


RTP *Imagining Plastics*
STRUCTURAL • ELASTOMERS • WEAR • COLOR
CONDUCTIVE • FLAME RETARDANT • FILM/SHEET


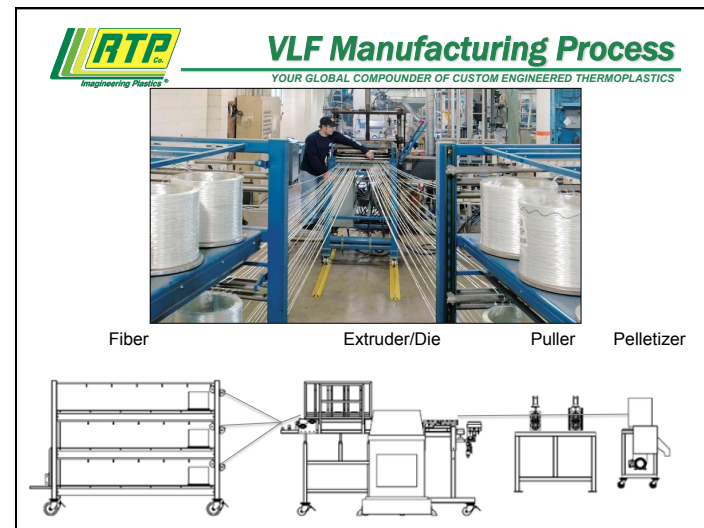
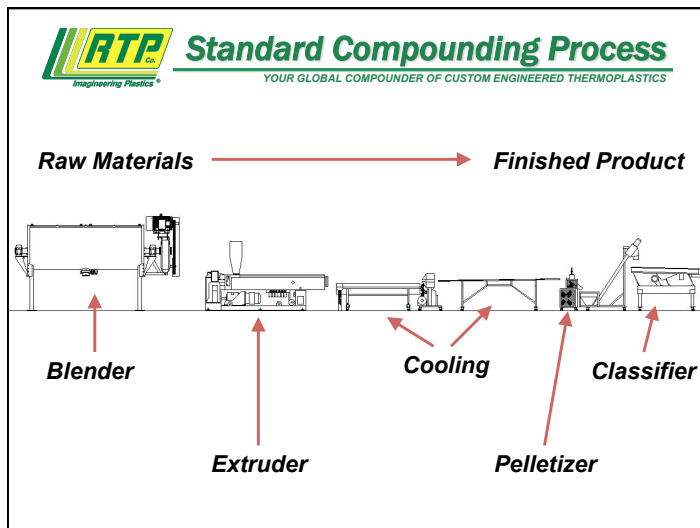


**The Long and Short of It:
 VLF (Very Long Fiber)**

Karl Hoppe
 Sr. Product Development Engineer
 RTP Company

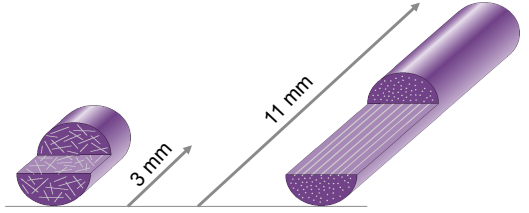
RTP *Imagining Plastics*
Presentation Overview
 YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

- Very Long Fiber (VLF) Intro
- Property comparisons
- Metal replacement
- Case studies

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Pellet Comparison



Short Fiber **VLF**

Fiber Length
~ 1-2 mm 11 mm

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Advantages of Long Fiber



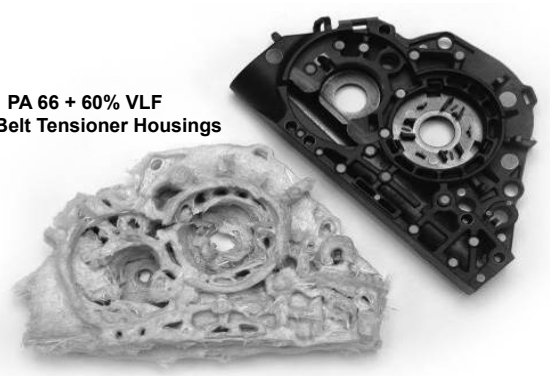
Impact Performance Strength/Stiffness

Creep resistance Reduced Warpage

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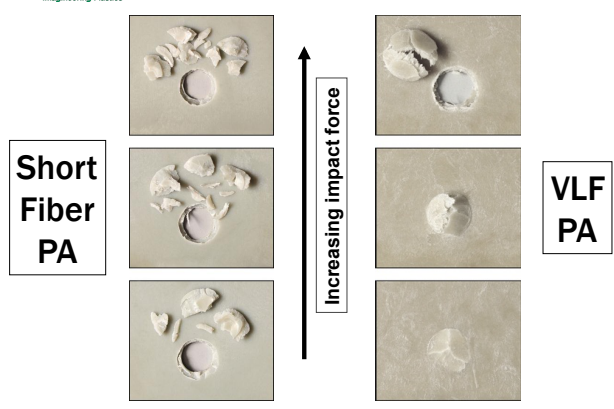
Fiber Skeleton

PA 66 + 60% VLF
Seat Belt Tensioner Housings



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Drop Impact Test



Short Fiber PA VLF PA

Increasing impact force

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Molding Considerations

LONG FIBER COMPOUNDS
Mold Design And Processing Conditions
A Guide to Processing Long Fiber Specialty Compounds
English/Standard and SI Metric

Avoid starting with long fiber and finishing with short fiber!

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Molding Considerations

General guidelines:

1. General purpose screw OK (low compression preferred)
2. Reduce shear: low back pressure and rpm's
3. Reverse barrel temperature profile

preferred:

Three Piece Screw Tip Ring Valve
100% "Free Flow" design
All components made from high quality, high purity tool steel.

Passageways sized to provide smooth open melt flow
High Polish
Precision ground mating surfaces for effective sealing

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Application

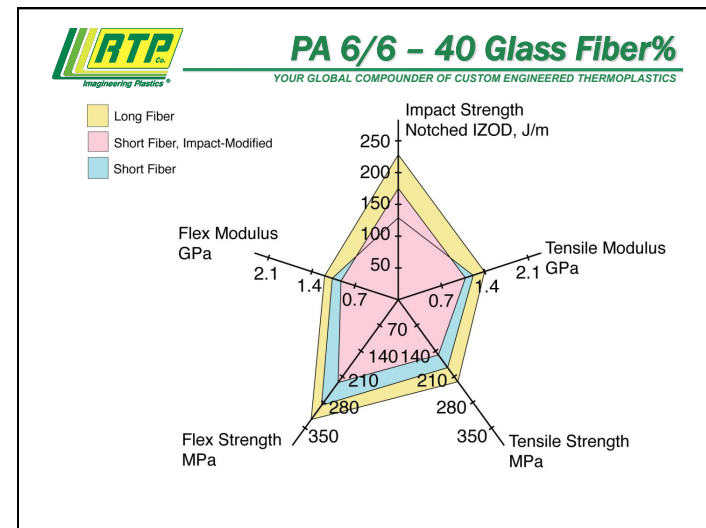
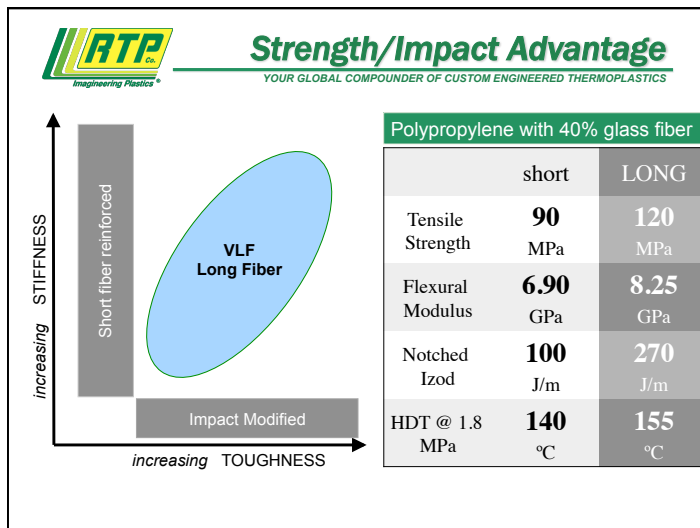
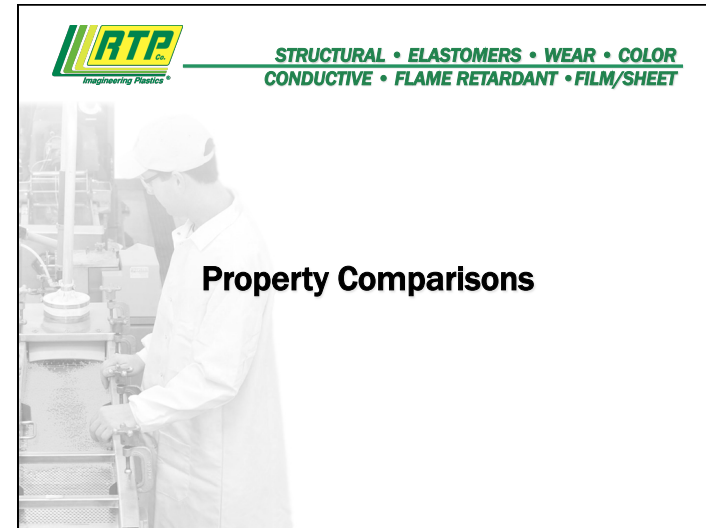
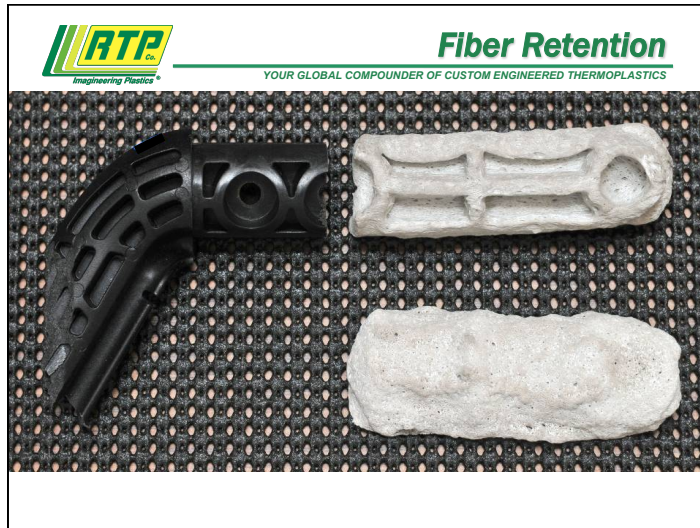
Market: Recreation
Application: Side Block Plate
Problem: Dimensional stability due to moisture, mechanical performance
Solution: VLF Nylon 6/10
Benefit: Stiff and tough with low moisture absorption

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First Question Break

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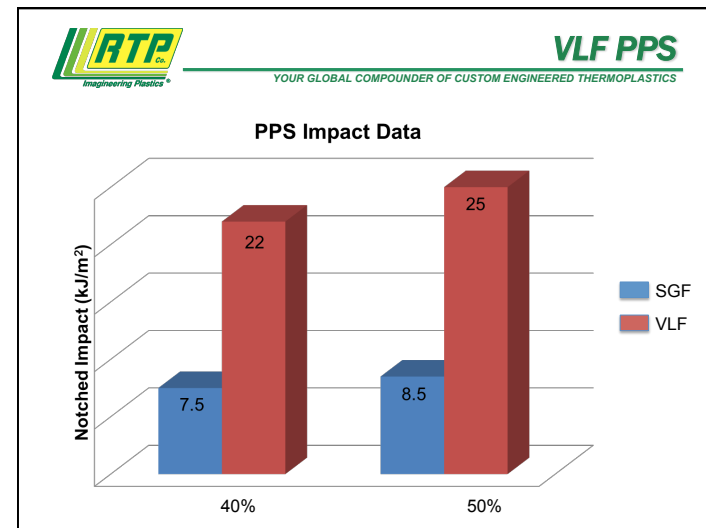
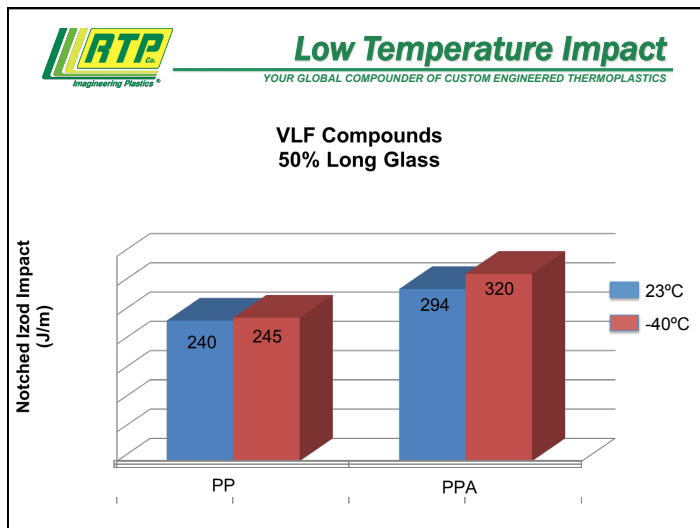


PA vs. PP
YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS


	30% Short Glass Polyamide 6/6		40% Long Glass PP
	(Dry as Molded)	(50% RH)	
Tensile Strength (MPa)	186	124	120
Flexural Modulus (GPa)	9.0	6.2	8.25
Izod Impact (J/m)	120	135	270
Specific Gravity	1.38		1.21
HDT (°C)	250		155

Application: Auto Shifter Base
YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

Market: Automotive
Application: Shifter Base
Problem: Cost reduce from metal part
Solution: VLF PP
Benefit: Selected over Short Glass Nylon for better cost position. Net molded part offered part consolidation.



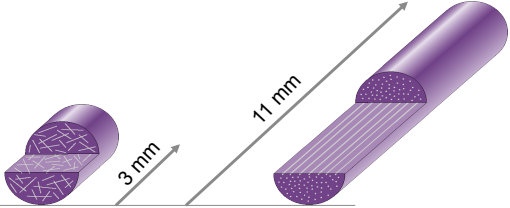
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Second Question Break

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Pellet Comparison



Short Fiber VLF


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 YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

Fiber Comparison



Short Fiber VLF

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Metal Replacement

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- Reduce cost
- Reduce weight
- Design freedom
- Corrosion and chemical resistance
- Sound and vibration dampening

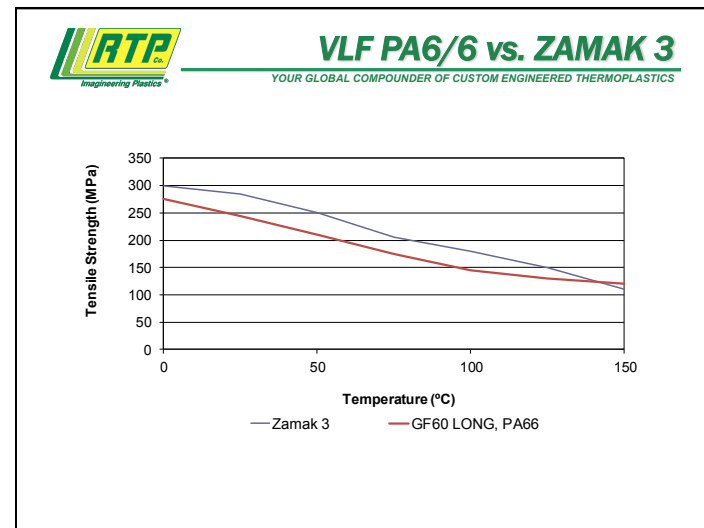


RTP *Imagining Plastics* **ZAMAK**
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- ZAMAK alloys are the designer's first choice when considering die casting.
 - Z for Zink (zinc)
 - A for Aluminum
 - MA for Magnesium
 - K for Kupfer (copper)
- ZAMAK 3: This is the most widely used general purpose zinc die casting alloy

RTP *Imagining Plastics* **Instantaneous Properties at 23 °C**
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	Zamak 3	60% VLF PA 6/6
Specific Gravity	6.6	1.7
Tensile Strength (MPa)	282	275
Flexural Modulus (GPa)	85.5	19.3




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YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

Application: Fastening Tool

Market: Industrial
Application: Fastening Tool
Problem: Metal design too heavy, slow to fire and reload
Solution: VLF Nylon
Benefit: Redesign in VLF Nylon reduced weight and improved efficiency for reloading and firing, also reduced worker fatigue.



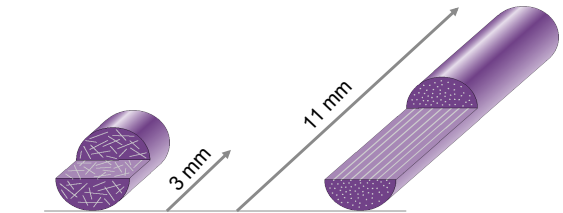
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Third Question Break

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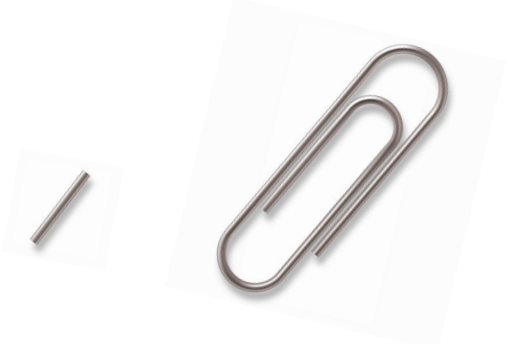
Pellet Comparison




Short Fiber **VLF**


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Fiber Comparison







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Combining Technologies



Combining Technologies
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Polymers	Additives	Long Cut dry blends
PEEK PPS PBT TPU PP PA PC	Your color – Your way Impact enhancement Flame retardants Wear & lubricity Heat stabilizers Nano particles UV resistance Conductivity Taggants Spheres Anti-stat	



Application: Axe Handle
YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS


Market: Consumer
Application: Axe Handle
Problem: Wood handles lack innovative design, ability to mass produce
Solution: VLF PP/TPE overmold
Benefit: Strength and stiffness with compatibility with TPE overmold for ergonomics.




Application: ATV Bead Lock Rings
YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

Market: Recreational Vehicle
Application: Bead Lock Ring
Problem: Carbon fiber material too expensive
Solution: Impact Modified, VLF Nylon
Benefit: Improved ductility over standard VLF. Offered cost-effective, colorable solution to previous material





Summary
YOUR GLOBAL COMPOUNDER OF CUSTOM ENGINEERED THERMOPLASTICS

- Increase impact, retain stiffness
- Take advantage of plastic design
- Combine technologies



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Thank you!