3D Printing For Manufacturing

envisionTEC

Strategic 3D Solutions

Strategic 3D Solutions

3D Printers

envisionTEC

Markforged

AIRWOLF3D

MakerBot

mcor technologies

3DSYSTEMS

3D Scanners

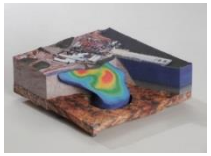
Geomagic

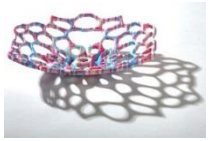
EinScan-Pro™

MakerBot

3DSYSTEMS

3D Printing





Additive Manufacturing Categories

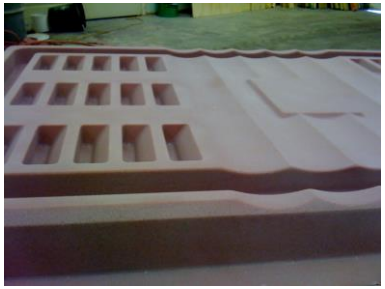
Category	Description	EnvisionTEC	Markforged	Airwolf	MakerBot	Mcor	3D Systems
UV Photo Curing	A liquid resin is selectively cured by light-activated polymerization	Thermo-plastics					
Material Jetting	Droplets of build material are selectively deposited	Bioplotter					
Sheet Lamination	Sheets of material are bonded to form an object	Composites				Paper	
Binder Jetting	A liquid bonding agent is selectively deposited to join powder materials	Sand Castings					
Material Extrusion	Material is selectively dispensed through a nozzle or orifice		Thermo-plastics	Thermo -plastics	Thermo-plastics		Thermo-plastics

Traditional Manufacturing

Additive Manufacturing can add value to many traditional forms of manufacturing.

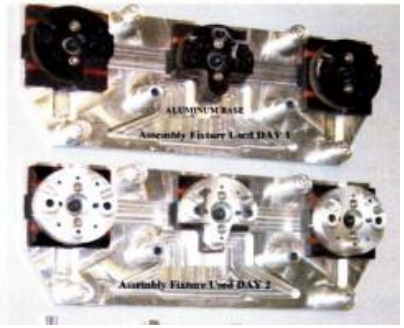
Casting

Molding



Thermoforming

Machining



Tooling & Fixtures

Strategic 3D Solutions

The Value of Additive Manufacturing

- Reduce cost of error by locating them and fixing earlier in design cycle
- Compression of time by “insourcing “, creating models within hours
- Increasing the number of prototyping iterations during the early design stage
- Keep it Confidential
- Dependable and reliable made with industrial grade components

Direct Manufacturing

PRO HELMET DECALS

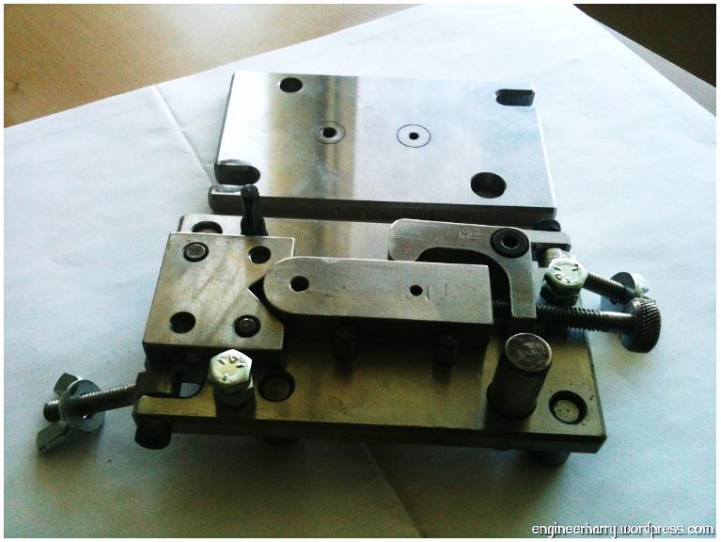
Direct Manufacturing

PRO HELMET DECALS

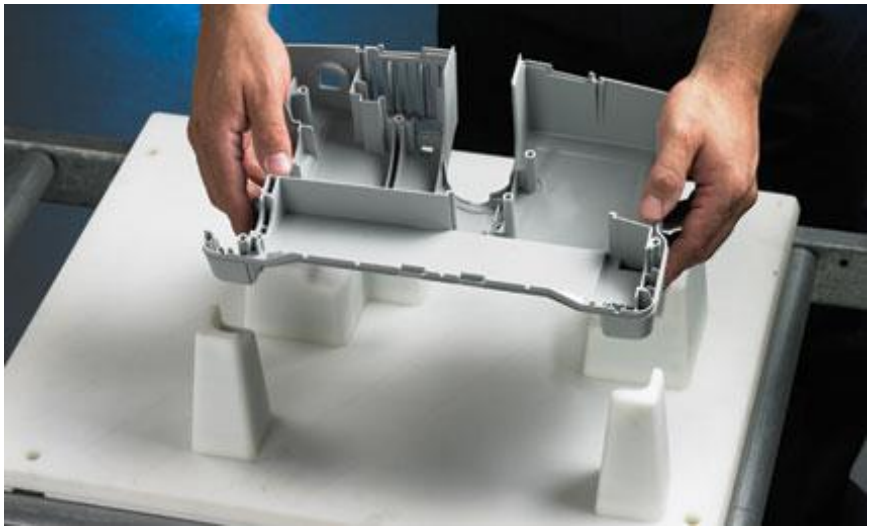
Direct Manufacturing

http://espn.go.com/mlb/story/_/id/15187003/uni-watch-la-dodgers-unveil-3-d-look-batting-helmet

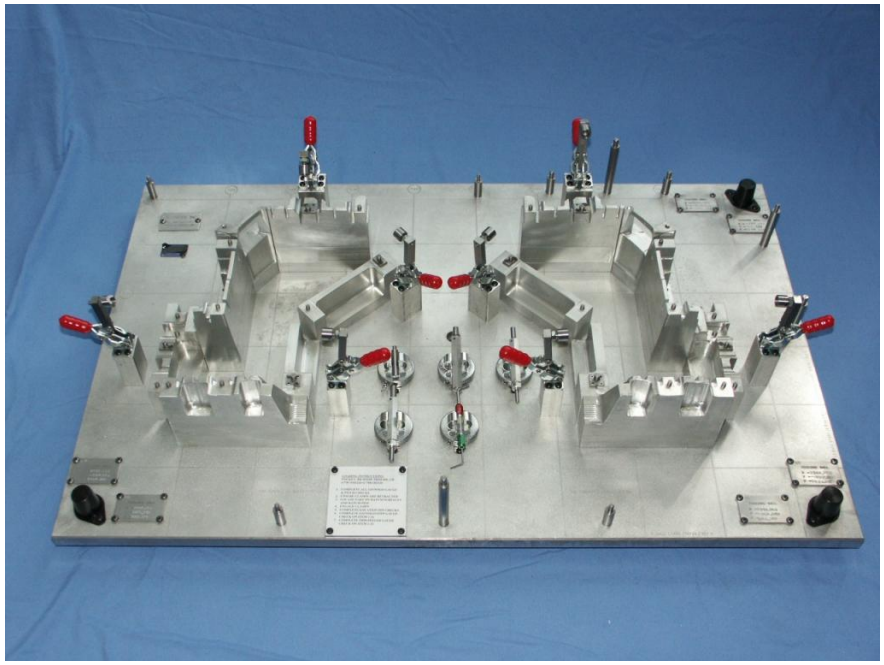
Jigs



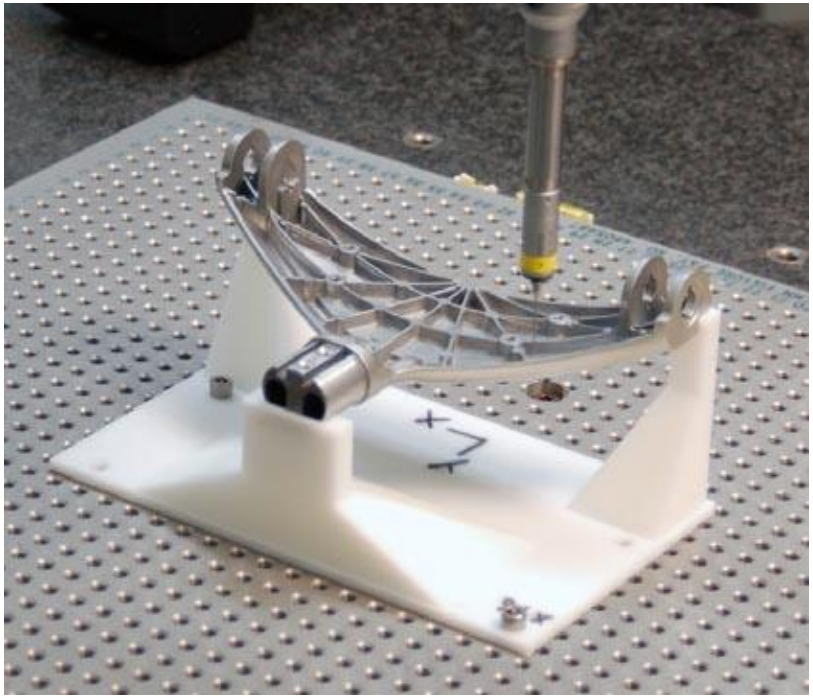
Jigs



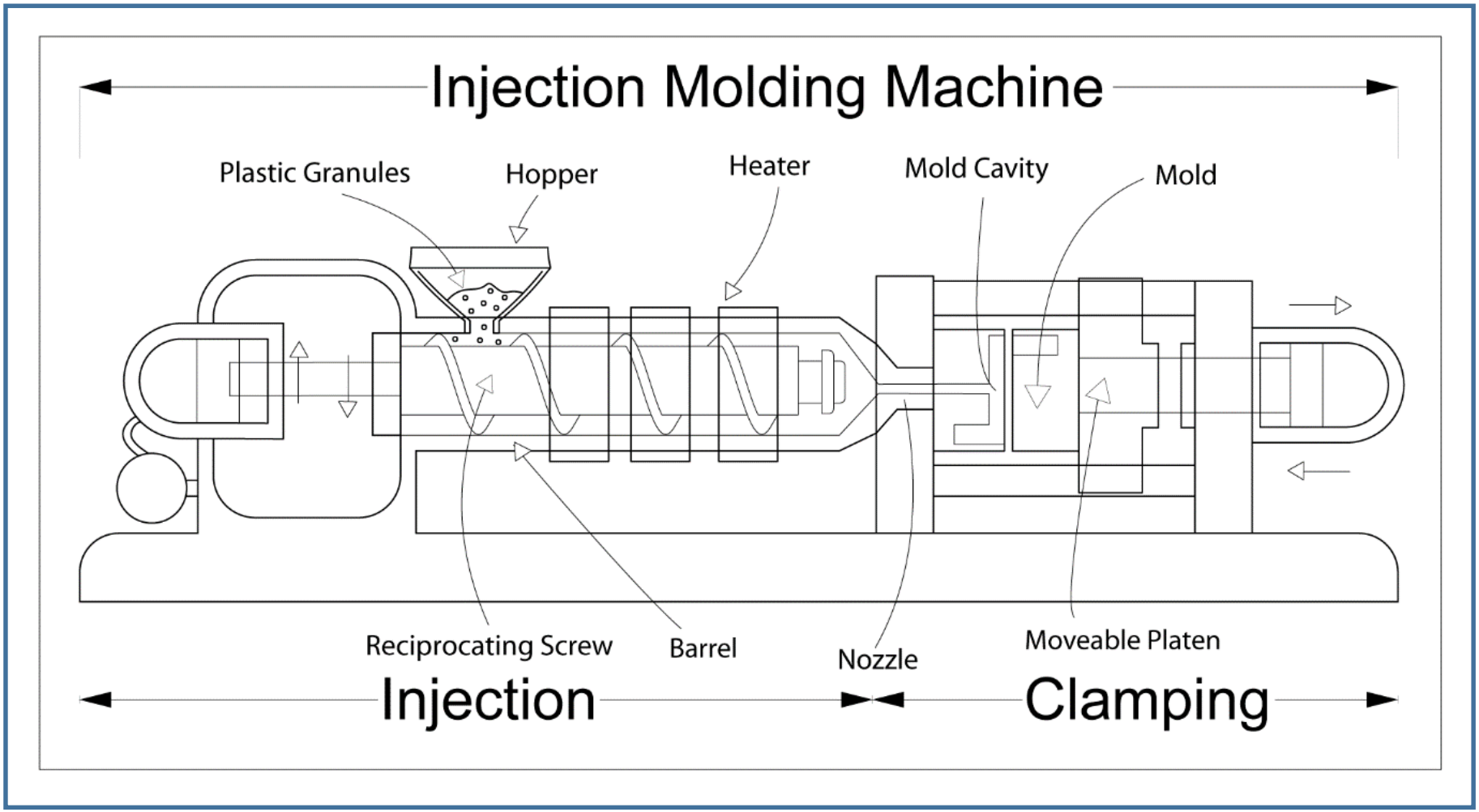
Fixtures



Fixtures



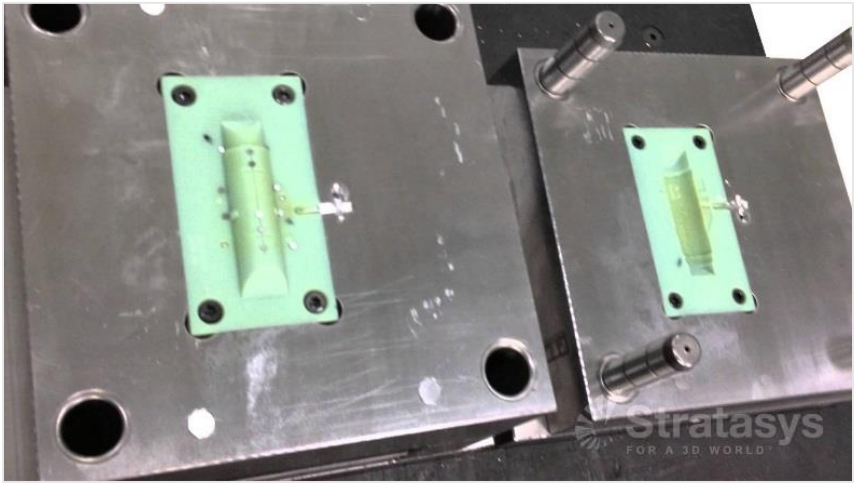
Injection Molding

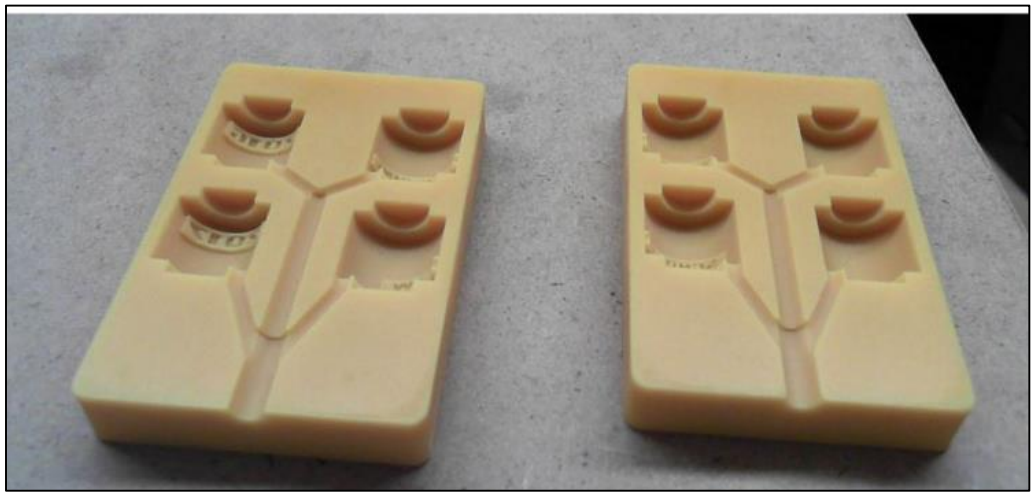


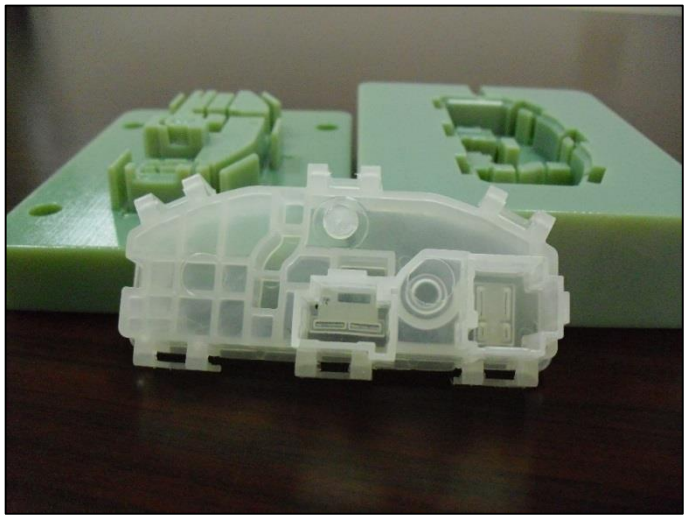
Injection Molding

Injection Molding Video

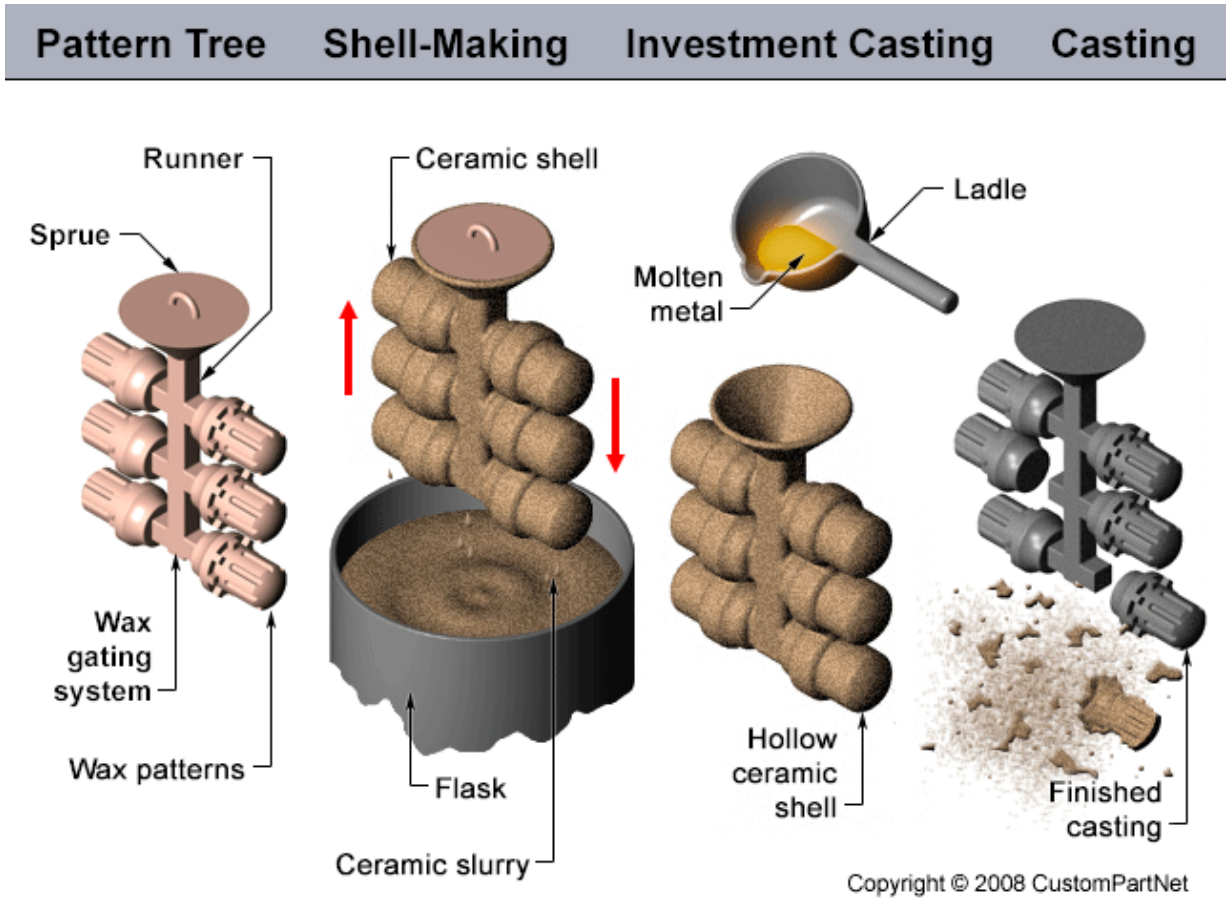
Injection Molding



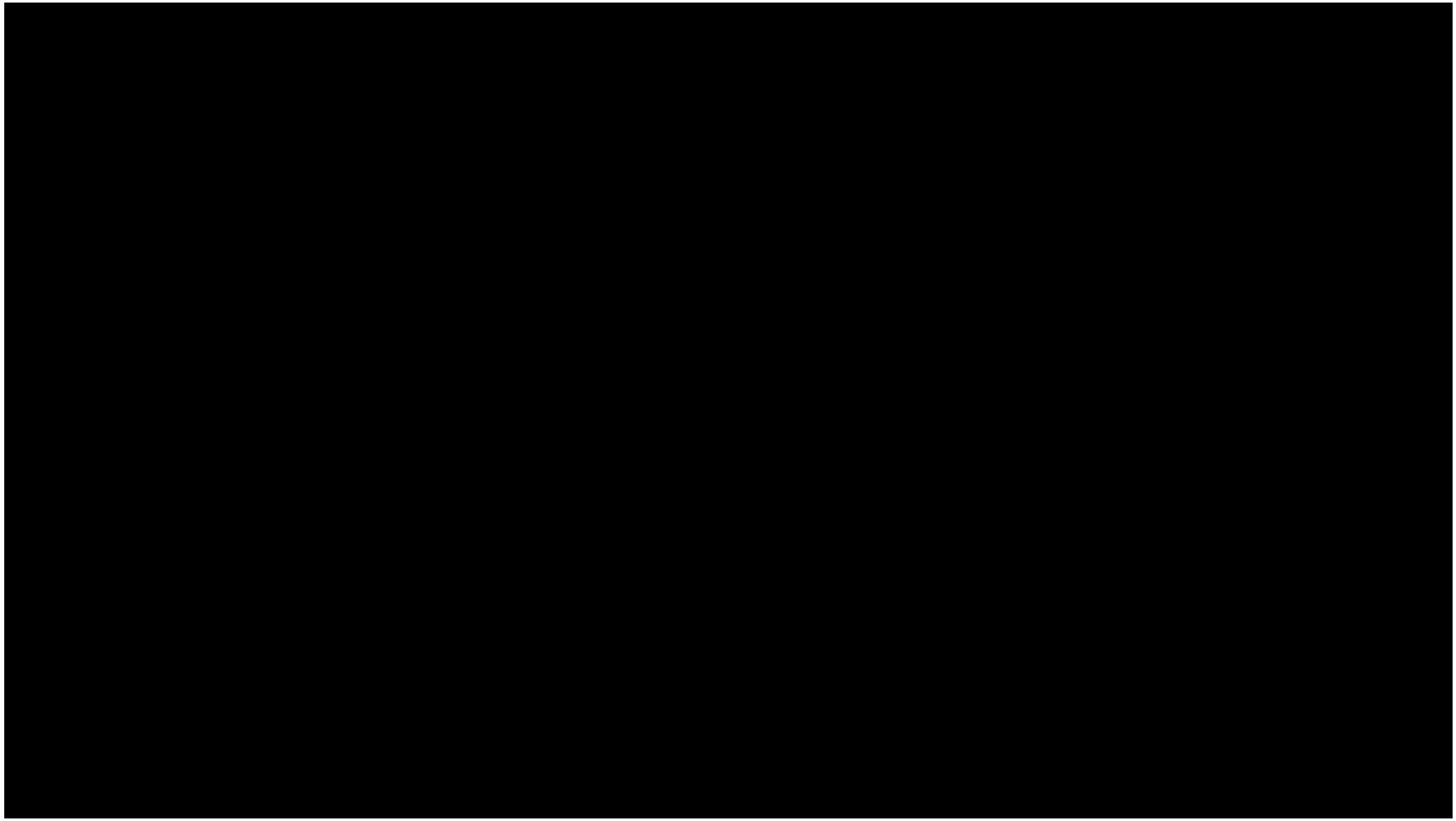




Investment Casting



Investment Casting Video

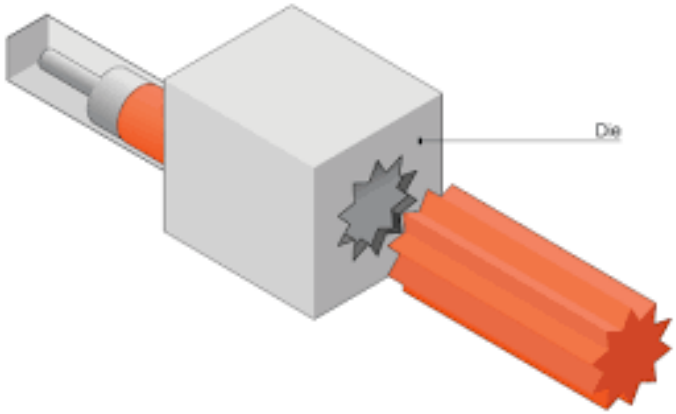


Investment Casting

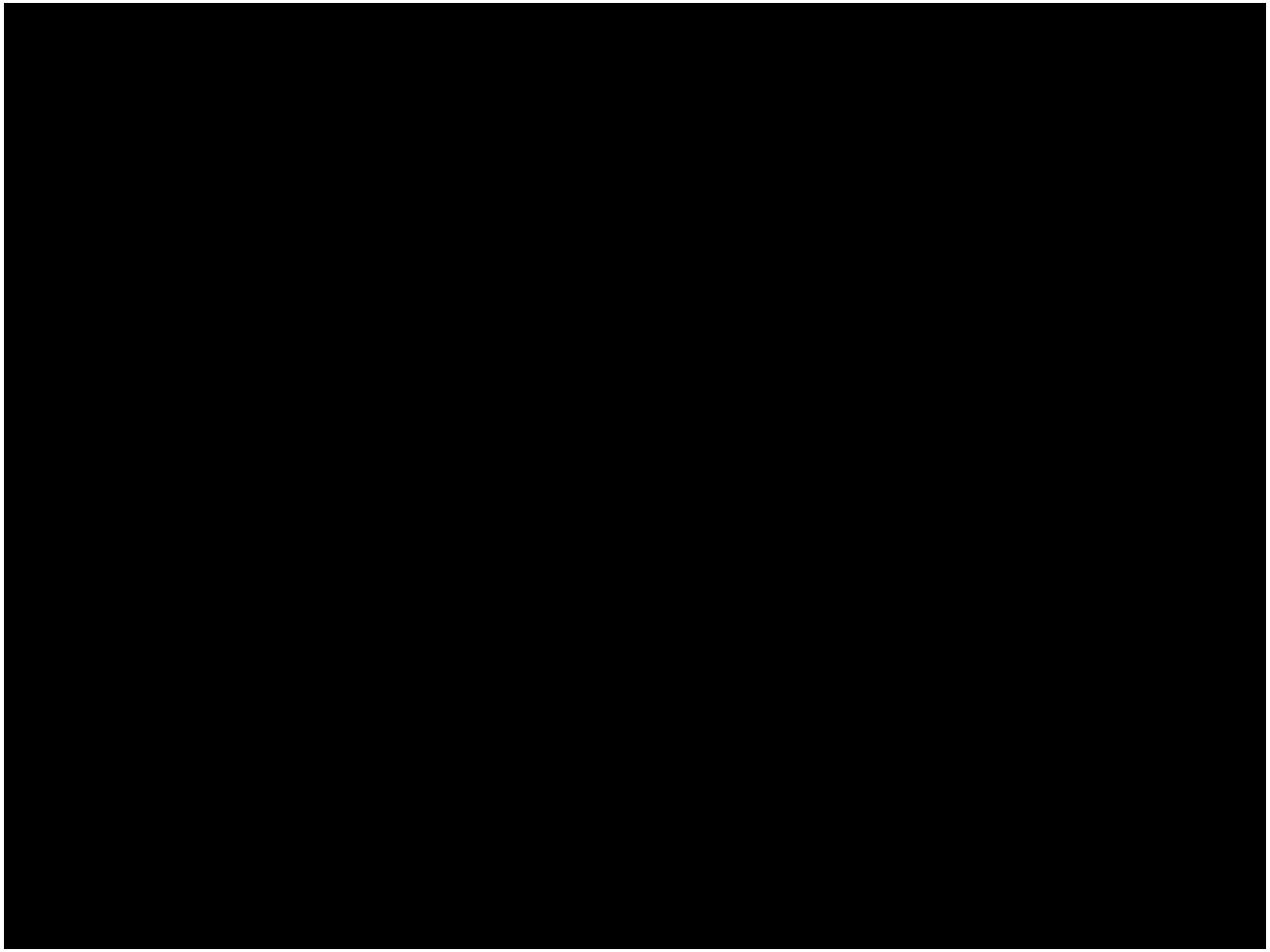
Investment Casting

It is going well. So well in fact that we are considering the possibility of another printer in a few months. I have gotten most things figured out. I am still interested in training in Dearborn so if you could send some dates for May and June, I would appreciate it. Thanks for checking in.

Extrusion Dies

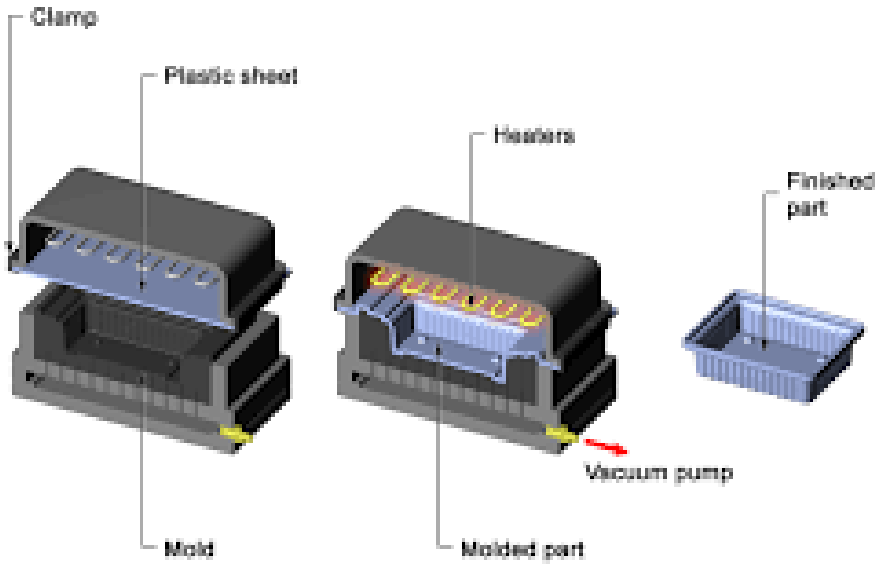


Extrusion Dies



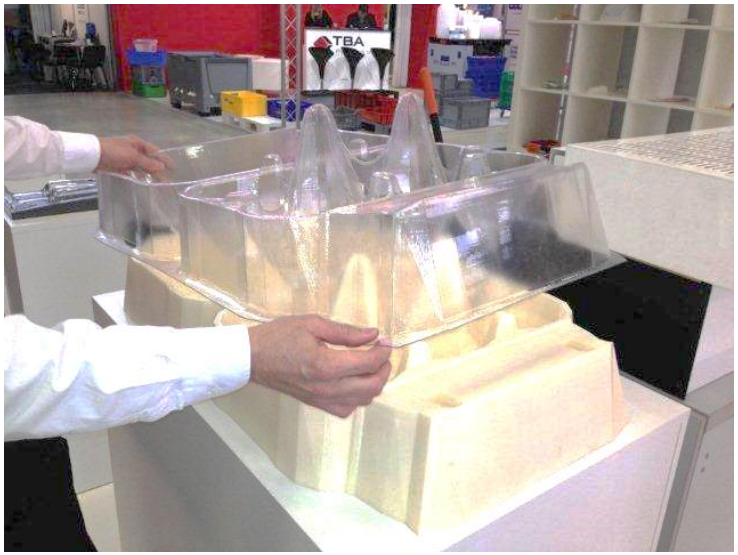
Extrusion Dies

Thermoforming/Pressure Forming

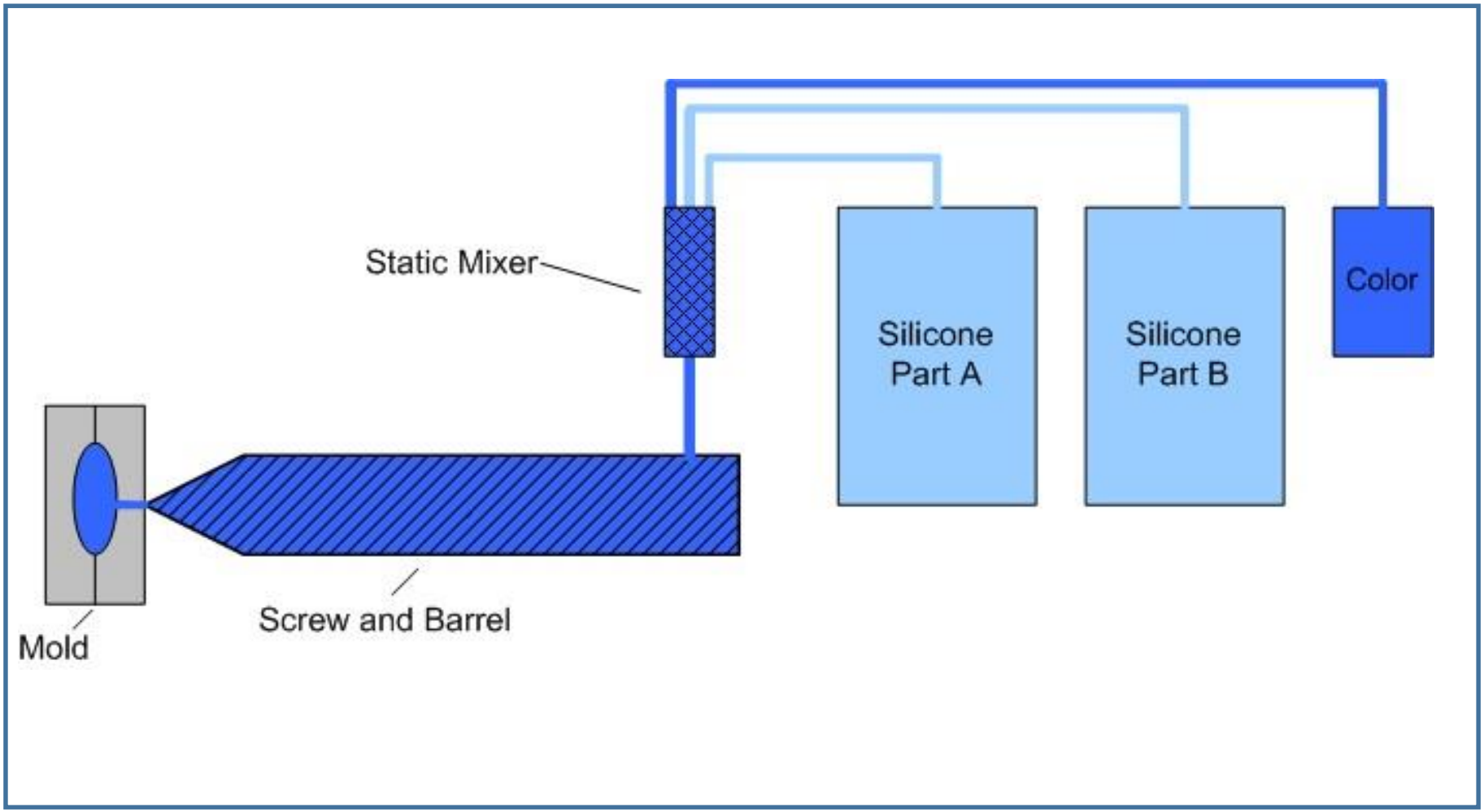


Thermoforming/Pressure Forming

Thermoforming

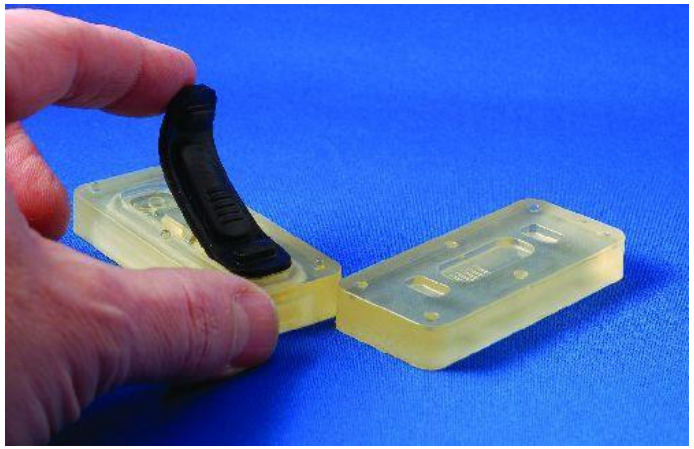


Silicone Molds

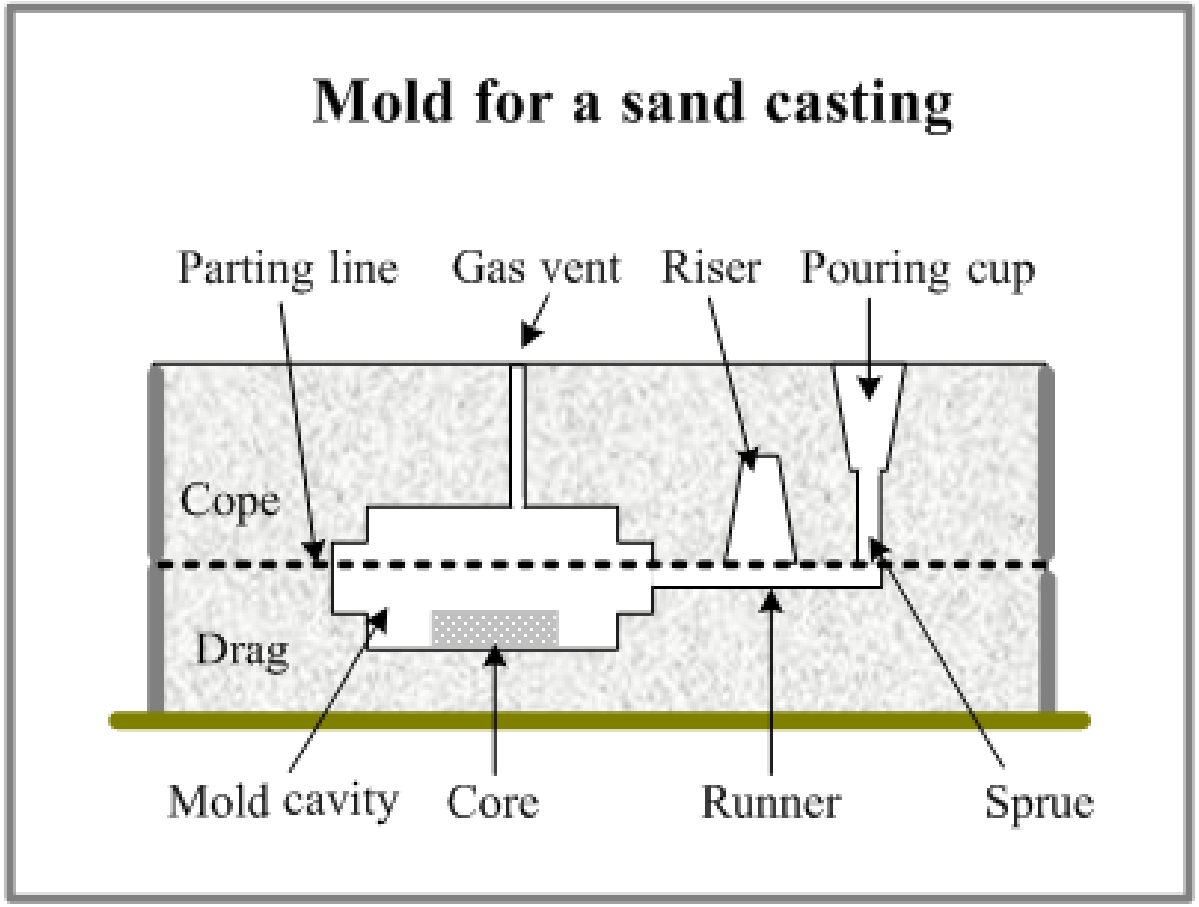


Silicone Molds

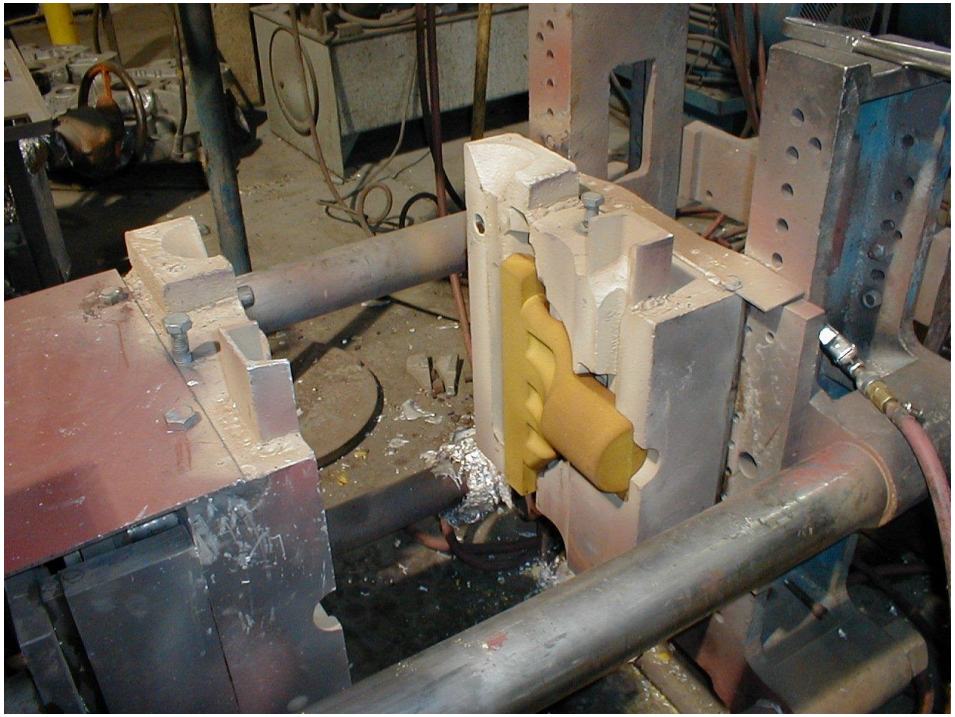
Silicone Molds



Sand Casting



Sand Casting



Sand Casting

Over 70% of all metal castings are produced via sand casting.

Sand Casting – Viridis3D

RAM123 Advantages:

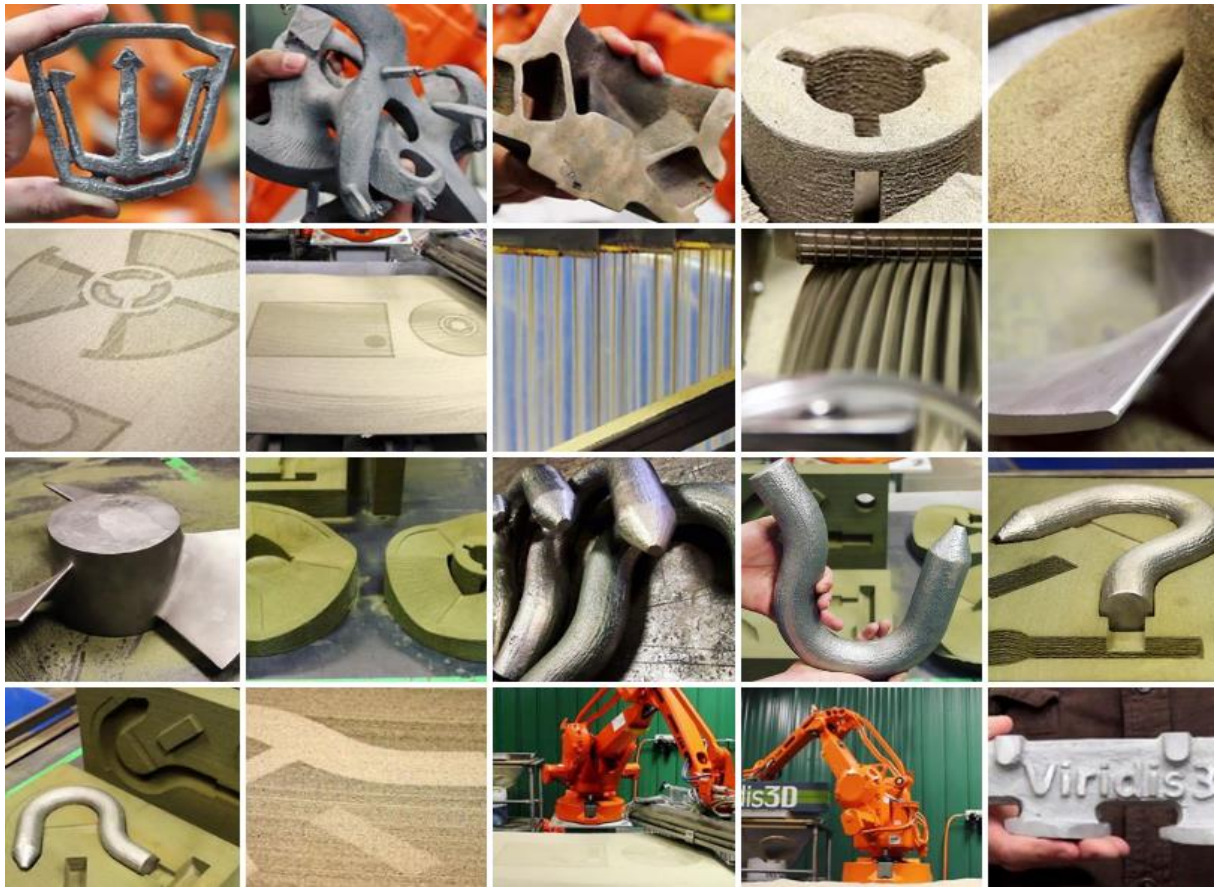
- Continuous Production
- Simple to Use Software
- Robust ABB Robotics
- Heavy Duty Palmer Auxillaries
- Short Set-up Time
- Optimized Materials Consumption
- Lower Installation Cost
- Lower Operating Cost
- Standard Foundry Sands and Resins

RAM123 Base System Includes:

- 28" Wide Printhead,
- ABB(R) Robotics & Controls
- Palmer(R) P-12 Powder Feeder
- Palmer 4000lb Hopper
- Uses Pre-blended Materials
- ViriPrint(TM) Desktop Software
- 1 year System Warranty
- Dry Catalyst Furan(TM) Materials

Sand Casting – Viridis3D Video

Sand Casting – Viridis3D



Selective Lamination Composites Object Manufacturing

EnvisionTEC Revealed SLCOM 1 as their Biggest 3D Printing Innovation of 2016 at RAPID

EnvisionTEC introduced the first industrial scale 3D printer for the production of woven fiber composite parts

Selective Lamination Composites Object Manufacturing

Machine Properties*	SLCOM1
Build Envelope	30" x 24" x 24"
Accuracy	+/- 100 microns in X and Y One layer thickness in Z after lamination
Cutting Speed	Up to 20 inches per second linear speed
Min/Max Layer Thickness	0.1 mm to 1.0 mm (prior to lamination)
Build Speed	Post lamination layer thickness dependent
Material	UNI and Bidirectional Thermoplastic Pre-pregs
Cutting Gantry	4 Full AXIS cutting Gantry system (XYZR)
Footprint	125"H x 156" W x 93" D

System Properties

- Builds solid parts using layer-by-layer laminated thermoplastic composite fabric sheets from a roll
- Unique material storage feed concept
- 48" x 48" X/Y/Z cutter range with 30kHz ultrasonic blade cutter
- Automatic blade replacement with blade wearing auto detection
- Automatic anti-lamination fluid application
- Waste material not fully laminated to build, reducing post-processing
- Processes continuous fiber-reinforced thermoplastic pre-pregs for use in lightweight structural applications
- Composite materials can be tailored for:
    - Exceptional toughness
    - Environmental resistance
    - Vibration dampening
    - Low flammability characteristics
    - High wear resistance
    - Radiolucency/x-ray transparancy

Selective Lamination Composites Object Manufacturing

Matrix Polymer	Nominal Processing Temp °C/°F	Tg °C/°F	Polymer Structure	Continuous Use Temp °C/°F*
Polyetheretherketone (PEEK)	385/725	143/290	Semi-crystalline	250/480
Polyetherimide (PEI)	320/610	215/420	Amorphous	200/390
Polyphenylene Sulfide (PPS)	330/625	90/195	Semi-crystalline	220/430
Polypropylene (PP)	190/375	-10/-14	Semi-crystalline	90/194
Polyethylene (PE)	175/350	-125/-195	Semi-crystalline	70/160
Polycarbonate (PC)	295/565	150/302	Amorphous	130/265
Polyethylene terephthalate (PET)	290/555	75/165	Semi-crystalline	130/265
Polyether Sulfone (PES)	290/555	225/435	Amorphous	180/355
Polybutylene Terphthalate (PBT)	265/510	56/135	Semi-crystalline	110/230
Polyamides (Nylon) (PA 12, PA 11, PA 6.10, PA 6, PA 4.1)	190-220/375-430	40-60/105-140	Semi-crystalline	120/250
Polyetherketoneketone (PEKK)	355/670	156/315	Semi-crystalline	230/445

Questions

Contact Information

Bruce Reimer
Strategic 3D Solutions, Inc.
4805 Green Road, Suite 114
Raleigh, NC 27616
Phone: (919) 324-3912
Mobile: (919) 451-5963
buce.reimer@strategic3dsolutions.com

Ned Bradham
EnvisionTEC, Inc.
15162 S Commerce Dr
Dearborn, MI 48126
Phone: (313) 436-4300
Mobile: (313) 770-0704
nbradham@envisiontec.com