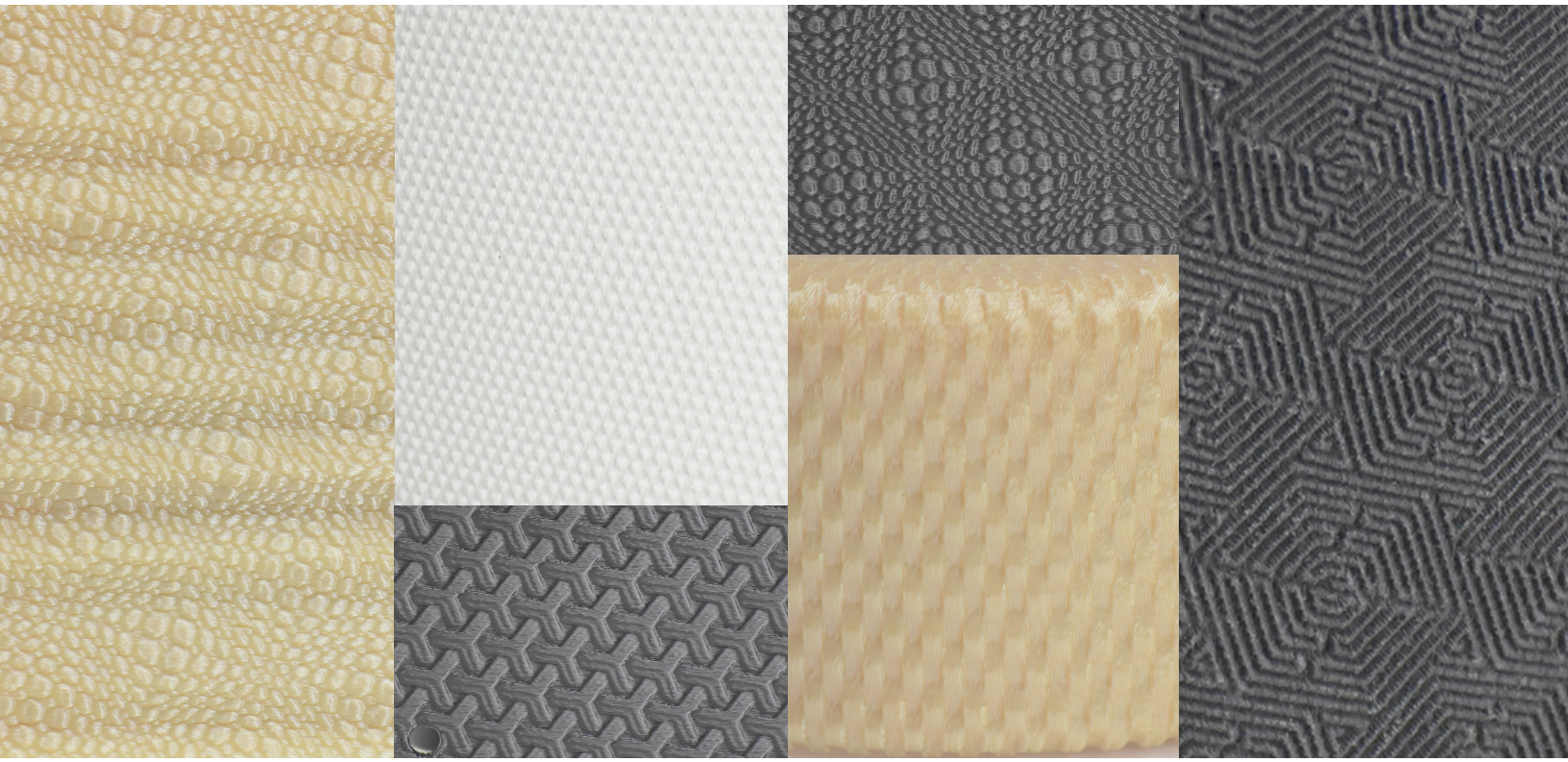
# Creating Texturing Patterns on FDM Parts

When producing FDM® parts that will be installed in user-facing applications, or when FDM prototypes need to have a more interesting appearance, surface profile and finish are critical. Texturing a part file allows for a unique pattern or design to be built directly into part surfaces, reducing the layer line visibility as well as post-processing time. Coatings and paint can be applied directly to the textured surface to create a finished part.

## Advantages

- Improve printed appearance
  - Appearance can mimic injection molded parts, similar to surfaces produced by Mold-Tech patterns in injection molding
- Reduce post-processing
- Customization capabilities
- Ability to build branding into the part
- Match textured parts already in production

# Examples of Achieved Textured Surfaces



## Software for Texturing

There are various software packages for applying a texture or bump map to the part file prior to building. Materialise's 3-matic Texturing Module has been used for the characterization of building textures into the parts. Other software packages that can apply bump maps to the part include Adobe Photoshop and Rhino.

## Texturing Computer Recommended Specs*

*Assuming use of Solidworks, 3-matic, Insight & Control Center

**CPU:** Intel i7, at least 3.4 GHz

**RAM:** Minimum 16 GB, DDR4

**Memory:** 1TB SSD

**GPU:** GTX 1070 or GTX 1080

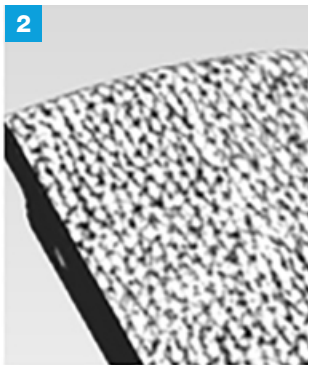
- A gaming card works better than a CAD card due to the need for better graphics on a single part instead of large CAD assemblies.

**Motherboard:** ATX, something with flexibility to upgrade later if more RAM is required.

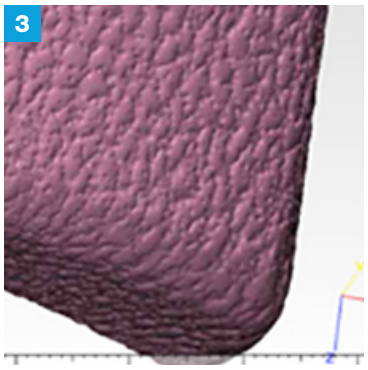
## Applying a Texture Using 3-matic

1. **Import the CAD file into 3-matic:** The texture application occurs after the CAD file has been created. 3-matic is able to import a variety of file types including IGES, STEP, Solidworks part, Pro-E part and STLs.
2. **Define the surface:** Using the 3-matic tools, mark and define the surface that is to be textured. Importing a CAD file instead of an STL sometimes makes this step easier with surfaces already defined.
3. **Select a texture image:** 3-matic provides a texture library with the software; however the users are able to select their own image. The image is converted into a displacement map with the depth correlating to grayscale of the image. Images can be of geometric or natural patterns as well as branding, words or photographs.
4. **Apply 2D texture:** Apply the texture to the selected surface. In this step, variables such as the image size and rotation are selected. These values can be refined to adjust the texture appearance.
5. **Apply 3D texture:** The depth of the texture is selected and the UV map is converted into a displacement map.
6. **Export, process and build the part:** The textured part is exported as an STL. Perform normal part processing using Insight or GrabCAD Print™. After building the part, enjoy the improved aesthetics and reduced post-processing needs.

Define Surface




Apply 2D

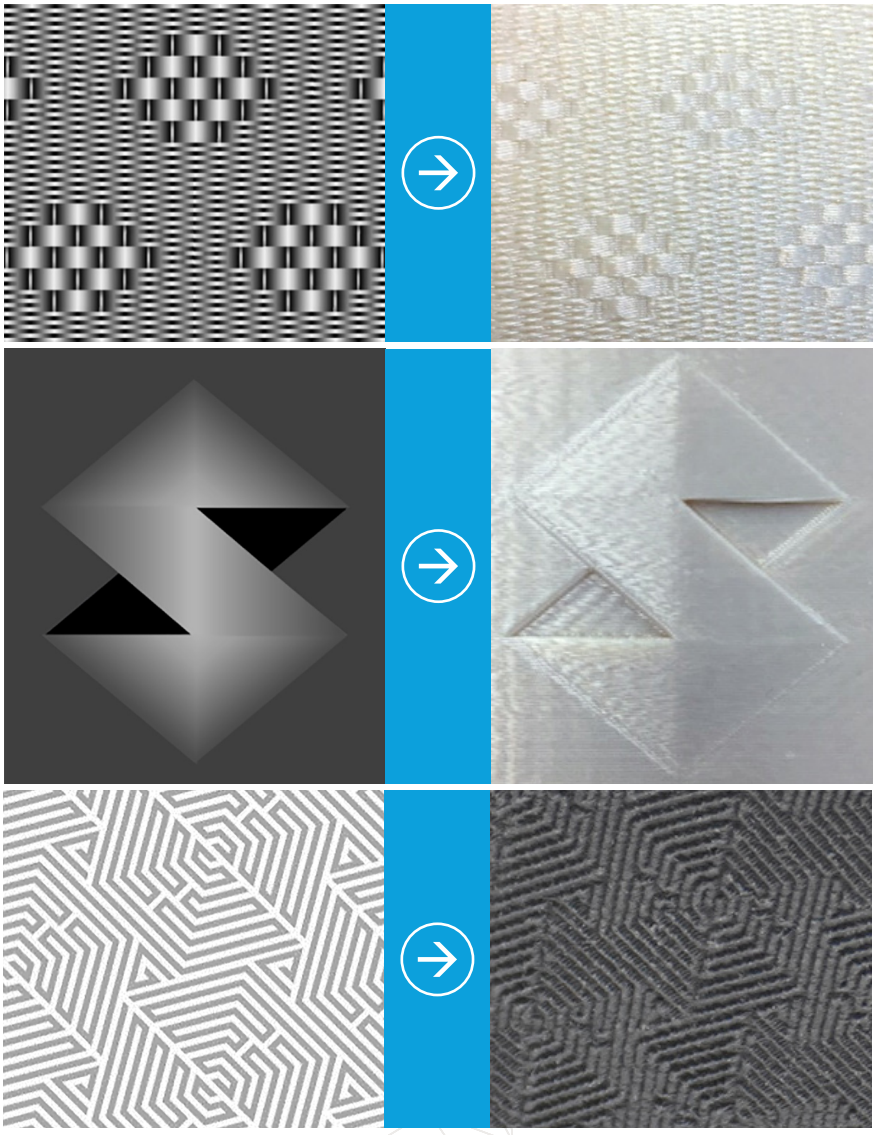


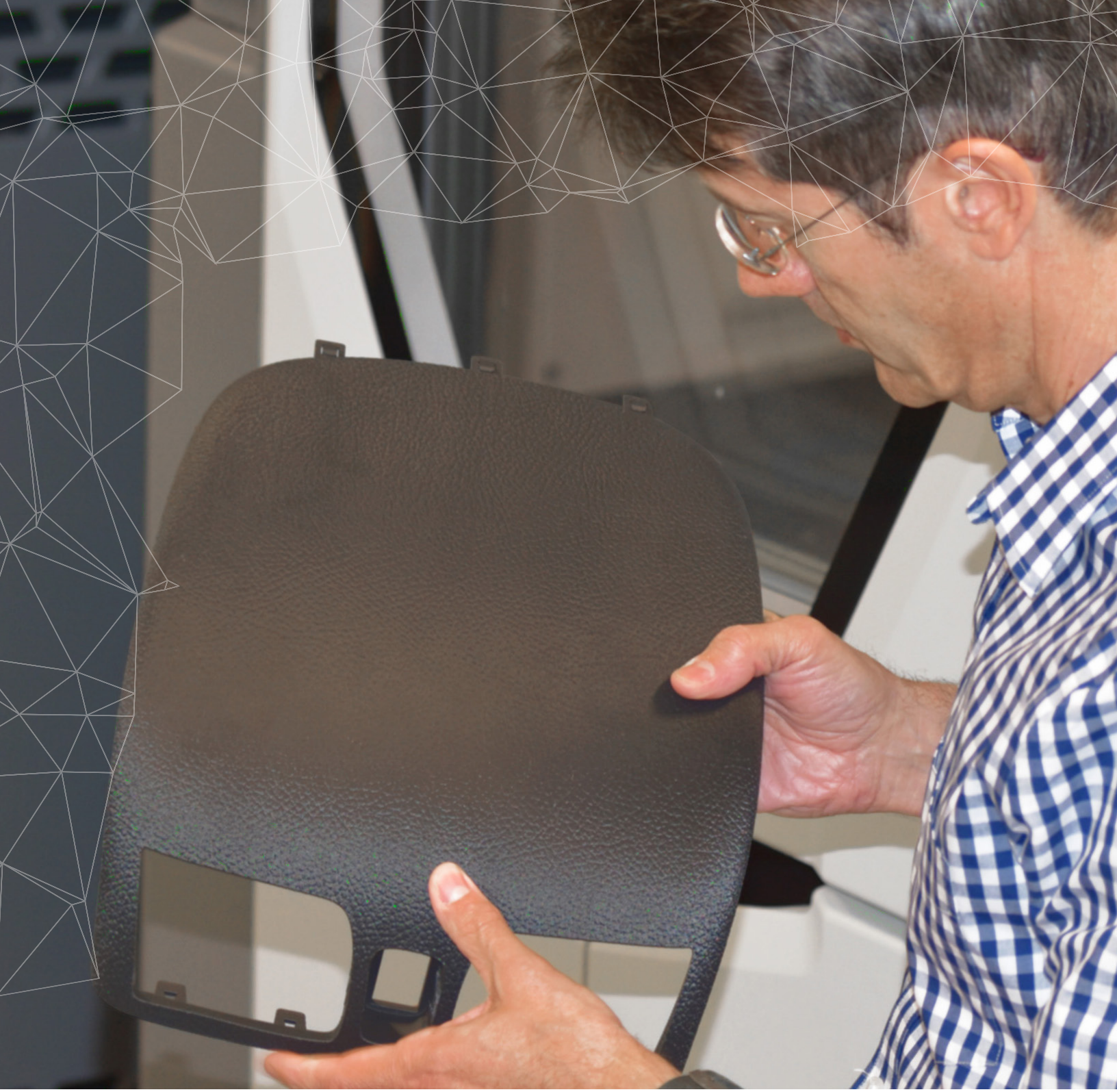

2D to 3D

### Additional Considerations for Texturing AM Parts

- **Texture image:** If the image is of poor quality, this will also affect the appearance of the texture. An ideal image is grayscale with good resolution and well-defined color gradients to create a clean texture. If the image is going to be repeated over the part, the image needs to be continuous between the opposing edges when tiled.
- **Build orientation:** The build orientation affects the finish of the texture. Vertically built textured faces have the best finish, whereas faces that are flat may only have random effects of the texture.
- **Stair stepping:** Areas that would normally be stair-stepped will still exhibit this effect even with a texture. To prevent this, parts should not be orientated with faces at a shallow angle to the XY plane.
- **Slice height:** Smaller slice heights allow for more resolution within the texture. The size and depth of textures may need to be adjusted for optimal appearance between various slice heights.

# Examples of Textured Images and Resulting Surface



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