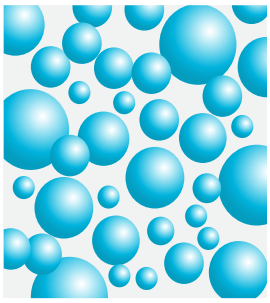
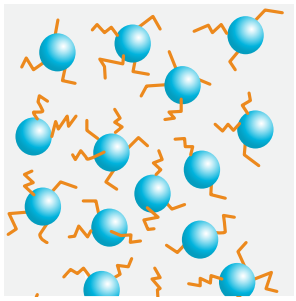
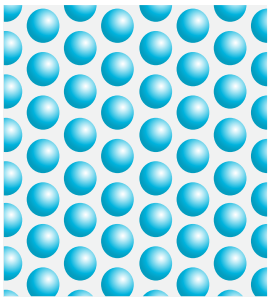
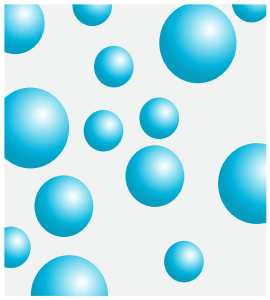
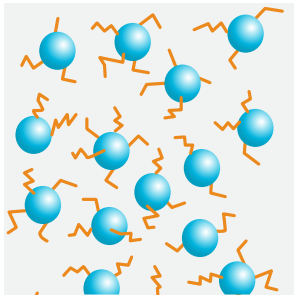
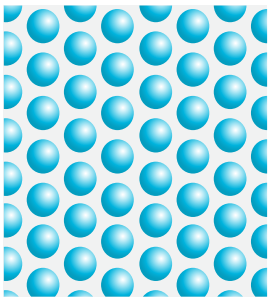
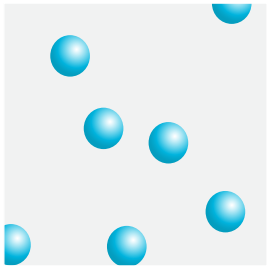
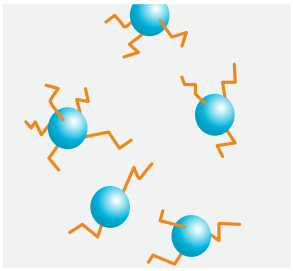
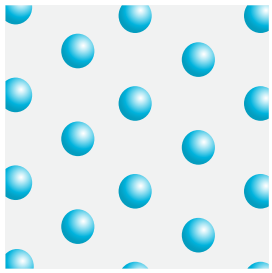
Milliken®

DeltaMax®

Performance Modifiers for Polypropylene

Milliken™

HOW IT WORKS

	BASE RESIN	DELTAMAX MECHANISM	NET EFFECT	RESULTING VALUE	
HIGH IMPACT ICP	 High Impact ICP with ample rubber content of various domain size	 Branching of rubber and PP	 Smaller domain sizes with little change in rubber distribution.	**Significant improvement in resin flow with no change in impact.**	MELTFLOW MODIFICATION
MEDIUM IMPACT ICP	 Medium Impact ICP with moderate rubber content of various domain size	 Branching of rubber and PP	 Smaller, more evenly distributed rubber domains improve impact properties.	**Higher impact, better flowing resin that is easier to process.**	IMPACT ENHANCEMENT
LOW IMPACT ICP	 Low Impact ICP containing little rubber content	 Branching of rubber and PP	 With little rubber available, DeltaMax modifies flow properties more than impact.	**Higher flowing resin that reduces production costs without sacrificing impact.**	MELTFLOW MODIFICATION

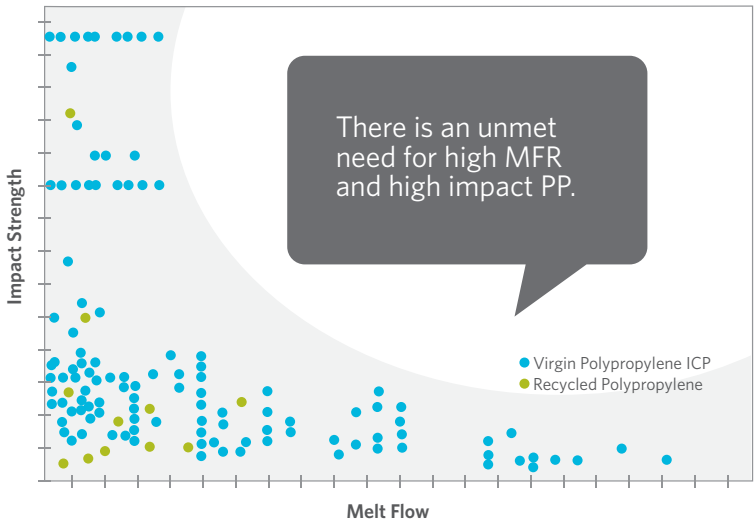
DELTAMAX®

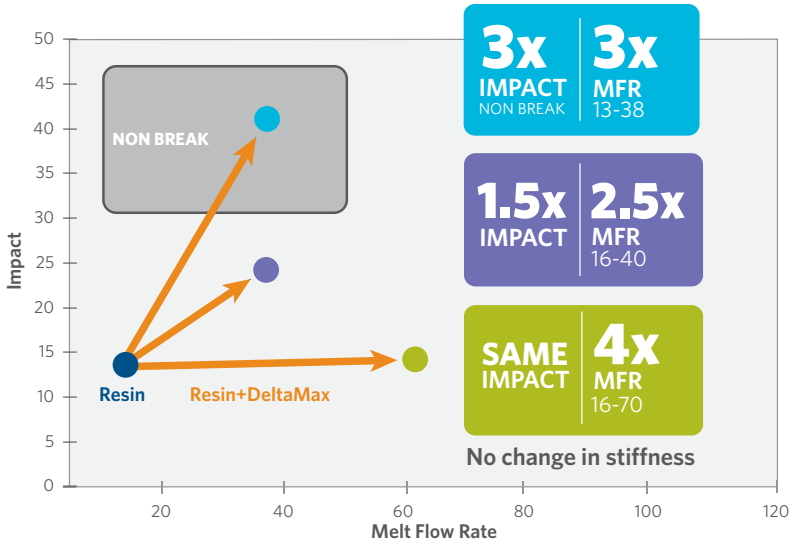
Performance Modifiers for Polypropylene

DeltaMax® Performance Modifiers are a family of masterbatch products designed for use in injection molded applications of virgin polypropylene impact copolymers and recycled polypropylene resins. While polypropylene is a cost-effective material, it is limited with respect to providing a balance of high impact with stiffness and melt flow making it difficult to cost-effectively formulate, design, and process parts. This is particularly the case for recycled polypropylene resins, which typically lack high melt flow and impact properties required for many injection molded applications within consumer, industrial, and automotive markets.

DeltaMax Performance Modifiers maximize the physical properties and processability of polypropylene in a way that transforms the virgin and recycled PP markets. The technology enables converters to enhance the impact and melt flow of their ICP or rPP resins by adding a masterbatch at injection molding machine-side. The net effect is the ability to design parts with higher impact and thinner profiles, run machines with faster cycle times or lower temperatures, reduce the use of costly impact modifiers, and reduce inventory of multiple ICP resins. Additionally, DeltaMax Performance Modifiers allow for the use of recycled PP at equal or better performance levels compared to virgin resins. This creates an opportunity to improve the circular economy and promotes more sustainable manufacturing practices.

DeltaMax Performance Modifiers extend the performance boundaries of PP impact copolymers

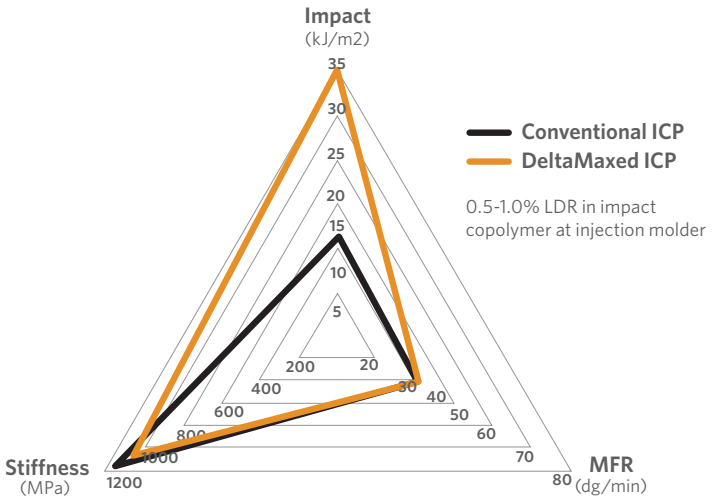




MASTERBATCHES DEFINED

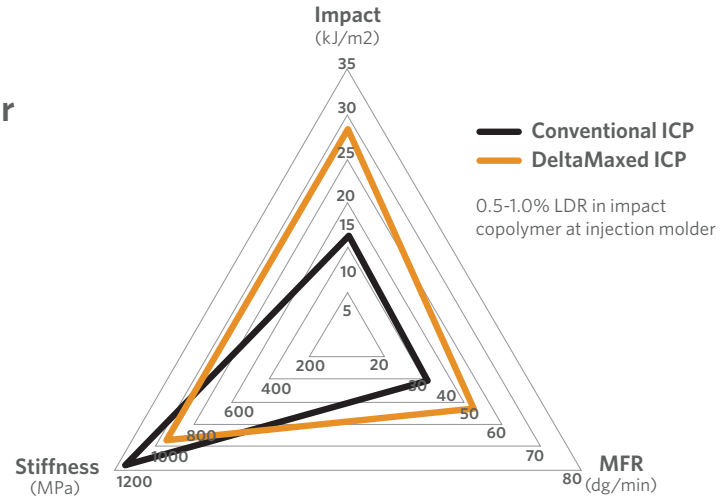
DeltaMax® i300 Impact Enhancer

DeltaMax i300 is a high performance impact enhancer designed for use in injection molded applications of polypropylene impact copolymers and recycled polypropylene resins. DeltaMax i300 maximizes impact performance while optimizing melt flow rate (MFR) for improved physical properties and processability of polypropylene.



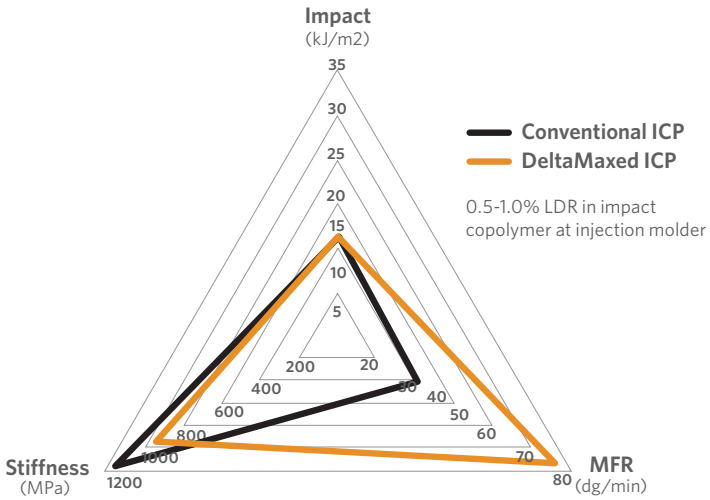
DeltaMax® a200 All-Purpose Modifier

DeltaMax a200 is a high performance impact and melt flow modifier designed for use in injection molded applications of polypropylene impact copolymers and recycled polypropylene resins. DeltaMax a200 provides a strong balance of impact, stiffness, and melt flow rate (MFR) to maximize the physical properties and processability of polypropylene.



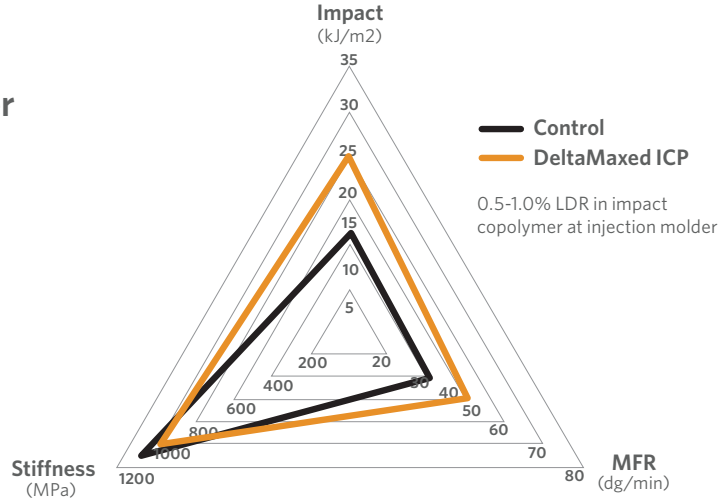
DeltaMax® m100 Melt Flow Modifier

DeltaMax m100 is a high performance melt flow modifier designed for use in injection molded applications of polypropylene impact copolymers and recycled polypropylene resins. DeltaMax m100 increases the melt flow rate (MFR) while providing equal or better impact performance to maximize the physical properties and processability of polypropylene.

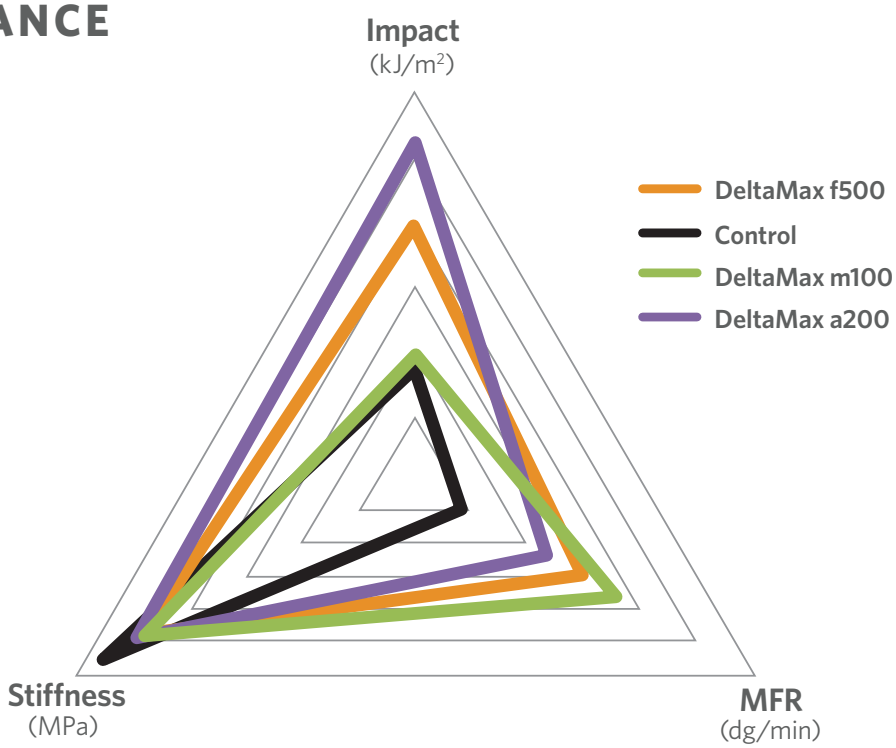


DeltaMax® f500 All-Purpose Modifier

DeltaMax f500 is an all-purpose modifier designed for use in injection molding applications. This additive improves the melt-flow rate (MFR) and impact performance of both polypropylene (PP) impact copolymers and recycled polypropylene (rPP) resins. This new grade offers the additional benefit of being colorless.



PERFORMANCE



Label	Impact (kJ/m²)	MFR (dg/min)	Stiffness (MPa)
DeltaMax f500	40	61	976
DeltaMax m100	20	73	966
DeltaMax a200	52	48	978
Control	18	18	1123

CASE STUDIES

Maximize Impact Properties

An industrial bucket and pail manufacturer is attempting to formulate a high impact, non break solution for a leading retailer.

IMPACT FROM **13 TO 43**

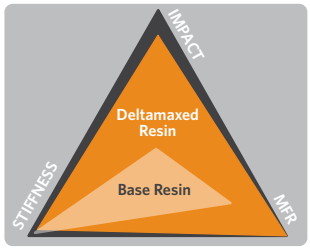
3X IMPROVEMENT **IN IMPACT**

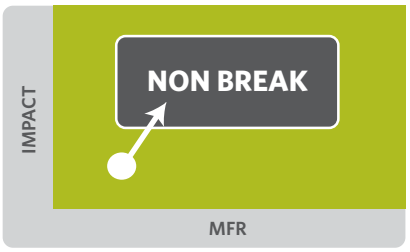
MFR FROM **17-30**

2X IMPROVEMENT **IN MFR**

STIFFNESS FROM **830-800**

MINIMAL CHANGE IN STIFFNESS





Maximize Melt Flow Properties

A housewares manufacturer must reduce production costs by optimizing operating efficiencies and increasing processing speeds.

DECREASED MOLDING TEMPERATURE

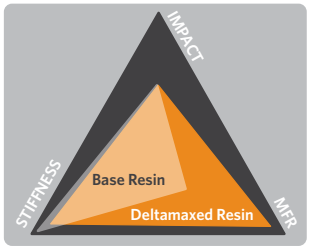
6%

FROM **425°f** TO **400°f**

IMPROVED COST SAVINGS/ PROFIT IMPROVEMENT

$190/T

CYCLE TIME REDUCTION **11%**



7% CO_2 **reduction in CO_2 emissions**

Maximized Sustainability

Based on a new sustainability initiative, a leading housewares manufacturer has been tasked with increasing the amount of recycled plastics being used without sacrificing physical properties.

IMPACT FROM **75 TO 91**

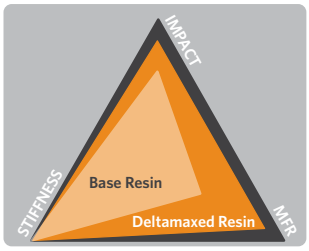
20% IMPROVEMENT **IN IMPACT**

MFR FROM **11-26**

2.5X IMPROVEMENT **IN MFR**

STIFFNESS FROM **1176-1090**

MINIMAL CHANGE IN STIFFNESS



100% **RECYCLED PP and landfill waste reduction**

Milliken®
DeltaMax®
Performance Modifiers
for Polypropylene

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