

RheTech

Polymer Compounding and Color Specialists



Polymer Compounding and Color Specialists

RheTech, Inc.

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- Leading Thermoplastics Compounder
 - ▣ Reinforced Polypropylenes, TPO's and Polyamides
- Founded 1969
- Privately held; Michigan (Ann Arbor) - based
- Four manufacturing facilities in Michigan, Ohio and South Carolina
 - ▣ Whitmore Lake, MI – RheTech, Inc. HQ
 - ▣ Fowlerville, MI – RheTech, Inc. Manufacturing
 - ▣ Sandusky, OH – RheTech Colors – RTC
 - ▣ Blacksburg, SC – RheTech Engineered Plastics – REP

RheTech, Inc. Facilities

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- Whitmore Lake, Michigan
 - ▣ RheTech Headquarters
 - ▣ Engineering and Technical Center
 - ▣ Specialty Extrusion
 - ▣ A2LA Accredited Laboratory
- Fowlerville, Michigan
 - ▣ High Volume Output Extrusion
 - ▣ Compounding and Laboratory





RheVision - Bio Reinforced Polyolefin



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RheVision Overview

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- RheVision is a family of bio fiber reinforced polypropylene / polyolefin
 - ▣ Also can add post consumer polyolefin into some formulations
- Product line is not biodegradable
- Majority of our bio fibers are true waste products. They are not grown for us nor do they take away from food production

RheVision Product Family

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- RheVision Natural Fiber Families
 - ▣ Coconut Fiber - CF Series - New Industry
 - ▣ Flax Fiber - FF Series - Expansion from Existing Industry
 - ▣ Hemp Fiber - HF Series - New Industry ... Commercial Q1 2015
 - ▣ Paper Powder - RP & PP - New Industry
 - ▣ Rice Hull - RH Series - Extended Industry
 - *Ground and unground*
 - ▣ Walnut Shell -WS Series - Expansion from Existing Industry
 - ▣ Wood Fiber - WM & WP Series - Extended Industry
 - ▣ WoodForce -WF Series - Expansion from Existing Industry

RheVision – Green Reinforced Polyolefn

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- Why did we choose these fibers ? Are others available ?
 - ▣ Availability ready to use
 - Others are available but are in a raw state
 - ▣ Offer Repeatable Properties
 - ▣ Offer Benefit
 - Aesthetic
 - Physical Properties
 - Compounds are Lighter Than Traditional Mineral Reinforced Products

Key Benefits - RheVision Molding

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- ❑ Existing Tools Can Be Used.
- ❑ Materials are medium melt flow
 - The nature of natural fibers does not give a true reading under typical melt flow conditions
 - Establish Melt Flow via Spiral Flow Tool
- ❑ Mold Cool
 - No Greater than 400 F
 - Natural fibers will burn.
- ❑ Overall shorter cycle times because lower temperatures are used.

RheVision Automotive Approvals

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- Ford Motor
 - Released a Worldwide Specification For Rice Hull Filled Grade
- Chrysler Corporation
 - Released Approvals for Wood Filled and Rice Hull Filled Grades



RheVision – Automotive Interiors



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Target Materials / Interior Applications

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- Applications That are Currently in Talc Reinforced Polypropylene
 - ★ Bins & Glove Box Inner
 - ★ Arm Rest Inserts
 - ★ Visor Cores

Applicable Natural Fibers

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- ❑ Ground Rice Hulls
 - ❖ Physical Attributes Like Ground Minerals
- ❑ Flax Fiber
 - ❖ Strength
- ❑ Ground Coconut Shell
 - ❖ Hardness

Rice Hulls / Husks

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Flax Fiber

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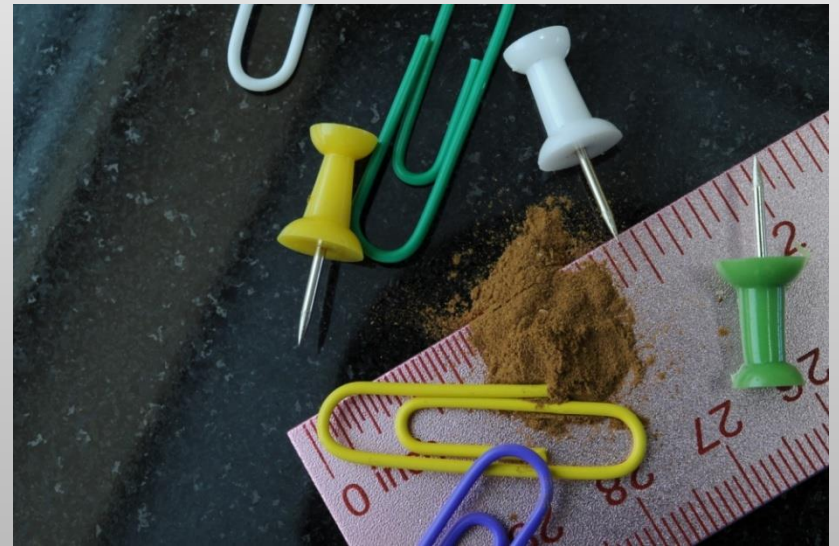
Ground Coconut Shell

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Course Ground Coconut Shell



Fine Ground Coconut Shell



10% Talc vs. 10% Ground Rice

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RTI Nomenclature	T10P250	RH10P325
Generic Description	10% Talc Reinforced	10% Ground Rice Hull Reinforced
Filler Content %	10	10
Specific Gravity	0.98	0.96
Tensile Str. (psi)	3,650	3,300
Flexural Mod (psi)	205,000	150,000
N. Izod (ft-lb/in)	1.1	2
HDT @ 66 PSI F	216	190
HDT @ 264 PSI F	129	135
Mold Shrinkage	0.0145	0.0105

20% Talc vs. 30% Natural Fiber

RTI Nomenclature	T20P100	P30P100	WP30P315	RH30P100
Generic Description	20% Talc Reinforced, Homopolymer - PP	30% Paper Reinforced, Homopolymer - PP	Pine Wood Fiber Reinforced Copolymer - PP	30% Ground Rice Hull Reinforced Homopolymer - PP
Filler Content %	20	30	30	30
Specific Gravity	1.06	1.1	1.02	1.01
Tensile Str. (psi)	4,700	4,600	4,100	4,100
Flexural Mod (psi)	350,000	300,000	420,000	365,000
N. Izod (ft-lb/in)	0.5	0.5	0.7	0.4
HDT @ 66 PSI F	253	235	268	279
HDT @ 264 PSI F	162	140	170	181
Mold Shrinkage	0.012	0.011	0.007	0.0095

20% Talc vs. 30% Natural Fiber

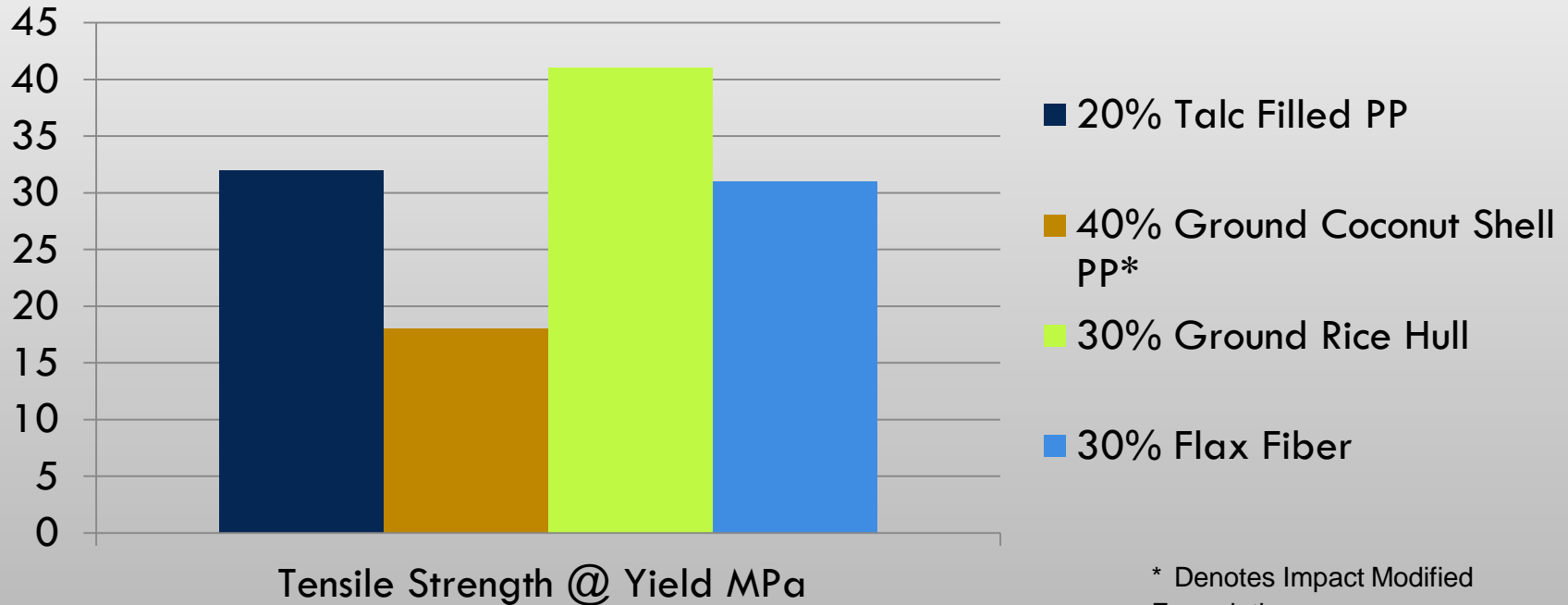
RTI Nomenclature	T20P100	P30P100	WP30P315	RH30P100
Generic Description	20% Talc Reinforced	30% Paper Reinforced	30% Pine Wood Reinforced	30% Ground Rice Hull Reinforced
Filler Content %	20	30	30	30
Specific Gravity	1.06	1.1	1.02	1.01
Tensile Str. (psi)	4,700	4,600	4,100	4,100
Flexural Mod (psi)	350,000	300,000	420,000	365,000
N. Izod (ft-lb/in)	0.5	.5	0.7	0.4
HDT @ 66 PSI F	253	235	268	279
HDT @ 264 PSI F	162	140	170	181
Mold Shrinkage	0.012	0.011	0.007	0.0095

Glass Fiber Vs Natural Fiber

RTI Nomenclature	GC10P100	GC20P100	WP50P200	FF20P100
Generic Description	10% Glass Fiber Reinforced	20% Glass Fiber Reinforced	50% Wood Pine Fiber Reinforced	20% Flax Fiber Reinforced
Filler Content %	10	20	50	20
Specific Gravity	0.98	1.05	1.11	0.97
Tensile Str. (psi)	7,800	9,900	4650	4650
Flexural Mod (psi)	356,000	530,000	735,000	365,000
N. Izod (ft-lb/in)	0.9	1.3	0.5	0.4
HDT @ 66 PSI F	300	315	300	290
HDT @ 264 PSI F	258	282	250	184
Mold Shrinkage	0.005	0.002	0.005	0.005

Natural Fibers with Dow Corning Coupler vs. Filled Polypropylene

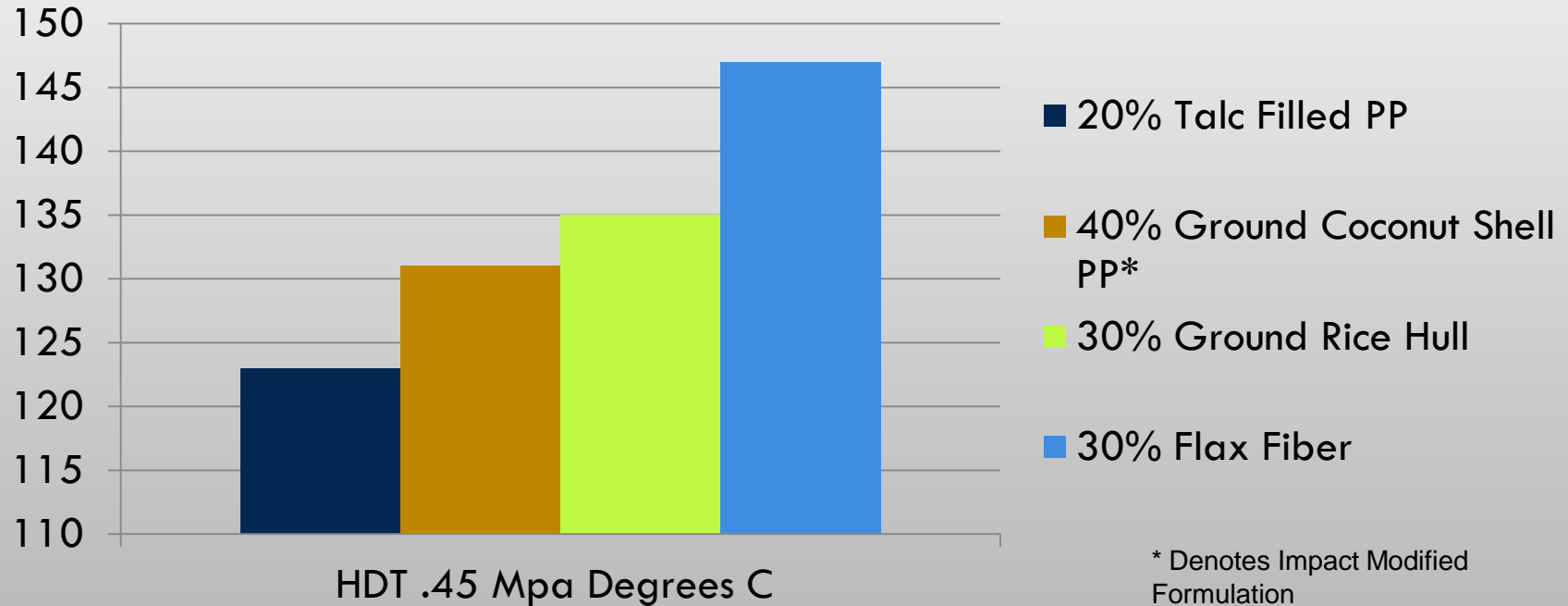
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* Denotes Impact Modified Formulation

Natural Fibers with Dow Corning Coupler vs. Filled Polypropylene

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Future / Conclusions

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- University Bio Plastics Research Centers Are Opening
 - ▣ CB2 at Iowa State www.cb2iastate.edu
- Supply Base Companies Are Expanding
- OEMs are Specifying Natural Fiber / Bio Resins
- New Technologies are Emerging to Enhance Natural Fibers
- Future is Bright !
- Consumers Want Renewable ... But Not at a Huge Premium !
- More Companies ,Regardless of Size, Have Bio Initiatives

Thank You!

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