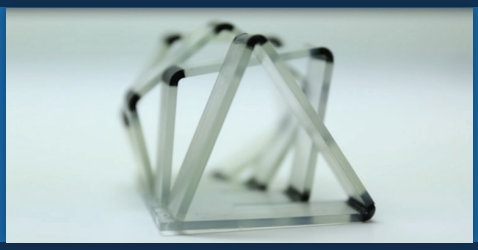
# LESSON GUIDE



# Designing Multi-Material Riddles

## Guiding Design Questions

1. What kinds of mechanisms can different materials create?
   a. Hinges
   b. Rods/beams
   c. Springs
   d. Locks

   How can these be combined to create an interesting structure?

2. How can 3D printing technology allow you to print complex structures with varied properties without assembly?

3. How can you build parts that work directly from the machine?

4. When you multiply movement, you also multiply the force required for the input. Since there is no load on the moving end, the force is required mainly to overcome friction.
   How can you design your structure for minimal friction?

### Lesson Guidelines

1. Design a part that looks simple but folds in surprising ways.
2. Leverage the ability of Connex™ technology to print multiple materials in one build by creating a structure that has different properties at different locations that cause it to perform in unexpected ways.
3. The entire structure must be 3D printed as a surface smaller than 30 x 30 x 0.5 cm.

## Design Tips for 3D Printed Parts Using Connex Technology™

1. To create “riddles” use VeroBlack™ as the rigid material and TangoBlackPlus™ as the rubber-like material. To create a visual effect you can use other rigid materials such as VeroWhite™ and VeroClear™ or use TangoPlus™, which is translucent.

2. You can create parts with intermediate properties using Digital Materials. Digital Materials are mixtures of the base resins at different ratios and they span the spectrum of properties between the base resins.

3. To create a structure that can be assigned different properties in different sections you need to divide the complete structure into sections in your CAD software. Then export each as a separate STL file and insert all the sections together as an assembly into Objet Studio™ software. This will create an assembly (the complete structure) on the virtual tray in which a material (base resin or digital material) can be assigned separately to each section.

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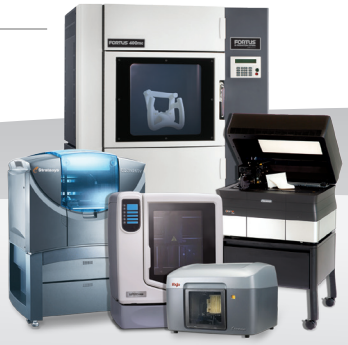

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