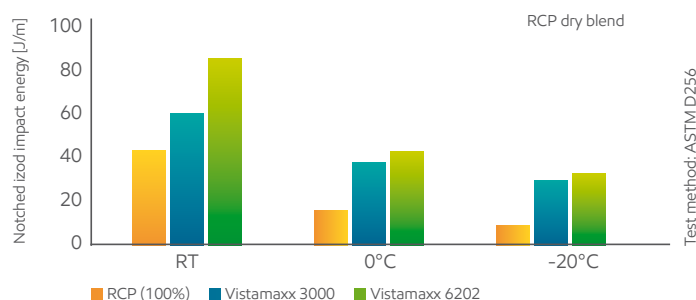
- Improved impact strength
- Enhanced flexibility
- Clarity maintained
- Food contact safety
- Easy to use

New possibilities with Vistamaxx polymers

Lisi turned to Vistamaxx polymers from ExxonMobil. Tests, undertaken by or on behalf of ExxonMobil Chemical, indicated that when RCP is dry blended with 10 percent Vistamaxx 3000 or Vistamaxx 6202, the impact strength increases within a range from room temperature down to minus 20°C (minus 4°F). The improvement in impact strength is more pronounced at lower temperatures.

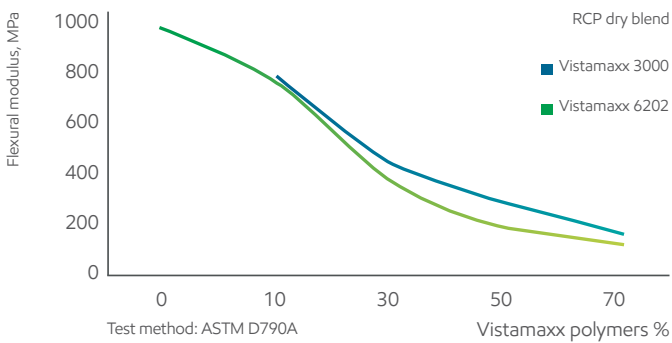


Figure 1: Impact strength - 10% Vistamaxx polymers in RCP



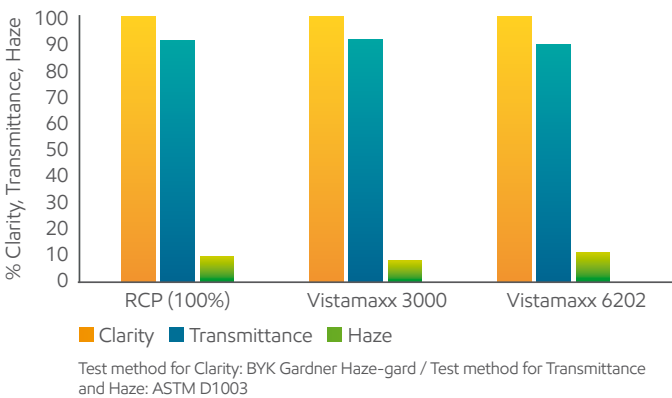
The material also becomes more flexible when RCP is dry blended with Vistamaxx™ 3000 or Vistamaxx 6202. Flexibility increases with the dosage of Vistamaxx performance polymers.

Figure 2: Flexural modulus



The clarity, light transmittance and haze of the original material are virtually the same when RCP is dry blended with 30 percent Vistamaxx 3000 or Vistamaxx 6202.

Figure 3: Optical properties - 30% Vistamaxx polymers blended with RCP: 1 mm thick discs



Enhanced products

Freezing tests, undertaken by Lisi, indicate that modifying RCP with a small percentage of Vistamaxx polymers improves impact strength of the container lid, even at temperatures between 0°C (32°F) and minus 20°C (minus 4°F).

Meanwhile, Lisi’s cornering fatigue tests show that Vistamaxx polymers deliver improved hinge flexibility which contributes to the durability of the lid.

Of all the additives tested by Lisi, only Vistamaxx polymers increased lid hinge impact strength during the freezing test, maintained clarity and reduced stress whitening. Easy to use, Vistamaxx polymers can be dry blended with the RCP before injection molding. This is done on existing equipment without additional investment in equipment or technology.

Vistamaxx polymers can also enhance the elasticity of RCP used in the body of the food container. This can improve the seal structure of the container. Because the body is softer, the harder lid can seal without the use of seal rings. This design simplification can result in a 10 percent manufacturing cost reduction.

Vistamaxx polymers are also compliant with many international food contact regulations, such as US FDA, EU and JOSPFA, and is on the Chinese Positive List for resins permitted in food packaging products. This saves time, as no pre-qualification of the material is required and speeds up time to market.

Item	Freezing test	Cornering fatigue test
Conditions	<ul style="list-style-type: none"> Sample lid cooled to -20°C for four hours before the test Sample dropped to the ground from a height of 76 cm 	<ul style="list-style-type: none"> Room temperature Open/close the hinge 100,000 times
Results	No breakage of the lid	No hinge breakage
References	Samples using other toughening agents are likely to break in this test	Industry standard: no breakage after opening/closing 10,000 times

Better performance, increased sales

Using Vistamaxx polymers to modify RCP has enabled Lisi to offer food container lids with improved durability while remaining transparent. This has increased the company’s competitiveness in the food container industry and, as a result, Lisi’s food containers have enjoyed a significant growth in sales.

“Due to the balance of physical properties delivered by Vistamaxx polymers, the quality and performance of our food container lids have improved significantly. We will use Vistamaxx polymers in other applications,” said Mr. Qinghua Zeng, R&D Manager, Ningbo Lisi Houseware Co., Ltd.

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