

- ▶ Exceptional strength, stiffness, and impact resistance
- ▶ Performance maintained at extreme high and low temperatures
- ▶ Easily injection molded into complex geometries, large or small

KEY BENEFITS

- Increased performance levels above short fiber reinforced thermoplastics
- Long term resilience to heat exposure, creep, and fatigue resistance
- Low densities provide high strength-to-weight ratios
- Low shrinkage rates improve dimensional accuracy and resist warpage
- Suitable for molding on common, general purpose equipment
- Primary polymers include: PP, PA, PPA, RTPU
- High Temperature polymers include: PEEK, PEI, and PPS
- Custom designed formulas with added technologies such as UV resistance, color, and flame retardancy available

Imagine lightweight, super strong, and extremely durable engineered thermoplastic compounds that can be injection molded into complex shapes which outperform more expensive thermoplastics... compounds that provide a viable alternative to die cast metals and may reduce both weight and costly secondary operations. At RTP Company, we not only imagined them, we've made them a reality.

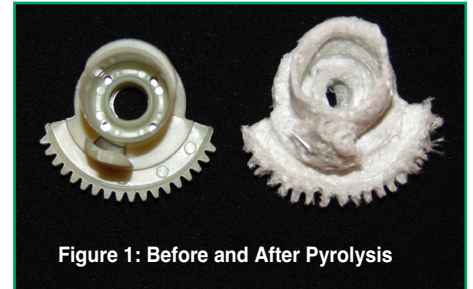


Figure 1: Before and After Pyrolysis



Very Long Fiber (VLF) compounds made from our proprietary pultrusion process yield pellets with completely wet out and encapsulated fibers. In molded articles, these long fibers (visible after pyrolysis, Figure 1) are more capable of resisting deformation and handling the transfer of stress caused by external forces. Additional additive technologies may be incorporated to create robust compounds that are designed to meet demanding performance requirements, including strength and impact at extremely high and low temperatures. The achieved performance levels make these compounds suitable for use in applications previously out of the domain of plastic, including high load bearing under-the-hood automotive components, aerospace brackets, and lightweight sporting goods.

When performance is critical, VLF compounds have high strength-to-weight ratios, very low creep, fatigue resistance, and extend their usefulness even as the temperature exceeds the glass transition point of the polymer. Adding other technologies* as required and the general benefits of the chemical resistance of polymers make these compounds a valuable candidate in many market segments.

Very Long Fiber compounds, another solution from your global leader in engineered thermoplastics.

**UV resistance, color, flame retardancy, wear and others*

Available worldwide. Manufacturing locations: China, Europe, Mexico, USA (Minnesota and Indiana).



RTP Company Corporate Headquarters • 580 East Front Street • Winona, Minnesota 55987 USA
 website: www.rtpcompany.com • email: rtp@rtpcompany.com • Wiman Corporation • +1 320-259-2554

TELEPHONE:

U.S.A.	SOUTH AMERICA	MEXICO	EUROPE	SINGAPORE	CHINA
+1 507-454-6900	+55 11 4193-8772	+52 81 8134-0403	+33 380-253-000	+65 6863-6580	+86 512-6283-8383

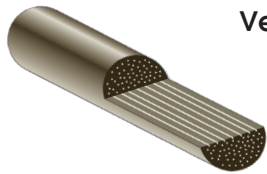


Physical Properties of selected Very Long Fiber Compounds

Polymer	PP	PA66	RTPU	PPA	PPS	PEI	PEEK
VLF Reinforcement (wt %)*	VLF50	VLF50	VLF50	VLF50	VLF50	VLF50	VLF50
Density/Specific Gravity (g/cm³)	1.33	1.57	1.60	1.64	1.73	1.68	1.70
Tensile Elongation (%)	2.0	2.2	2.5	2.0	1.0	1.0	1.5
Tensile Strength @ 23°C (MPa)	140	260	230	275	170	195	230
Tensile Modulus - 5mm/min @ 23°C (MPa)	12500	16000	14000	18000	18500	17000	17000
Notched Izod @ 23°C (kJ/m²)	28	34	43	38	25	20	18
Unnotched Izod @ 23°C (kJ/m²)	70	88	93	56	35	48	75
Notched Charpy @ 23°C (kJ/m²)	23	41	44	42	28	24	20
HDT @ 1.8 MPa (°C)	155	250	115	288	265	207	315
Mold Shrinkage after 48 h @ 23°C - flow (%)	0.20	0.18	0.15	0.20	0.15	0.15	0.20
Flexural Modulus @ 23°C (MPa)	11000	15000	14000	18000	18500	17000	18000
Flexural Strength @ 23°C (MPa)	220	400	350	400	290	290	350
Specific Tensile Strength	98	166	144	168	98	116	135

*For precise performance requirements, VLF compounds with 20-60 wt. % are available.

Characteristics of Very Long Fiber and Short Fiber Pellets



Very Long Fiber pellets:

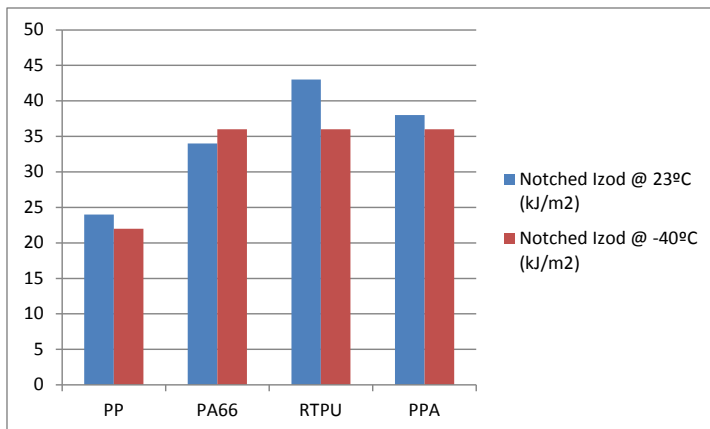
- 11mm long
- Fibers are continuous through the length of the pellet
- Fibers are fully wetted with thermoplastic resin



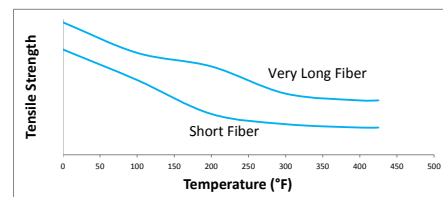
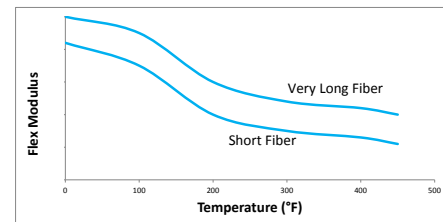
Short Fiber pellets:

- ~ 3mm long
- Random fibers vary in length and orientation through the pellet

Impact Strength at Extremely Low and Ambient Temperatures



VLF Compounds Improve Performance at Elevated Temperatures



RTP Company: Your Global Compounder Of Custom Engineered Thermoplastics

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