

## Technical Article

### High Performance Crossover Materials for Fabricators

By Michael J. Gehrig

For The Plastics Distributor and Fabricator Magazine

The development of High Performance Forming Materials over the last two years is presenting unique opportunities for fabricators of thin section materials. Material developments have included resins never before available in thin section configuration as well as dramatic property improvements on standard engineering materials such as nylons and acetals.

The most dynamic of these new materials is polyphenylene sulfide, PPS. A long time favorite for injection molders and heavy stock shapes fabricators, PPS is now available in a wide range of formulations for thin section applications. When the demand for high heat capacities, up to 450°F, or aggressive chemical resistance is required, PPS is the thermoplastic of choice.

As PPS is available in a wide range of sizes, the formulations are just as varied. PPS products are available in neat grades for high purity and medium heat conditions. Impacts modified grades, with and without glass reinforcement, are available for high traffic and heavy handling applications. Glass reinforced grades go as high as 40% filled and provides extremely high strength to weight ratios with maximum heat capacities. All grades of PPS are inherently flameproof.

The applications for fabricators range from stamped washers and spacers to dual laminate chemical tanks. The major marketplaces, automotive, aerospace, medical, electronics, are all familiar with the attributes and properties of PPS so specification cycles are accelerated. The fabrication processes for PPS are conventional and the material requires no special considerations. PPS may be bonded with common urethane and epoxy adhesives without any preparation. Welding processes include ultrasonic as well as hot flame or hot air. Welding rods are available to compliment all grades. Finished parts may also be painted with urethane and epoxy finishes without any surface preparations.

Nylons are also offering new potentials in the thin section market. The formulations developed for thermoforming require higher melt strengths, as a by product of this development new property sets have emerged. Enhancements include higher heat capacities, over 60°F higher than previously available, higher tensile and elongation factors, and greater UL94 ratings.

These new nylon offerings are expanding the market window for nylon products in new and challenging applications. With continuous service ratings of 285-325°, depending upon the grade and formulation, these nylons are going where nylon has never gone before. The variety of the offering includes both type 6 and type 6/6 resins with and without glass reinforcement. These resins are typically heat ageing stabilized and dry impact modified.

The fabrication techniques required for these enhanced nylons does not vary from conventional nylon fabrication processes. The only consideration would be the life of cutting devices on glass filled products.

New acetal offerings have also hit the market in both homopolymer and copolymer formulations. Homopolymer improvements include varied property sets as well improvements in surface decorability. The ability to paint and print on acetal surfaces has been very well received in the injection markets. Copolymer formulations have widened to include glass filled formulations that offer increased strength to weight ratios and expanded mechanical properties.

As these new acetals offer wider and deeper market applications for fabricators the fabrication process remains again largely unchanged. Conventional methods and yields still prevail for fabricators. This expansion of the markets is also fueling further development in acetal resins. Development is currently underway on materials that will provide reduced center line porosity and even higher mechanical properties.

All of these new materials are available as sheets, strips, and rolls from .010in to .250in thick in widths up to 50 inches. Thin strips are available for stamping fabricators as narrow as .250in. wide. These materials are also available with optional fabric backings for gluing applications and a wide range of laminate finishes for specific and demanding applications.

Fabricators may also take advantage of a wide range of High Performance Forming Materials developed in polyesters, thermoplastic elastomers, cyclic olefin copolymers, and other high performance engineering resins targeted at the thermoforming markets. The time has come where fabricators can compete on an even playing field in a growing global market for high performance applications that were previously unavailable to them due to material availabilities.

For further information contact David A. Pincin, National Sales Manager, ENSINGER/PennFibre 800-662-7366 or [penninfo@pennfibre.com](mailto:penninfo@pennfibre.com).