Executive Summary

Manufacturer – 3D Printers – Printing from Waste
PROBLEM/OPPORTUNITY
While the $7B 3D printing market has become increasingly competitive, concentration within the industry remains low. This fragmentation implies a compelling market opportunity for new entrants such as re:3D. However, four limiting factors constrain the market potential of industrial 3D printing: cost, printer size, printing speed & access to input material. re:3D is actively addressing these limitations through pellet extrusion.

With over $5M in sales and penetration into multiple verticals, re:3D is poised to capitalize on the industrial 3D printing segment that is growing at over 15% annually. The ability to print from pellets & recyclables promises to open new markets and double sales within one year of commercialization.

HID Global, an Austin-based company, is currently producing 900 lbs of clean PC waste per week. That waste could be put to use in our Gigabot X 3D printer for design, research, and printing in Austin.

SOLUTION/PRODUCT
Gigabot, re:3D’s flagship technology is cost/scale the most affordable industrial 3D printer on the market, distinguished by a modular frame and a commitment to owners that all improvements & re-designs will be offered as retrofit kits. Loyal customers thus become accounts, continuously purchasing enhancements and consumables as the technology evolves. This platform has been modified to print from filament or pellets.

The dream has been to print from trash. Our Gigabot X (GBX) 3D printer is that dream realized. The [re]verse pitch material, polycarbonate (PC), is an amazingly robust polymer that has many different applications. We will be designing and printing from this material here in Austin, and the prize money will go towards the purchase of a grinder (to make the PC into useable pieces) as well as building a GBX printer that will live in Austin. This printer will be installed as part of a pilot program with ATI/IC2 for circular economy research at UT. The printer and grinder will also be available for the Austin community and other businesses who want to test the viability of printing from their waste-streams of plastics.

Currently re:3D is manufacturing the beta GBX units that will be going out to a select number of buyers. We have had an extremely large group of interested businesses that want to purchase the GBX once it comes onto the market. There is a secondary opportunity that we could become a materials supplier by selling the ground up PC to our GBX customers. This will be relatively small market and opportunity, because shipping trash defeats the purpose of curbing CO2 emissions and other goals associated with using local waste as a printing medium.

Product: Along with the potential to sell ground PC in small batches to local companies. We are planning to stand up a project we call Designed: by re:3D. We will be creating small-batch one-of-a-kind objects (furniture, art pieces, sculptures, etc) and putting them up on our webstore. The Designed: by re:3D aspect of our company will be based in Austin, using waste from Austin, printed in Austin, and designed in Austin.

POTENTIAL RETURN/REVENUE MODEL
The majority of the return is in the potential for robust research on printing from plastic waste, which in turn will result in more sales of our 3D printers. The market for 3D printing is massive: AT Kearney reports that globally, 3D printing is anticipated to increase manufacturing jobs by 30% in 5 years. According to Gartner 40% of manufacturers (a $12T industry) are planning to invest in 3D printing in the next 5 years.
Our products to be sold via Designed: by re:3D we expect a minimum of a 50% profit margin to as high as 175% - as the increase in speed and decrease in feedstock costs of printing with GBX may greatly increase our ability and profitability to churn out products. Further our profit margin for PC regrind that we could sell would be a minimum of 70% but could realistically be much higher.

**COMPETITION**

Re:3D is focused on the large-scale but affordable 3D printing market. There are very few competitors currently vying for the pellet/trash printing market in an affordable way. The largest competitors in the general 3D printing market are 3D Systems, Stratasys, EOS, BigRep – the lowest priced printers from these direct competitors is still +300% more expensive than our GBX.

Current direct competitors with Pellet Printing 3D printers:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Gigabot X</th>
<th>Titan</th>
<th>Cosmo AM1</th>
<th>SeeMeCNC</th>
<th>Fouche</th>
<th>Delta Wassp</th>
<th>Cincinnati</th>
<th>DPF XLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Type</td>
<td>Cartesian</td>
<td>Cartesian</td>
<td>Cartesian</td>
<td>Delta</td>
<td>Cartesian</td>
<td>D</td>
<td>Cartesian</td>
<td>D</td>
</tr>
<tr>
<td>Cost</td>
<td>$15,000.00</td>
<td>$52,000.00</td>
<td>$72,000.00</td>
<td>$40,000.00</td>
<td>$12,500.00</td>
<td>$29,500.00</td>
<td>$250,000.00</td>
<td>$45,000.00</td>
</tr>
<tr>
<td>Unlimited Customer</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Build Size</td>
<td>696mm x 500mm x 500mm</td>
<td>762mm x 762mm x 1143mm</td>
<td>1100mm x 1100mm x 800mm</td>
<td>1117.6mm x 1117.6mm x 820mm</td>
<td>1000mm x 1000mm x 500mm</td>
<td>1000mm x 900mm x 400mm</td>
<td>356mm x 356mm x 356mm</td>
<td>1200mm x 1200mm x 400mm</td>
</tr>
<tr>
<td>Advertised Print Materials</td>
<td>ABS, PLA, PETG, Nylon, TPE, Ninjaflex, advanced materials</td>
<td>ABS, PLA, TPU, PC-PBT, mixed materials</td>
<td>PLA</td>
<td>PLA</td>
<td>PLA, ABS, ASA, PETG, FLEX, TPU, PC, PLA, PVA</td>
<td>PLA, ABS, Nylon, Ninjaflex, PVA, and HIPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Print Temperature</td>
<td>350C</td>
<td>380C</td>
<td>400C</td>
<td>260C</td>
<td>230C</td>
<td>260C</td>
<td>356C</td>
<td>350C</td>
</tr>
<tr>
<td>Can print PLA</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Training, Warranty, and Maintenance Services</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Extruder Sold Separately</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Can be adapted to other printers</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL IMPACT**

The potential to upcycle otherwise discarded post manufacturing waste is the main environmental impact. Current global estimates show that only 9% of the world’s plastics have been recycled since the 1950s. Research on printing directly from plastic waste is still on-going, but the potential to use and re-use and re-use again waste plastics is the ultimate vision of a circular economy.

Further research and study is necessary, but re:3D envisions a world where plastics no longer have to be thrown away. To take waste and turn it into anything, sounds like magic, but it is our reality through the GBX. We also want to encourage and empower HID Global to print from their own waste stream as well (since they already 3D print), which would further reduce the amount of PC waste that they are creating.
ECONOMIC IMPACT
We believe that this product will impact the world. Specifically, for the Austin economy, there is the potential to create at least 1 additional job in the short term for the processing of the waste plastic from HID Global, but our goal is to continue to grow our presence in Austin. Impact on Austin businesses would be a distinct possibility, as our pilot program with UT would allow for research and use of our GBX 3D printer. Further – standing up a GBX printer and grinding system within Austin would allow for other businesses to validate using their own waste streams as a potential 3D printable resource. Finally, turning this post-manufacturing waste into products within the Austin community, and further reducing the landfilling of plastic wastes, will have far-reaching effects.

THE TEAM
re:3D is comprised of former NASA technicians, strategists, & engineers that have the knowledge to execute their vision and can easily customize Gigabot to support problem-solvers worldwide.

Matthew Fiedler – Co-Founder – Bachelor’s and master’s from University of Nebraska in Manufacturing Engineering Technology and Biomechanics and Biomedical Engineering. Matthew previously worked at the Biomechanics Laboratory, NASA JSC.

Samantha Snabes - Co-founder - Samantha is an active contributor to re:3D’s material and applied research activities. Previously, she served as the Social Entrepreneur-in-Residence for NASA HQ and Deputy Strategist at NASA JSC.

Jeric Bautista – Bachelor’s in Mechanical Engineering from RPI, concentrating on Design, Innovation, and Society. Previously a lead for Design for America, Jeric creates products designed with the user in mind.

Michael Strong – Master’s degree in Technology Commercialization from UT, McCombs School of Business. And a Digital Design and Fabrication certificate from the Hudson Valley Advanced Manufacturing Center at SUNY New Paltz.

EXECUTION PLAN/GO TO MARKET STRATEGY
With the receipt of this prize we will go from a feasibility study of – can we print from PC waste? To having a printer that is specifically used to print from PC waste in Austin. The planned partnership with the University of Texas ATI/IC2 institute, will provide access to facilities to pilot 3D printing from locally sources reclaimed plastic in Austin.

We estimate that specific sales from this prize money will be in the printing of furniture and design/art pieces that we will be creating in-house here in Austin. Further, we believe that our current customers would benefit immensely from clean, PC re-grind. Which means there would be further opportunity to sell ground up PC as a material supplier.

The benefit of this prize-money goes beyond just sales from re:3D’s perspective. It allows us to focus on a waste-stream, create community partnerships, and encourage more businesses to print from waste.
Appendix:

Gigabot X 3D Printer:

**MEET YOUR**

**GIGABOT X**

Affordable | Quality | Industrial | Hand Crafted

- Hopper
- Industrial Cable Carriers & Mounts
- LED Light Strip
- Linear Rails on X and Y axis
- All-Metal Hot End with a 1.75mm nozzle
- PRINTinZ
- Integrated Viki 2.0 LCD Printing Control
- Heated Bed
- 4 Point Bed Leveling Knobs
- Wheeled Platform

**PRICES**  $15,000

**BUILD VOLUME**  590 x 600 x 600mm

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**3D PRINTING AT THE Human Scale**

Industrial 3D printing is now affordable. The massive print volume starts at 30x larger than desktop 3D printers, at a fraction of the cost of industrial systems.

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**FOR HIGH-STRENGTH Materials**

Print with thermoplastics that melt below 320°C. Gigabot®'s all-metal hot end opens the door to a wider variety of 3D printing materials, including both high-strength and heat-resistant plastic filaments.

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**MODULAR, LIFETIME Construction**

Free from the constraints of product versioning, the Gigabot® platform enables user upgrades and customization. No machine will fall behind with new features available as add-on packages.
**DESIGN & RESEARCH FOCUSED ON YOUR NEEDS**

**Full Service Solutions**

re:3D is ready to assist you with your industrial large scale 3D printing needs.

Our team is experienced in fabricating build-to-spec modified hardware for specialized print requests and available to support material selection, design, contract printing, education and consulting needs.

Simply email info@re3d.org for a quote and to speak with an expert who can advise you on our services to take you from idea to print.

### Printing Specs

<table>
<thead>
<tr>
<th>All-Metal Hot End</th>
<th>Supports</th>
<th>100-200 Micron Layer Resolution</th>
<th>60-100 mm/sec Printing Speed</th>
<th>1.75 mm Nozzle Diameter</th>
</tr>
</thead>
</table>

### Mechnical

| Robust Aluminum Cartesian Frame | Cast Aluminum Build Plate |

### Software

| Micro 3D or USB File Transfer Method | WIFI 3.0 | Dot Control | Compatible with Mac, Windows and Linux OS | G-code [gcode] | Upload File Type | Recommended Software: Simplify3D |

### Electrical

| 110/220V (975-2200 Watts) | 50/60HZ | 180-300°C Extruder Temperature | 60-115°C Build Surface Temperature |

### Other Solutions

- **FULLY ASSEMBLED GIGABOT**
  - 590 x 600 x 600mm
  - GIGABOT®: $11,950
  - Enclosure: $2,950

- **FULLY ASSEMBLED GIGABOT XL**
  - 590 x 760 x 600mm
  - GIGABOT® XL: $13,950
  - Enclosure XL: $2,250

- **FULLY ASSEMBLED GIGABOT XLT**
  - 590 x 760 x 900mm
  - GIGABOT® XLT: $16,995
  - Enclosure XLT: $3,500

- **FULLY ASSEMBLED TERABOT**
  - 915 x 915 x 915mm
  - TERABOT®: $27,500
  - Enclosure: $6,900

**Custom Solutions**

Our team of experts are available to quickly fabricate a GigaBot that fits your unique size and material requirements.
GBX Extruder
First PC Print Attempt
Designed: by re:3D – Renders and photos of furniture pieces created by Gigabot