



## APPLICATION GUIDE:

# Manufacturing Tools: Modular Fixtures

TIME REQUIRED ■■■ COST ■■■ SKILL LEVEL ■■■

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## OVERVIEW

A modular fixturing system is a versatile alternative to a single-purpose, dedicated fixture. Constructed from a kit of interchangeable components, the modular fixture is easily reconfigured for any workholding application. When not in use, the fixture can be dismantled for convenient storage.

Modular systems are ideal for intermittent or one-time use. They are commonly used to:

- Stage parts for CMM inspections
- Hold work pieces during machining
- Position parts when bonding or assembling

For these applications, the modular system saves time and reduces cost.

While the majority of the modular fixture is constructed from standard components, the interface is custom made with FDM technology on a Fortus 3D Production System. At each support point, an FDM contact element acts as the transition from the part's surface to the fixture's grid plate, pillar or beam. These contact elements can be manually designed in CAD, but this design effort may take more time than that to construct the FDM elements.

The Magics RapidFit module provides a faster and easier way to create the STL files for the custom FDM elements. This software, created by Materialise, automates the digital design process. With just a few mouse clicks, the files are ready for building on a Fortus system. Just a few hours later, the fixture is assembled and ready for use.

### Supplies:

- Modular system (Alufix, Rexroth, Rayco or similar)
- Magics software with RapidFit module
- Assembly board

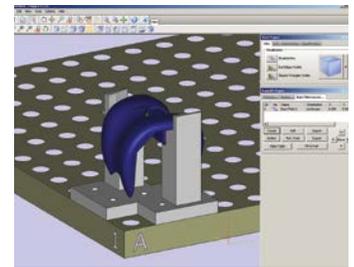


Figure 1: In RapidFit, orient the part (blue) and grid plate. The contact elements (gray) are created automatically.

## PROCESS DESCRIPTION

### 1. DESIGN FIXTURE:

Option A - Use CAD program

Option B - Use Materialise RapidFit

1. Import the STL file of the part to be fixtured into Magics RapidFit. Also, import or create the files for the modular components of the fixture.
2. Begin the design by positioning the part, grid plate, pillars and beams in the desired configuration (figure 1).
3. To create the custom contact elements, select the fixture support points and specify the type of contact to use and the direction to the grid plate. The RapidFit software will automatically create the contact elements and label each with a location and part name. RapidFit also documents the assembly plan.

# MANUFACTURING TOOLS: MODULAR FIXTURES

## 2. MANUFACTURE FIXTURE COMPONENTS:

Import the STLs of the contact elements into Insight and prepare them for building. All Fortus materials and build styles may be used. However, ABS-M30, PC, PC-ABS with soluble supports and a solid fill are recommended.

When the build is complete, simply remove the support structures and proceed to assembly (figure 2).

## 3. CONSTRUCT FIXTURE:

Gather the grid plate, pillars, beams and FDM components. Following the assembly instructions, place the FDM components on the beams and pillars, and connect the beams to the grid plate. The modular fixture is now ready for its inspection or manufacturing application (figure 3).

## SUPPLIERS

Materialise ([www.materialise.com](http://www.materialise.com))

Horst Witte ([www.horst-witte.de/index\\_en.php](http://www.horst-witte.de/index_en.php))

Rayco Industries ([www.raycofixture.com](http://www.raycofixture.com))



Figure 2: FDM contact elements designed to support an artificial knee.

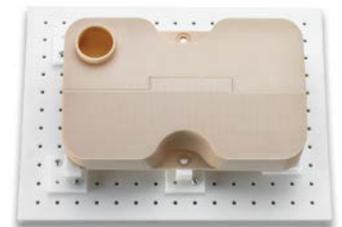


Figure 3: Modular fixture system, with the grid plate and all contact elements made from FDM, supports a tank during an assembly operation.

## FDM PROCESS DESCRIPTION

Fortus 3D Production Systems are based on patented Stratasys FDM (Fused Deposition Modeling) technology. FDM is the industry's leading Additive Fabrication technology, and the only one that uses production grade thermoplastic materials to build the most durable parts direct from 3D data. Fortus systems use the widest range of advanced materials and mechanical properties so your parts can endure high heat, caustic chemicals, sterilization, high impact applications.

The FDM process dispenses two materials—one material to build the part and another material for a disposable support structure. The material is supplied from a roll of plastic filament on a spool. To produce a part, the filament is fed into an extrusion head and heated to a semi-liquid state. The head then extrudes the material and deposits it in layers as fine as 0.005 inch (0.127 mm) thick.

Unlike some Additive Fabrication processes, Fortus systems with FDM technology require no special facilities or ventilation and involve no harmful chemicals and by-products.

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