Who are We?

- A relatively new company dedicated to designing and 3D printing scale replica’s.
- We are a creative and technology savvy group.
- All work is done in-house by us, from design through manufacture, and shipment.
- And of course - we are railroad enthusiasts!
What Kind of Things Do We Make?

- Scenery Details
- Animals
- Figures
- Small Buildings
- Vehicles
- And more…
“And More” Teaser...
Where Can You Find CatzPaw Products?

- Model railroad layouts
- Toy farm displays
- Slot car layouts
- Die cast dioramas
- Historical dioramas
- School projects
Out of Fuel - Mark Vicker

Liquid Tanks Loaded Up
Chris Vickers

Ready for Winter
Shaw Implement Sales

Time for a Potty Break - Mark Vicker
How Do We Create This Awesome Stuff?

3D Printing Technology
What Do We Use?

• **ABS Plastic**
  Same plastic as Lego® Building Blocks

• **MakerBot Replicator Dual**

• **MakerBot Replicator 2x**
  • Both have dual print heads; allowing us to print objects in two colors simultaneously.
How Does 3D Printing Work?

• 3D printing is an additive manufacturing process that builds an object layer by layer.

• More traditional methods utilize:
  
  • the removal of material; such as milling or machining which grinds away excess material leaving just the desired object,
  
  • creating a master and then casting duplicates from molds.
• The 3D printing process works by melting ABS plastic filament which is deposited a layer at a time through a heated extruder onto a movable build platform.

• Each layer hardens as it is deposited and bonds to the previous layer.
• Building objects by layers requires support structures for any objects with overhanging geometries.

• The supports are removed manually by snapping and/or cutting them off the part.

• This process can be slow and sometimes painful.

• New filaments are becoming available that dissolve in limonene or water; making support structure removal an easier process.
• Some objects need additional finishing steps.
  
  • Sanding
  
  • Acetone Wipe/Vapor Bath used to chemically melt the ABS plastic and provide an even smoother, glossy surface.
Benefits of 3D Printing

• Unlimited creativity: some say “if it can be drawn in a 3D computer program, it can be 3D printed.”

• 3D printing is a tool-less process that reduces costs and lead times. Whereas milling and mold making both require specialized tools and die making before a part can be manufactured.

• Complex objects can be designed as a single piece or multiple pieces that can be assembled later.

• The use of ABS, nylon, and carbon infused filaments can yield lighter and stronger objects.
• The price to print an intricate or complex piece can cost roughly the same as printing a simpler piece of similar size and volume.

Both are 18 grams, take 2.5 hours to print, and cost $18.
The Impact on Model Railroading

- Design and create items previously unavailable.

- Ability to create and print replacement parts for broken or missing pieces for current models.

- Scalability - design in one scale (S Scale) reduce or enlarge to additional scales (N, HO, O, & G scales).

- 3D items printed in multiple colors reduces the need for painting.

- Products can be personalized according to individual needs and requirements.
New & Unique Items

Replacement Parts

O, S, HO Scales

Personalized

N, HO, S, O, & G Scales
• As mentioned earlier, 3D printing eliminates the need for tool production; thus reducing costs, lead times, and labour associated with a part’s creation.

• Creating prototypes for testing can be done quickly and cost effectively.

• Products can be produced on demand, as few or as many as needed. No minimum orders required.

• Items are locally manufactured here in the USA.
How We Do It

• First - the spark of inspiration.
• Next - research: our items are true to scale and as realistic as possible.
• We also verify that our items are unique and not infringing on anyone else’s copyrights or trademarks.
• Then the design process begins; recreating the prototype in a 3D drawing computer program.

• Refining the design for printability comes next.

• For two color prints this includes separating the object into pieces and separate drawing files, one piece/file for each color.
• Then the file is converted from the drawing file’s format (obj, 3ds, etc.) to a format that the printer understands, an STL file.

• **STL - Standard Tessellation Language**

• An STL file describes only the surface geometry of a three-dimensional object without any representation of color, texture or any other attributes.

STL vs OBJ
• Next another piece of software "slices" the image into the layers that will be printed; creating the objects “gcode.”

• Layer thickness can set to 0.1mm, 0.2mm, or 0.3mm. The thinner the layer the greater the detail and the longer the print time.

• The quality of a print is also determined by the slicing software used. Depending upon what is being created we use: ReplicatorG, MakerWare, or Slic3r. Each slicer has its strengths and weaknesses.
• Finally, we “3D print” the object.

• Unfortunately the process does not end there. It is rare that an object prints successfully the first time.
And sometimes no matter what we do, we get this...
We are not sure which we have more of: “A ha” or “Oh shit” moments.
So...

- We go back to the drawing program and tweak the design of the object itself.

- Next we modify the revised drawing for printability; creating separate objects/files as necessary.

- Then we repeat the conversion, slicing, and printing process until we get a successfully printed part.

- And the final finally, we print at least five (5) of each item to make sure it is stable and reproducible.

- Only then will we offer the item for sale.
And Yes, Our Items Are Protected by Copyright Law

• It was recently brought to our attention that there was an attempt to use CatzPaw's 3D printed products as the basis for molds to create resin castings.

• Our products are protected by US copyright laws.

• Each piece is marked with a “paw print” the CatzPaw Logo.
Make Sure It Is a CatzPaw 3D Printed Product

• Look for the CatzPaw mark.

• Purchase from one of the following:
  • CatzPaw’s website
  • A CatzPaw eBay action; we have them occasionally
  • One of CatzPaw’s authorized distributors: Hoquat Hobbies, Patch Farm Toys, JK Customs
3D Printing in Action
This object actually took two and half (2.5) hours to print!
Questions & Answers