Event Guide

Your quick guide to all things medical at RAPID + TCT 2018
# Medical Manufacturing Innovations Schedule at a Glance

<table>
<thead>
<tr>
<th>Conference or fee registration required</th>
<th>Included with all registrations unless indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, April 23</td>
<td></td>
</tr>
<tr>
<td><strong>Registration/Badge Pick-up</strong></td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td><strong>Pre-conference Workshops</strong></td>
<td>8:30 am – 2:00 pm</td>
</tr>
<tr>
<td><strong>Regulatory &amp; Quality System Considerations for 3D Printed Medical Devices</strong></td>
<td>Room: 204A</td>
</tr>
<tr>
<td>Workshop Leader: Danielle Beski, Materialise</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTORS: Dan Fritzheimer, DePuySynthes, Matthew DiPrima, Food &amp; Drug Administration; Kim Tortuemke, 3D Systems, Ben Karczewski, Materialise; Beatrice Ogembo, American Preclinical Services;</td>
<td></td>
</tr>
<tr>
<td>3D Printing in Hospitals: What You Need to Know</td>
<td>Room: 203C</td>
</tr>
<tr>
<td>Workshop Leader: Jonathan Morris, MD, Mayo Clinic &amp; Frank Rybicki, MD, The University of Ottawa</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTORS: Andy Christensen, Somaden LLC; Amy Alexander, Mayo Clinic; Nicole Wake, NYU School of Medicine; Adam Jakus, DimensionInx</td>
<td></td>
</tr>
<tr>
<td><strong>Biomaterials and Bioprinting Fundamentals &amp; Applications</strong></td>
<td>Room 204B</td>
</tr>
<tr>
<td>Workshop Leader: Adam Jakus, DimensionInx</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTORS: Stuart Williams, Biofabric Organs Program; Ken Church, nScrypt; James Hoyer &amp; Lehanna Sanders, Advanced Solutions; Thomas Hinton, Carnegie Mellon University</td>
<td></td>
</tr>
</tbody>
</table>

**RAPID + TCT Workshops of interest:**
- Fundamentals of Additive Manufacturing
- Fundamentals of 3D Scanning and Modeling
- Metal Part Fabrication Using Additive Manufacturing
- Making the Business Case for Additive Manufacturing

3:00 pm – 5:00 pm
**RAPID + TCT Kickoff**
Room: Arena

Additive Manufacturing Awards

**KEYNOTE: From Hollywood to the Winter Games – Making Additive Manufacturing the Competitive Advantage for Innovation**
Shari Foret, Lockheed Martin Corporation

5:00 pm – 7:00 pm
**RSNA 3D Printing Special Interest Group Meeting**
For more information, visit: [https://www.rsna.org/3D-Printing-SIG/](https://www.rsna.org/3D-Printing-SIG/)

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<table>
<thead>
<tr>
<th>Tuesday, April 24</th>
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</thead>
<tbody>
<tr>
<td><strong>Registration/Badge Pick-up</strong></td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td><strong>KEYNOTE</strong></td>
<td>8:00 am – 9:45 am</td>
</tr>
<tr>
<td>Room: Arena</td>
<td></td>
</tr>
<tr>
<td><strong>IT TEAM Launch</strong></td>
<td></td>
</tr>
<tr>
<td><strong>KEYNOTE: Tomorrow's Additive Manufacturing: An Aerospace &amp; Defense OEM Perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Michael D. Packer, Director of Manufacturing, Advanced Production Programs – Skunk Works®, Lockheed Martin Aeronautics</td>
<td></td>
</tr>
</tbody>
</table>

**MMI Clinical Applications I**
10:10 am – 12:15 pm • Room: 203C

**RAPID+TCT Sessions of Interest**
10:10 am – 12:15 pm

**Exhibits and Other Activities**

**Exhibit Hours**
10:00 am – 6:00 pm
8:00 am – 6:00 pm
**MMI Collaboration Center**
Featuring Mayo Clinic and BioFabUSA
Room: Lobby A/B

10:20 am to 11:00 am
**How Healthcare 3D Applications are Going Mainstream**
Lee Dockstader, HP Smart Manufacturing Hub, Booth 3204

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 AM - 10:40 AM</td>
<td>Predicting the Best-Fit Cardiac Guide-Catheter Prior to Transcatheter Mitral-Repair Using 3D-Printed Models</td>
<td>Clare Ward, Materialise</td>
<td></td>
</tr>
<tr>
<td>10:45 AM - 11:10 AM</td>
<td>Influence of Sterilization on Laser Sintered Polyamide Material</td>
<td>Laura Gilmour, EOS North America</td>
<td></td>
</tr>
<tr>
<td>11:15 AM - 11:25 AM</td>
<td>A Comparison of 3D Printed Urological Cancer Models Created with Different 3D Printing Technologies</td>
<td>Nicole Wake, New York University School of Medicine</td>
<td></td>
</tr>
</tbody>
</table>
## Wednesday, April 25

**Registration/Badge Pick-up**  
7:00 am – 5:00 pm

**KEYNOTE**  
8:00 am – 9:55 am  
**ROOM:** Arena

Innovation Audition Finals and Award  
SME Medical AM3DP Annual Report  

**KEYNOTE: Rise of Point-of-Care Manufacturing: Impacting More Patients with 3D Printing**  
Jonathan Morris, MD, and Amy Alexander, BME, MS, Mayo Clinic
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
</table>
| 10:10 AM – 12:15 pm | MMI: Implants  
  MODERATOR: Adam Jakus, Dimension Inx  
  The Socio-Economic Dynamics of the Adoption of 3D Printed Patient-Matched Knee Implants  
  Namin, Northeastern University  
  Effect of Build Orientation on Axial/Torsional Fatigue Life of Ti-6Al-4V ELI  
  DiPrima, PhD, US Food and Drug Administration | ROOM: 203C | RAPID+TCT Sessions of Interest  
  MODERATOR: David Dean, The Ohio State University  
  MMI Biomaterials  
  MODERATOR: Adam Jakus, Dimension Inx  
  Research I  
  Materials II  
  Software & Modeling  
  MMI Collaboration Center  
  Featuring Mayo Clinic and BioFabUSA  
  Lobby A/B  
  Meet & greet with the Mayo Clinic Keynote Speakers  
  MMI Collaboration Center  
  Lobby A/B |
| 11:15 AM – 12:15 pm | Laser Additive Processing of a Functionally Graded Internal Fracture Fixation Plate  
  Joshi, PhD & Aditya Mantri, PhD, University of North Texas  
  How Can Additive Manufacturing Improve Fatigue Life in Fracture Fixations: An Experimental Study in Proximal Humerus Fracture  
  Tilton & Manogharan, PhD, Penn State University | | Exhibit Hours  
  10:00 am – 6:00 pm  
  8:00 am – 6:00 pm  
  SME MMI Theater Hour  
  SME Medical AM/3DP Workgroup  
  FDA/CDRH  
  DICOM WG-17  
  3D Manufacturing Meeting  
  ROOM: 106  
  12:30 pm -1:30 pm  
  How Healthcare 3D Applications are Going Mainstream  
  Dockstader, HP Smart Manufacturing Hub, Booth 3204  
  2:30 pm – 3:30 pm  
  Tech Briefing: MMI  
  Keynote Theater, Arena |
| 2:10 PM – 4:15 PM | Medical and Pharma Printing in the Factory-of-the-Future  
  Reese, TNO  
  Individualized PEEK Implants Using Fused Filament Fabrication (FFF)  
  Popp, Apium Additive Technologies  
  Engineering the Intrahepatic Biliary Tree Using 3D Decellularized Extracellular Matrix Hydrogels  
  Lewis, Northwestern University  
  In Vivo Evaluation of Neurotized 3D-Printed Graphene Biomaterials  
  Jordan, The Ohio State University  
  Class I and Class II Medical Device Development with Advanced Material Technology for 3D Printing  
  Fernback & DiVencenzo, JuggerBot 3D LLC | | |
| 2:15 PM – 4:10 PM | The "Fluffy" System: A New, 3D-Painting Based Approach to Engineering Material Porosity in Additive Structure  
  Jakus, PhD, Diminsion Inx & Shah  
  3D-Printed Hyperelastic Bone for Craniofacial Regeneration  
  Huang, University of Illinois-Chicago  
  Engineering the Intrahepatic Biliary Tree Using 3D Decellularized Extracellular Matrix Hydrogels  
  Lewis, Northwestern University  
  In Vivo Evaluation of Neurotized 3D-Printed Graphene Biomaterials  
  Jordan, The Ohio State University  
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| 2:45 PM – 3:40 PM | 3D-Printed Hyperelastic Bone for Craniofacial Regeneration  
  Huang, University of Illinois-Chicago  
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  Lewis, Northwestern University  
  In Vivo Evaluation of Neurotized 3D-Printed Graphene Biomaterials  
  Jordan, The Ohio State University  
  Class I and Class II Medical Device Development with Advanced Material Technology for 3D Printing  
  Fernback & DiVencenzo, JuggerBot 3D LLC | | |
| 3:45 PM – 3:55 PM | In Vivo Evaluation of Neurotized 3D-Printed Graphene Biomaterials  
  Jordan, The Ohio State University | | |
| 4:00 PM – 4:10 PM | Class I and Class II Medical Device Development with Advanced Material Technology for 3D Printing  
  Fernback & DiVencenzo, JuggerBot 3D LLC | | |
| 4:15 PM – 5:00 PM | How Healthcare 3D Applications are Going Mainstream  
  Dockstader, HP Smart Manufacturing Hub, Booth 3204  
  Tech Briefing: MMI  
  Keynote Theater, Arena | | |
<p>| 5:00 PM – 6:00 PM | Show Floor Networking Reception | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>7:00 am - 1:00 pm</td>
<td>Registration/Badge Pick-up</td>
</tr>
<tr>
<td>8:00 am - 9:45 am</td>
<td>KEYNOTE: Printing the Future</td>
</tr>
<tr>
<td></td>
<td>AM Community Awards</td>
</tr>
<tr>
<td></td>
<td>KEYNOTE: Printing the Future</td>
</tr>
<tr>
<td></td>
<td>Terry Wohlers, Principal Consultant and President, Wohlers Associates, Inc.</td>
</tr>
<tr>
<td>10:00 am - 12:15 pm</td>
<td>MMI: Personalized Prosthetics</td>
</tr>
<tr>
<td></td>
<td>ROOM: 203C</td>
</tr>
<tr>
<td>MODERATOR: Beth Ripley, Puget Sound VA Hospital</td>
<td></td>
</tr>
<tr>
<td>10:10 am - 12:15 pm</td>
<td>RAPID+TCT Sessions of Interest</td>
</tr>
<tr>
<td></td>
<td>Exhibit Hours</td>
</tr>
<tr>
<td>10:15 AM - 10:40 AM</td>
<td>Using Additive Manufacturing to Create Soft Tissue Prosthetics After a Sarcoma Diagnosis</td>
</tr>
<tr>
<td></td>
<td>Irene Healy, New Attitude Prosthetic Designs</td>
</tr>
<tr>
<td>10:45 AM - 11:10 AM</td>
<td>Specialized Orthotic and Prosthetic Componentry Through the Use of Advanced Digital and Conventional Techniques</td>
</tr>
<tr>
<td></td>
<td>Peter Liacouras, PhD &amp; Jamie O. Gandert, Walter Reed National Military Medical Center</td>
</tr>
<tr>
<td>11:15 AM - 11:40 AM</td>
<td>Creation of End Use Personalized Assistive Devices in US Veterans Affairs Hospitals by Clinical Rehabilitation Engineers</td>
</tr>
<tr>
<td></td>
<td>Ben Salatin, New Mexico VA Health Care System</td>
</tr>
<tr>
<td>11:45 AM - 12:10 PM</td>
<td>Remote Fabrication of Prosthetic Sockets Using Computer Tomography Scanning and 3D Printed Molding Procedure</td>
</tr>
<tr>
<td></td>
<td>Mohammad Abubasha, Texas A&amp;M University</td>
</tr>
<tr>
<td>12:00 PM - 12:10 PM</td>
<td>Design Optimization and Additive Manufacturing of Custom-Fit Prosthetic Sockets</td>
</tr>
<tr>
<td></td>
<td>Christiane Beyer, PhD, &amp; Monica Robles, California State University-Long Beach</td>
</tr>
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### Medical Additive Manufacturing Resources

*Stay up to date throughout the year with these resources.*

- [www.sme.org/medical-additive](http://www.sme.org/medical-additive)
  - Technology summaries, articles, suppliers, YouTube playlist, more
  - Standards: [www.sme.org/am3dp](http://www.sme.org/am3dp)
  - Tech papers: [www.sme.org/am3dptech](http://www.sme.org/am3dptech)
  - SME Medical AM/3DP Workgroup: [www.sme.org/medical-am3dp-workgroup](http://www.sme.org/medical-am3dp-workgroup)

- **Bioengineers Needed: Expansive Growth in Medical 3D Printing Industry Creates Demand for Experts**

- **Medical AM3DP Job Competency Models**
  - Technician for device or point-of-care manufacturer
  - Engineer for device manufacturer
  - Engineer for a point-of-care manufacturer (clinical setting)

- Physicians as Manufacturers: The Rise of Point-of-care Manufacturing
To find resources for Medical Manufacturing Innovations, visit the exhibitors with blue borders.

MMI Collaboration Center featuring Mayo Clinic, SME Medical AM3DP Workgroup and ARMI/BioFabUSA
MMI Self-guided Exhibits Tours

With so much to see and do at the event, the SME Medical AM3DP Workgroup has been together these self-guided tours based on different interests. Visiting every exhibitor in this MMI Directory will be sure to add to your experience. If you find your time is limited or you just want to better understand an application area, use these recommended lists of Exhibitors to visit. The SME Medical AM3DP workgroup has even provided some things you can ask them about.

### Beginners, for those new to AM3DP for medical

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialise</td>
<td>1404</td>
<td>Software &amp; services</td>
<td>Software for segmentation and processing of scan data</td>
</tr>
<tr>
<td>Stratasys</td>
<td>1104</td>
<td>Machines &amp; materials</td>
<td>BIOMIMICS service for anatomical models, Types of machines &amp; materials</td>
</tr>
<tr>
<td>3D Systems</td>
<td>1204</td>
<td>Machines, materials, services</td>
<td>D2P software for medical imaging, types of machines, surgical planning services</td>
</tr>
<tr>
<td>EOS</td>
<td>1118</td>
<td>Machines</td>
<td>Powder bed fusion capabilities for both metal and polymers</td>
</tr>
<tr>
<td>EnvisionTec</td>
<td>1304</td>
<td>Digital Light Processing machines &amp; materials</td>
<td>Bioplotter machine, dental materials</td>
</tr>
<tr>
<td>FormLabs</td>
<td>918</td>
<td>Machines &amp; materials</td>
<td>Desktop machines, dental materials</td>
</tr>
<tr>
<td>NorthStar Imaging</td>
<td>1136</td>
<td>Non destructive testing</td>
<td>CT-based quality systems</td>
</tr>
</tbody>
</table>

### Software & modeling & workflow

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSYS</td>
<td>418</td>
<td>SpaceClaim, 3D modeling tool</td>
<td>Modeling and simulation software</td>
</tr>
<tr>
<td>Materialise</td>
<td>1404</td>
<td>Materialise Mimics</td>
<td>Medical imaging post processing, segmentation,</td>
</tr>
<tr>
<td>LINK3D</td>
<td>143</td>
<td>Scheduling, production, system optimization software follows FDA and ISO approval software requirements</td>
<td>How their software can help scheduling for device manufacturers and hospital-based, point-of-care manufacturing 3D printing</td>
</tr>
<tr>
<td>nTopology</td>
<td>145</td>
<td>Algorithms for highly complex geometric structures</td>
<td>Benefits of optimizing design and material use; how their software helps</td>
</tr>
</tbody>
</table>

### Clinical Applications/Point-of-care Manufacturing—for those working within hospitals

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialise</td>
<td>1404</td>
<td>Medical Imaging post processing software; services</td>
<td>Image segmentation, preparing models for printing, iMaterialise 3D printing services</td>
</tr>
<tr>
<td>Stratasys</td>
<td>1104</td>
<td>FDM &amp; material jetting machines, materials</td>
<td>Anatomical models, Biomimics models, J750 multi-material, multi-color 3D printer with clear materials, GrabCad Print</td>
</tr>
<tr>
<td>3D Systems</td>
<td>1204</td>
<td>Stereolithography, powder bed fusion, material jetting, and binder jetting machines with a full range of materials and services</td>
<td>D2P (DCOM to Print) software, virtual surgical planning including haptic devices, anatomical modeling machines, medical device manufacturing, multi-color printing technology, and 3D Systems Health services for model and planning</td>
</tr>
<tr>
<td>Formlabs</td>
<td>918</td>
<td>Desktop stereolithography and materials</td>
<td>Dental materials, FUSE1 Desktop powder bed system</td>
</tr>
<tr>
<td>HP</td>
<td>1330</td>
<td>Multi jet fusion machines</td>
<td>New all in one (build with powder processing, recovery system) machine with full color</td>
</tr>
<tr>
<td>Wacker Chemie AG-ACEO</td>
<td>2010</td>
<td>Materials provider</td>
<td>Silicone printing</td>
</tr>
<tr>
<td>KLS Martin</td>
<td>3512</td>
<td>Individual Patient Solutions (Implants, etc.)</td>
<td>Services for Craniofacial, Dental, Neuro, Cardiothoracic applications and surgical instruments</td>
</tr>
</tbody>
</table>

### Bioprinting/biomaterials/tissue fabrication—for those working in or interested in biofabrication

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
</tr>
</thead>
<tbody>
<tr>
<td>EnvisionTec</td>
<td>1304</td>
<td>Digital Light Processing machines &amp; materials</td>
<td>Bioplotter</td>
</tr>
</tbody>
</table>
### Implants/device manufacturers—For those working primarily with metals, but includes some polymers

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialise</td>
<td>1404</td>
<td>Imaging processing software and services</td>
<td>Orthopaedic, Craniofacial, and Cardiac procedures and devices</td>
</tr>
<tr>
<td>3D Systems Health</td>
<td>1204</td>
<td>Machines, materials, &amp; services</td>
<td>Ekso Bionics, Middle Ear Prostheses; Custom Vertebral Fusion Cages (spine fusion),</td>
</tr>
<tr>
<td>EnvisionTEC</td>
<td>1304</td>
<td>Machines &amp; materials</td>
<td>Hearing Aids, Dental Guides and Implants, Bioplotter</td>
</tr>
<tr>
<td>EOS</td>
<td>947/1304</td>
<td>Powder bed systems for polymers, metal, and more</td>
<td>Patient-specific Implants, Disposable Surgical Instruments</td>
</tr>
<tr>
<td>Lithoz</td>
<td>610</td>
<td>Ceramic materials system</td>
<td>Cranial Plates, Fixation Plates, Intracardiac Catheter Pump</td>
</tr>
<tr>
<td>GE Additive</td>
<td>1318</td>
<td>Metals machines, validation consulting services</td>
<td>Arcam Trabecular Titanium, process validation services</td>
</tr>
<tr>
<td>KLS Martin</td>
<td>3512</td>
<td>Individual Patient Solutions (Implants, etc.)</td>
<td>Craniofacial, Dental, Neuro, Cardiothoracic applications and surgical instruments</td>
</tr>
</tbody>
</table>

### Surface scanning For those building prosthetics, teeth, etc.

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth number</th>
<th>Why visit/what they do</th>
<th>Ask them about</th>
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</thead>
<tbody>
<tr>
<td>Direct Dimensions-</td>
<td>2323</td>
<td>Facial and body scanning</td>
<td>What technologies they have, How technology works and medical applications</td>
</tr>
<tr>
<td>Faro Technologies</td>
<td></td>
<td>Laser scanning, touch probe</td>
<td>How their scanners works, types they have, use for quality</td>
</tr>
<tr>
<td>EnvisionTec</td>
<td>947/1304</td>
<td>Machines &amp; materials</td>
<td>Collaboration with 3Shape</td>
</tr>
<tr>
<td>3D Systems</td>
<td>1204</td>
<td>Scanners, software, machines for dental</td>
<td>How their scanners and software work and integration with their machines</td>
</tr>
<tr>
<td>Wenzel</td>
<td></td>
<td>Optical scanning</td>
<td>How small can they go accurately with micro-CT</td>
</tr>
</tbody>
</table>

### Booth Number

| 3D Material Technologies       | 1625         | CIDEAS Inc ........................................... 810 | Formlabs........................................ 918 |
| 3D Systems                     | 1204         | Cosine Additive...................................... 1030 | Freeman Technology Inc .................. 635 |
| 3DEO                           | 1642         | Creative Design & Machine Inc ... 1609 | Frustum ........................................ 2523 |
| Additive Industries            | 1418         | Direct Color Systems by Cawley ... 534 | GE Additive ......................................... 1318 |
| Aerotech Inc                   | 2218         | Direct Dimensions Inc ........................................ 2323 | Global Advanced Metals .......... 235 |
| allnex                         | 224          | DSM Additive Manufacturing ...... 1410       | GPI Prototype & Manufacturing Services .......................................................... 422 |
| American Additive Manufacturing LLC | 3313        | Dunlee ............................................. 522 | Granutools........................................ 646 |
| DWS Systems                    |              | DyeMansion Gmbh..................................... 942 | HP Inc ............................................. 1330 |
| ANSYS                          | 418          | EnvisionTEC Inc..................................... 1304 | Imagenet Consulting LLC .................. 1746 |
| AON3D                          | 542          | Extrude Hone........................................ 134 | Impac Systems Engineering ............ 140 |
| Atlas 3D                       | 648          | EOS North America ................................ 1118 | Innofil 3D .......................................... 1934 |
| Autodesk Inc                   | 1522         | Epilog Laser Corp............................... 1647 | InTech Industries Inc ............... 612 |
| Bodycote Thermal Processing    | 335          | Essentium ........................................... 1834 | Jesse Garant Metrology Center ...... 737 |
| C & A Tool Engineering          | 138          | Extrude Hone........................................ 134 | Keene Village Plastics .................. 647 |
| CADBLU                         | 2124         | FARO Technologies Inc........................... 1618 | Kudo3d Inc ........................................ 2425 |
| Capture 3D                     | 1919         | Farsoon Technologies......................... 1904 | Laboratory Testing Inc .............. 1722 |
| Carbon                         | 2210         | FoldStar Inc......................................... 2334 | LAI International.......................... 1910 |
| Carpenter Technology Corp      | 1930         | Forecast 3D.......................................... 425 | LINK3D .............................................. 143 |
| Chieftek Precision Usa Co Ltd  | 348          | Formalloy........................................... 244 | Lithoz Gmbh ...................................... 610 |
Lulzbot 3D Printers ................................ 404
Markany Inc ........................................ 949
Markforged ........................................... 1746
MasterGraphics ...................................... 947
Materialise ........................................... 1404
Matheson Tri-Gas Inc ............................... 2046
Mazak Corporation .................................. 2004
Metal Additive Manufacturing Magazine ..... 3309
Met-L-Flo Inc ........................................ 1736
Microtek Finishing .................................... 930
Nano Dimension ....................................... 119
Newpro3D ............................................. 2338
North Star Imaging Inc .............................. 1136
Nscrypt Inc ........................................... 708
NSL Analytical Services Inc ....................... 934
Ntopology ............................................. 145
OR Lasertechnology Inc ............................ 1630
Photocentric Inc ..................................... 208
Polygonica - MachineWorks ...................... 2037
Poly-Med Inc ........................................ 136
PostProcess Technologies .......................... 631
Protolabs ............................................. 1704
Raise3D .............................................. 1810
Raplas America .................................... 736
REM Surface Engineering ........................ 1636
Ritech Systems LLC ................................. 125
Rize Inc .............................................. 1824
SAT Plating .......................................... 137
Siemens PLM Software Inc ....................... 2224
Sinterit Sp. Z O.O ................................... 2332
SLM Solutions NA Inc .............................. 1004
Smart Materials 3D Printing S.L. ................. 948
Smooth-On .......................................... 2042
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Sodick ................................................ 1130
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**3D Material Technologies**

810 Flight Line Blvd
Deland, FL 32724-2055
United States
P: 386-626-0006

**3D Systems**

333 Three D Systems Cir
Rock Hill, SC 29730-7811
United States
www.3dsystems.com
P: 803-326-3900

**3DEO**

1400 Van Ness Ave
Gardena, CA 90249
United States
www.3deo.com
P: 310-694-6847

3DEO specializes in small, complex metal pieces are prevalent in medical devices.

**Additive Industries**

Leidingstraat 27
Eindhoven, 5617AJ
Netherlands
additiveindustries.com
P: 31(402)180660

**Aerotech Inc**

100 Zeta Dr
Pittsburgh, PA 15238-2897
United States
www.aerotech.com
P: 412-963-7470

Aerotech, Inc. is one of the first hardware participants in the early efforts to print biological scaffolding for use in the stem cell based growth of organs for transplant. Aerotech currently provides equipment to research institutions who are investigating ways to make printable implants and organ/body part replacements.

**allnex**

224
9005 Westside Pkwy
Alpharetta, GA 30009-4783
United States
www.allnex.com
P: 770-280-8300

At allnex, we produce oligomers and monomers that are used in SLA/DLP additive manufacturing. We are currently understanding which products can be used in formulations that met medical device directives.

**American Additive Manufacturing LLC**

3313
PO Box 838
Ambler, PA 19002-0838
United States
www.americanadditive.com
P: 215-559-1200

Medical Devices: Prototypes, Custom Parts Prosthetics: Prototypes, Custom Parts Pre-Surgery: guides/patterns

**ANSYS**

418
2600 Ansys Dr
Canonsburg, PA 15317-0404
United States
www.spaceclaim.com
P: 844-462-6797

**AON3D**

542
9494 Boul Saint-Laurent
Montreal, QC H2N 1P4
Canada
www.aon3d.com
P: 438-807-0872
The new Sunata™ software from Atlas 3D ends the trial-and-error guesswork of metal additive manufacturing. Sunata, designed to work seamlessly with Direct Metal Laser Sintering (DMLS) printers, automatically chooses the best orientation for a part and generates the necessary support structures for a successful build, eliminating the expensive and time-consuming simulation process that plagues 3D design engineers.

Bodycote has heat treatment facilities with MedAccred accreditation for demonstrating ongoing commitment to quality by satisfying customer requirements and medical industry specifications. MedAccred is an industry managed supply chain oversight program that reduces risk to patient safety, assures quality products and compliance with requirements as they apply to critical processes used in the production of medical devices.

Capture 3D is a leader in innovative non-contact metrology solutions that optimize 3D scanning, inspection, and reverse engineering applications for product development, manufacturing, and production. Our advanced technology and intelligent software quickly obtains accurate full part geometry to rapidly solve engineering issues, prevent future problems, eliminate costs/iterations, while improving quality.
Manufacturers of medical devices and equipment utilize DCS printers to print directions, measures, texture or other additive requirements, (including variable data) on their products. One example is Enable Injections, LLC, who use the printers to print on the plastic injectors they produce.

We create cosmetically accurate facial and other prosthesis based on 3D scanning and 3D printing. We collaborate with Johns Hopkins and others on this work.

Look to Extrude Hone's COOLPULSE and other Technologies (AFM/ECM/TEM) to help: Deburr and polish internal, hard-to-reach areas Reduce wear and improve corrosion resistance Shape and finish tools and devices in a single step Enhance sterility of instruments by removing surface imperfections and rough edges Achieve the mirror polish preferred for surgical instruments Accomplish precise machining of intricate shapes for surgical instruments and other devices

From prototype samples for surgical pre-operation evaluation to the production of titanium and tantalum implants we offer systems and materials for the medical industry.

DyeMansion technology is used for surfacing and coloring laser sintered orthotics and other medical equipment. Our dyes are biocompatible and skin-safe.
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<th>City</th>
<th>State</th>
<th>Website</th>
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<td>Forecast 3D</td>
<td>425</td>
<td>2221 Rutherford Rd</td>
<td>Carlsbad</td>
<td>CA</td>
<td><a href="http://www.forecast3d.com">www.forecast3d.com</a></td>
</tr>
<tr>
<td>Frustum</td>
<td>2523</td>
<td>4410 Arapahoe Ave Ste 105</td>
<td>Boulder</td>
<td>CO</td>
<td><a href="http://www.frustum.com">www.frustum.com</a></td>
</tr>
<tr>
<td>GE Additive</td>
<td>1318</td>
<td>9701 Windisch Rd Ste 100</td>
<td>West Chester</td>
<td>OH</td>
<td><a href="http://www.geadditive.com">www.geadditive.com</a></td>
</tr>
<tr>
<td>Global Advanced Metals</td>
<td>235</td>
<td>880 Winter St Ste 320</td>
<td>Waltham</td>
<td>MA</td>
<td><a href="http://www.globaladvancedmetals.com">www.globaladvancedmetals.com</a></td>
</tr>
<tr>
<td>GPI Prototype &amp; Manufacturing Services</td>
<td>422</td>
<td>940 N Shore Dr</td>
<td>Lake Bluff</td>
<td>IL</td>
<td><a href="http://www.gpiprototype.com">www.gpiprototype.com</a></td>
</tr>
<tr>
<td>Granutools</td>
<td>646</td>
<td>107 Rue Jean Lambert Defrene</td>
<td>Awans</td>
<td>BU</td>
<td><a href="http://www.granutools.com">www.granutools.com</a></td>
</tr>
<tr>
<td>HP Inc</td>
<td>1330</td>
<td>1201 SE Tech Center Dr Ste 170</td>
<td>Vancouver</td>
<td>WA</td>
<td><a href="http://www.hp.com">www.hp.com</a></td>
</tr>
<tr>
<td>Imagenet Consulting LLC</td>
<td>1746</td>
<td>913 N Broadway Ave</td>
<td>Oklahoma City</td>
<td>OK</td>
<td><a href="http://www.imagenetconsulting.com">www.imagenetconsulting.com</a></td>
</tr>
</tbody>
</table>

We service many medical companies by utilizing our technologies and craftsmanship to produce their prototypes and end-use parts. We help them bring their innovative components to market faster.

Formalloy's systems can be used to deposit highly-porous titanium for medical applications.

Patient-specific tactile reference models help physicians prepare for complex operations while improving patient consent, lowering recovery time, and minimizing time and cost in the OR. Models printed on the Form 2 are commonly used in orthopedic, cardiothoracic, vascular, OMFS, oncology, urology, plastics, pediatric, and interventional radiology. Form 2 is a validated printer in the first and only FDA-cleared process for diagnostic use models segmented with Materialise Mimics.

Frustum’s 3D generative design technology enables designers and engineers to push the design limits on medical implants and tools in order to realize complex shapes, while producing lightweight parts optimized for additive manufacturing. The ability to quickly iterate on additive designs is ideal for designing custom, patient specific implants that would otherwise be extremely expensive and time consuming to create using traditional design tools and manufacturing techniques.

At GPI Prototype we specialize in metal 3d printing. Currently we have 6 metal 3d printers from EOS at our Lake Bluff, IL ISO:13485:2003 certified facility. Typical medical projects include surgical tools, custom screws, and implant replica prototypes.

GranuTools develops and manufactures laboratory instruments which help to quantify powders spreadability for a recoater process. This information is used by manufacturers to achieve a homogeneous powder layer and therefore the perfect mechanical resistance for the medical protheses.

HP has a High Reusability PA 12 that is capable of up to a USP Class VI application. HP has an open materials platform strategy allowing a wide range of medical material partners. HP Fitstation.com is a leading edge footwear platform capable of providing high volume low cost custom orthotics using HP MJF technology.

EnvisionTEC is historically known for 3D Printers in the dental and hearing aid industry. Recently they have added a Bio Plotter 3D Printer that can 3D Printer stem cells, tissues, graphene and so much more. Along with that, I am working with the University of Texas South Western to build them a state-of-the-art 3D Lab and Texas A&M University of Dentistry to start 3D printing dental needs in-house.
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<th>City, State/Province</th>
<th>Phone</th>
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<tr>
<td>Impac Systems Engineering</td>
<td>319 S 1st St # A</td>
<td>Temple, TX 76504-5500</td>
<td>254-742-2050</td>
</tr>
<tr>
<td>LAI International</td>
<td>708 W 22nd St</td>
<td>Tempe, AZ 85282-1906</td>
<td>480-469-4170</td>
</tr>
<tr>
<td>Innofil 3D</td>
<td>Eerste Bokslootweg 17</td>
<td>Emmen 7821 AT</td>
<td>650-636-7881</td>
</tr>
<tr>
<td>LINK3D</td>
<td>833 Broadway Apt 2F</td>
<td>New York, NY 10003-4700</td>
<td>link3d.co</td>
</tr>
<tr>
<td>In’Tech Industries Inc</td>
<td>7180 Sunwood Dr NW</td>
<td>Ramsey, MN 55303-5100</td>
<td>763-576-8100</td>
</tr>
<tr>
<td>Jesse Garant Metrology Center</td>
<td>G7-628 Monmouth Rd</td>
<td>Windsor, ON N8Y 3L1</td>
<td>519-962-5300</td>
</tr>
<tr>
<td>Keene Village Plastics</td>
<td>100 16th St SW</td>
<td>Barberton, OH 44203-7004</td>
<td>330-753-0100</td>
</tr>
<tr>
<td>Laboratory Testing Inc</td>
<td>2331 Topaz Dr</td>
<td>Hattfield, PA 19440-1936</td>
<td>800-219-9095</td>
</tr>
<tr>
<td>Kudo3d Inc.</td>
<td>11700 Dublin Blvd Ste 220</td>
<td>Dublin, CA 94568-2824</td>
<td>925-399-4242</td>
</tr>
<tr>
<td>Keene Village Plastics</td>
<td>100 16th St SW</td>
<td>Barberton, OH 44203-7004</td>
<td>330-753-0100</td>
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<tr>
<td>Lithoz Gmbh</td>
<td>Mollardgasse 85a/2/64-69</td>
<td>Vienna 01060</td>
<td>4.3934661221e+011</td>
</tr>
<tr>
<td>Lulzbot 3D Printers</td>
<td>626 W 66th St</td>
<td>Loveland, CO 80538-1210</td>
<td>970-377-1111</td>
</tr>
<tr>
<td>Markany Inc</td>
<td>10F Ssanglim Bd</td>
<td>Seoul-City, 100-400</td>
<td>82(22)2625257</td>
</tr>
<tr>
<td>Markforged</td>
<td>44650 Helm Ct</td>
<td>Plymouth, MI 48170-6061</td>
<td>734-259-6445</td>
</tr>
</tbody>
</table>

Our PAPC product is a patented medical grade, FDA Approved, material that is being utilized in medical research, medical device development, and is being tested for implants. It is developed to be used in 3D printing applications where appropriate for medical research and prototyping.

In contrast to other well-established materials such as metals or polymers, bioinert and bioreabsorbable ceramic materials possess particular properties offering unimagined application options. By applying the Lithography-based Ceramic Manufacturing (LCM) we are able to produce customized implants for any purpose, components for medical devices and surgical equipment made out of high-performance ceramic materials.

Laboratory Testing Inc. offers services necessary for testing input materials, prototypes and finished products. LTI services are also used for comparison testing of materials created through additive manufacturing with those produced by traditional methods.
Materialise Medical, which has pioneered many of the leading medical applications of 3D printing, enables researchers, engineers and clinicians to revolutionize innovative patient-specific treatment that improves and saves lives. Materialise Medical’s open and flexible platform of software and services, Materialise Mimics, form the foundation of certified Medical 3D Printing, in clinical as well as research environments, offering virtual planning software tools, 3D-printed anatomical models, and

**Matheson Tri-Gas Inc** 2046
150 Allen Rd Ste 302
Basking Ridge, NJ 07920-2977
United States
www.mathesongas.com
P: 908-991-9200

Matheson's gas technologies help increase production speed and reduce product defects in 3D manufacturing process.

**Mazak Corporation** 2004
8025 Production Dr
Florence, KY 41042-3092
United States
www.mazakusa.com
P: 859-342-1700

Mazak provides a variety of AM (additive manufacturing) HYBRID Multi-Tasking machines that combine full 5-axis capability and additive technology to revolutionize product design, reduce time to market and cut R&D costs for medical components. At the event, Mazak will demonstrate how the VC-500 AM machine builds part features to near net shape up to ten times faster than comparable systems.

**Metal Additive Manufacturing Magazine** 3309
2 The Rural Enterprise Centre
Shrewsbury, SY1 3FE
United Kingdom

Metal AM magazine is firmly established as the go-to industry resource for the latest on innovations and technology for metal Additive Manufacturing and is the first point of contact for an increasing number of manufacturers researching the technology, including those in the medical industry.

**Met-L-Flo Inc** 1736
720 N Heartland Dr Ste S
Sugar Grove, IL 60554-9864
United States
www.met-l-flo.com
P: 630-409-9860

**Microtek Finishing** 930
5579 Spellmire Dr
West Chester, OH 45246-4841
United States
www.microtekfinishing.com
P: 513-766-5600

**Nano Dimension** 119
2 Ilan Ramon St
Ness-Ziona, 74036
Israel
www.nano-di.com

Nano Dimension is developing, manufacturing and selling 3D printers and ink materials and products based on nano-technology. The company’s DragonFly 2020 Pro 3D Printer uses proprietary ink and integrated software to quickly create sensors, antennas and PCB prototypes - which are the heart of every electronic medical device. The medical sector can benefit from Nano Dimension's 3D printed solutions for rapid prototyping and short-run manufacturing.

**Newpro3D** 2338
307-4475 Wayburne Dr
Burnaby, BC V564x4
Canada
P:

NewPro fast printing speeds create an opportunity for pre-surgical planning by producing models from MRI/CT Scans in record speed.

**North Star Imaging Inc** 1136
19875 S Diamond Lake Rd Ste 10
Rogers, MN 55374-4651
United States
www.4nsi.com
P: 763-463-5650

**Nscrypt Inc** 708
12151 Research Pkwy Ste 150
Orlando, FL 32826-2920
United States
www.nscrypt.com
P: 407-275-4720

**NSL Analytical Services Inc** 934
4450 Cranwood Pkwy
Cleveland, OH 44128-4004
United States
www.nslanalytical.com
P: 216-438-5200

**nTopology** 145
153 Lafayette St Fl 7
New York, NY 10013-3139
United States

nTopology Element is widely used in the medical industry to easily create lattices and other porous structures for implants made with additive manufacturing. The increased surface area of lattice and porous structures improves osseointegration - lattice design helps facilitate tissue growth and implant fixation. nTopology Element can also be used to optimize medical tool design for lightweighting and other performance characteristics.

**OR Lasertechnology Inc** 1630
1420 Howard St
Elk Grove Vlg, IL 60007-2221
United States
P: 847-593-5711
Proto Labs has four distinct manufacturing services that help medical companies move through their product development cycles much quicker. These services include injection molding, 3D printing, CNC machining, and sheet metal fabrication.

Raise3D systems are widely used in a variety of industries. The 1ftx1ftx2ft volume of the N2 Plus 3D printer has established the system as a staple piece for many companies doing prosthesis for arms, hands, lower limbs, and designs for casts. Other companies have further implemented 3D printing by printing bones and other scanned data for fit testing and surgical testing prior to operations.

Raplas machines are used by the orthodental industry to produce vacuum forming moulds for clear plastic dental braces. This process allows to provide economical solution for correcting denture defects in a relatively short period of time.

Retech designs and builds metal atomization and casting machines used for making medical materials and parts.

Rize APD 3D printing emits no toxic particles and the process uses only safe, biocompatible and recyclable materials. Rize requires virtually no post-processing of parts, eliminating costly labor and equipment and time-consuming, messy, and harmful solvents. Rize printers produce prototypes to improve medical device design and models for pre-surgical planning, functional parts to perform appliance tests and customized end-use products for clinical trials.
With Siemens Personalization and 3D Printing solutions including medical image processing, you can use 3D geometry from biomedical images as engineering input for individualized device designs, used to create and optimize personalized devices and implants. Patient-specific images can be used to 3D print devices that fit a unique anatomy or disease condition as well as surgical guides that conform to the patient’s anatomy for more accurate surgical precision.

Thanks to high accuracy Sinterit Lisa printer can be used for pre-surgical planning, patient communication and medical education.

We have developed three specific products which comply with the USP Clas VI regulation for medical purposes.

Our Dragon Skin and EcoFlex brand silicones are used by the medical industry along with many of our resins for medical simulation, triage simulation and for medical prosthesis and training.

To medical doctors and their patients, an aesthetically bright, clean implant or instrument is imperative. To the medical device engineer, material properties are crucial for the proper fit, form and function of the implant or instrument. Solar Atmospheres medical vacuum heat treating continues to provide the medical markets what they need – aesthetically pleasing bright, clean results, minimal distortion, with exact final mechanical properties.

The Lightspeed Machine is able to print copper parts, there are many advantages using copper in medical manufacturing.

Tech-Labs is a local distributor of additive manufacturing/3D printing technologies, 3D scanners, and other solutions including powder bed fusion-metal 3D printers, FDM and PolyJet systems, and AM Metal Powders. We represent leading manufacturers in their fields including Renishaw, Stratasys, DesktopMetal, Artec, 3D Digital, and Post Process.

To medical doctors and their patients, an aesthetically bright, clean implant or instrument is imperative. To the medical device engineer, material properties are crucial for the proper fit, form and function of the implant or instrument. Solar Atmospheres medical vacuum heat treating continues to provide the medical markets what they need – aesthetically pleasing bright, clean results, minimal distortion, with exact final mechanical properties.
Our vacuum furnaces are used for stress relief of 3D metal printed parts as well as annealing and sintering.

TRUMPF is the world’s leading manufacturer to have all of the relevant laser technologies for additive manufacturing with metals. Laser Metal Fusion systems offer the performance, features and quality required for medical applications. 3D printing enables the manufacturing of bio compatible parts as well as bionic and hollow structures.

Ultimaker is used by many organizations in medicine in countless ways such as making visualization aids by 3D printing MRI scans, helping with surgical planning by printing bone models, developing low cost prosthetic limbs for amputees in developing countries, and allowing designers to prototype new types of medical devices. Ultimaker’s ease of use, reliability, wide range of materials, and commitment to accelerating the world’s transition to digital manufacturing makes it an industry leader.

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October 17-18, 2018
Palm Desert, CA

**RAPID + TCT**
May 21-23, 2019
Cobo Center
Detroit, MI

**RAPID + TCT West**
October 9-10, 2019
Santa Clara Convention Center
Santa Clara, CA

www.rapid3devent.com/mmi