

Jigs and Fixtures: Material Selection and Additive Manufacturing Considerations

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On factory floors of every kind, jigs and fixtures function as a vital part of industry and manufacturing processes. From simple fixtures to complex jigs, these parts allow manufacturers to save time and money.

Though jigs and fixtures are crucial for manufacturing, traditional production methods for these parts, including CNC machining and injection molding, have limitations. To start, CNC machining produces an extensive amount of material waste, requires expensive labor and equipment, and is not equipped for parts with complex geometries. When manufacturers run into these issues, many turn to injection molding for their jigs and fixtures. Though injection molding solves some of these issues, it offers limited material selections for molds and the cost of the equipment and mold creation process makes it difficult to realize an ROI unless the product order is massive.

When these traditional methods fail, employing additive manufacturing to create jigs and fixtures can open opportunities for printing parts with complex geometries and specific material specifications that are unachievable with injection molding and CNC machining. This allows industries that require flexible materials, high temperature and solvent resistant plastics, and ESD-safe filaments, to create novel jigs and fixtures that can help them capture previously unattainable returns.

MATERIALS SELECTION

The availability of these unique and innovative materials is one of the largest factors when creating novel jigs and fixtures. Today I will focus on TPU 58D-AS (Thermoplastic Polyurethane) and how it is transforming jig and fixture creation in various industries. This newer material features several primary features that make it an excellent choice for any factory floor, including electrostatically sensitive environments.



The first feature is non-marring properties. Reducing the possibility of damage to a part is extremely important on any factory floor. Whether that part can be damaged by mechanical features or electrostatic, having a material that protects it, saves time and money. In addition to protecting sensitive parts, TPU 58D-AS covers can also protect humans from injuries by softening hard or sharp surfaces.

The second feature is flexibility. The flexible properties in the material, allow manufacturers to use jigs and fixtures made of TPU 58D-AS in applications such as interference fits. Eliminating the need for fasteners.

The third feature is variable damper properties. Users can adjust perimeter lines and infill percentages to create 58D-AS parts that can be stiff or springy depending on the requirements for the application. This is ideal for ergonomic applications since parts can be customized to an individual's personal preferences.

Finally, the last feature is color customization. TPU 58D-AS is produced in a variety of colors that can act as distinct visual indicators. This allows users to color-code parts for specific uses, for appropriate departments, or for contamination issues. For example, to increase factory floor safety, dangerous parts can be printed in red, helping employees quickly recognize hazards.

These features open up opportunities for innovative applications in various industries like a TPU 58D-AS tool insulator boot. This specific boot would be placed on a tool that is used during a manufacturing process to prevent damage to the manufactured product. For this application, the TPU 58D-AS is especially useful for protecting against damage from handheld static electricity accumulation. The anti-static properties of this material prevent possible damage to electronic parts caused by unexpected electrostatic discharge. Additionally, this part could be custom designed to protect parts from a variety of manufacturing tools, from handheld devices to installed tools and holders.



The features of these novel materials paired with the agility and speed of the HSE 3D Printing Platform make quick design to prototype possible for limitless applications.

Essentium, Inc. provides industrial 3D printing solutions that are disrupting traditional manufacturing processes by bringing product strength and production speed together, at scale, with an open ecosystem and material set. Essentium manufactures and delivers innovative industrial 3D printers and materials enabling the world's top manufacturers to bridge the gap between 3D printing and machining and embrace the future of additive manufacturing.