

Toyobo Develops JF-30G Glass-fiber Reinforced Nylon Resin with World-class Strength, Modulus and Impact Resistance

Toyobo Co., Ltd. has developed the JF-30G glass-fiber reinforced nylon resin, which provides world-class strength, modulus and impact resistance as a glass-fiber reinforced resin. The JF-30G combines superior strength, modulus and impact resistance with the moldability of conventional glass-fiber reinforced nylon resins. Expected applications include automobile parts (which face growing demands for weight reduction), and casings for such mobile devices as cellular phones and note PCs and other equipment.

1. Development Background

Iron, aluminum and other metals have high strength but because they are heavy, they are difficult to process for molding detailed shapes, and pose other problems. In contrast, engineering plastics are light and easily molded.

Toyobo is developing sales of nylon resins, polyester resins, polyphenylene-sulfide resins and other engineering plastics. Nylon resins are used in diverse fields because they provide superior chemical resistance, mechanical characteristics and electrical characteristics, and offer good moldability. Toyobo increased the strength, modulus and impact resistance by using glass fiber to reinforce the nylon resin. In recent years, engineering plastics with high strength, modulus and impact resistance have been replacing metals especially in automobile parts (which face growing demands for weight reduction) and casings for mobile devices.

2. Product Characteristics

(1) World-class Strength, Modulus and Impact Resistance as a Glass-fiber Reinforced Resin

The JF-30G applies Toyobo's proprietary resin-design and compounding technologies to achieve world-class strength, modulus and impact resistance among glass-fiber reinforced resins. Patents are pending.

Compared with metals, the JF-30G makes it possible to reduce weight while minimizing thickness. Compared with conventional glass-fiber reinforced nylon resins, the JF-30G can be made lighter and thinner. The strength, modulus and impact resistance are comparable to those of carbon-fiber reinforced resins.

	JF-30G	Toyobo Glass-fiber Reinforced (50%) Resin	Iron	Zinc	Carbon-fiber Reinforced Resins
Specific gravity	1.87	1.57	7.8	6.7	1.57
Strength:flexural strength (MPa)	520	320	500	490	500
Modulus:bending modulus (GPa)	28	17	210	100	43
Impact resistance: Charpy impact strength (kJ/m ²)	35	17	—	—	20

(2) Moldability Equivalent to Conventional Glass-fiber Reinforced Nylon Resins

The JF-30G has moldability equivalent to conventional glass-fiber reinforced nylon resins, and can be molded using conventional injection molding machine. Compared with metal processing and the manufacturing of carbon-fiber reinforced resins, the molding is easy, the costs are far lower, and the CO₂ emissions in manufacturing are greatly reduced. Using JF-30G can also accelerate development speed as the costs of capital investment and examining conditions are small.

(3) High Stability of Molded Products

The JF-30G has an extremely low water absorption coefficient compared with prior glass-fiber reinforced nylon resins, at just 0.6% (at 23° C indoors), so the JF-30G has the physical properties of low temperature dependence and low warpage as additional characteristics.

3. Future Developments and Sales Plans

The JF-30G and newly developed grades using this technology will replace metals in automobile parts (which face growing demands for weight reduction) and casings for mobile devices.

Toyobo has already initiated sample work with Japan and overseas, mostly for automobile parts manufacturers, and is preparing a commercial production system. The company has adopted a sales target of ¥8.0 billion in FY 2015.

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