SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF AUTOMOBILE ENGINEERING

19AUT303 – Additive Manufacturing and its applications

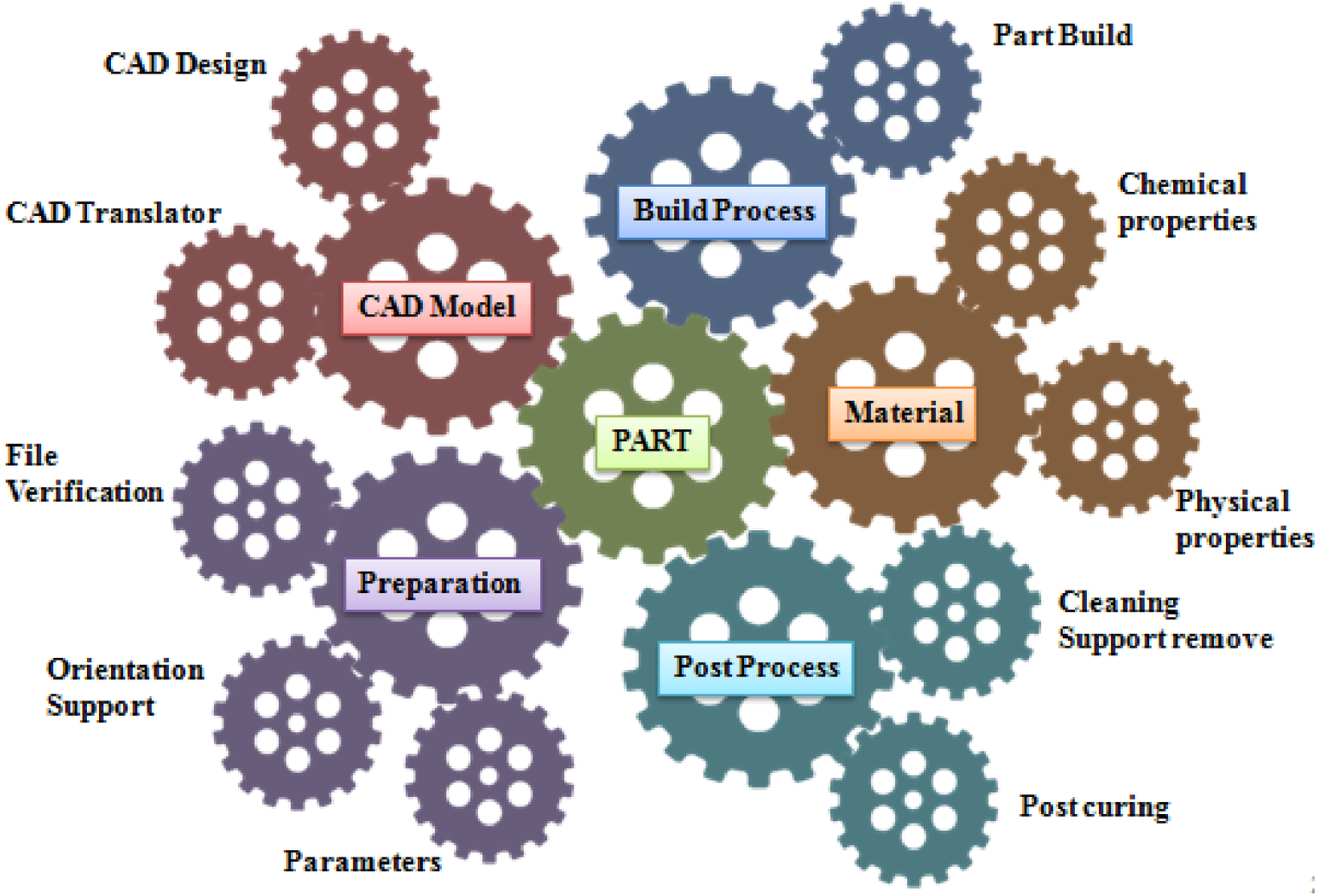
III YEAR / V SEM

UNIT – 5 ADDITIVE MANUFACTURING APPLICATIONS

Topic – Applications of additive manufacturing

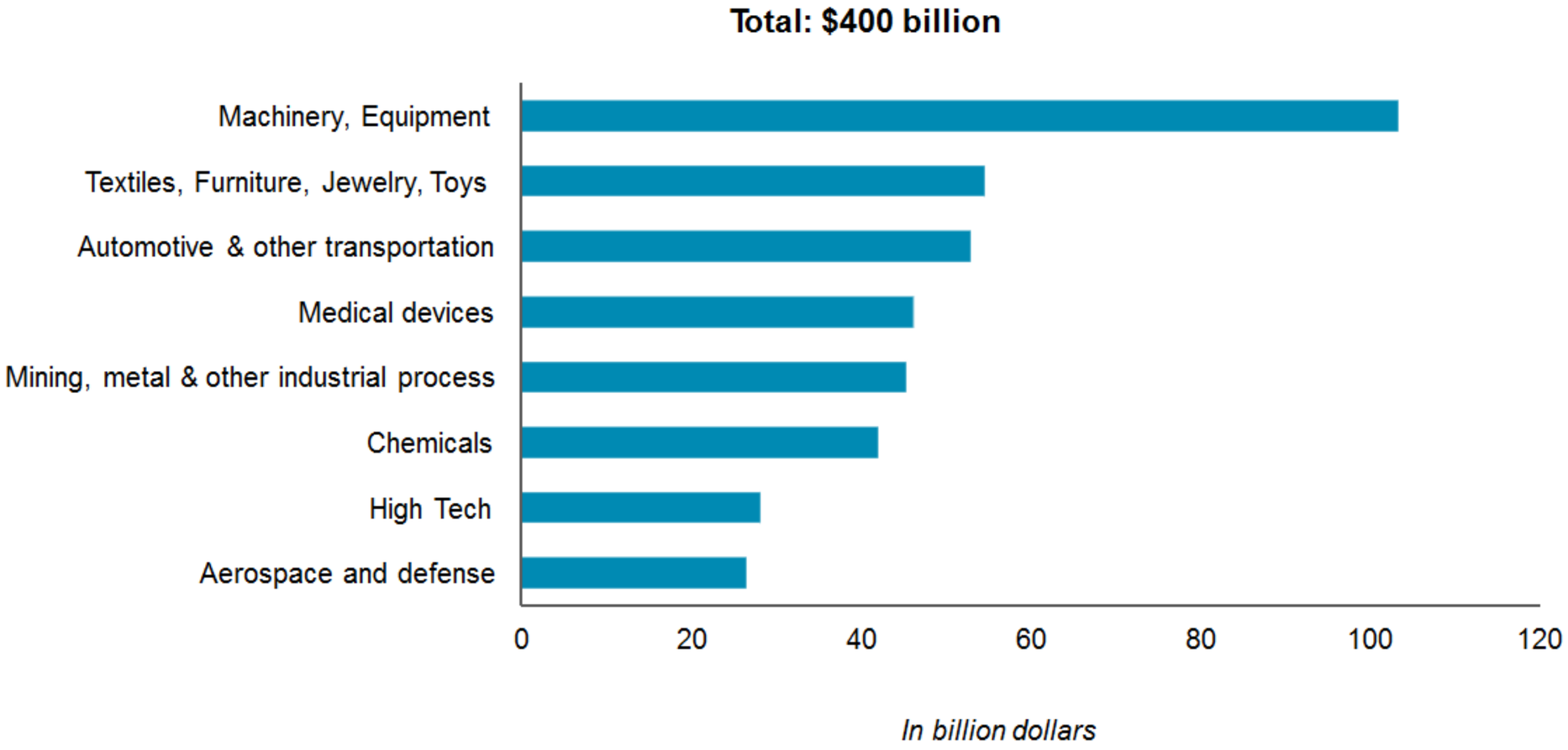
Applications

Additive manufacturing makes **prototyping more affordable for not only wealthy companies but for small businesses and entrepreneurs** who would otherwise not be able to test their products generously. It also allows you to **test multiple colors, materials, and other aesthetic functions of a product in real life**.


CAD Design
Part Build
CAD Translator
Build Process
Chemical properties
CAD Model
PART
Material
File Verification
Physical properties
Preparation
Cleaning
Support remove
Post Process
Orientation
Support
Post curing
Parameters

Additive manufacturing by Industry Sectors

Manufacturing sub-sectors impacted by 3D printing - 2030
Global – forecast 2030

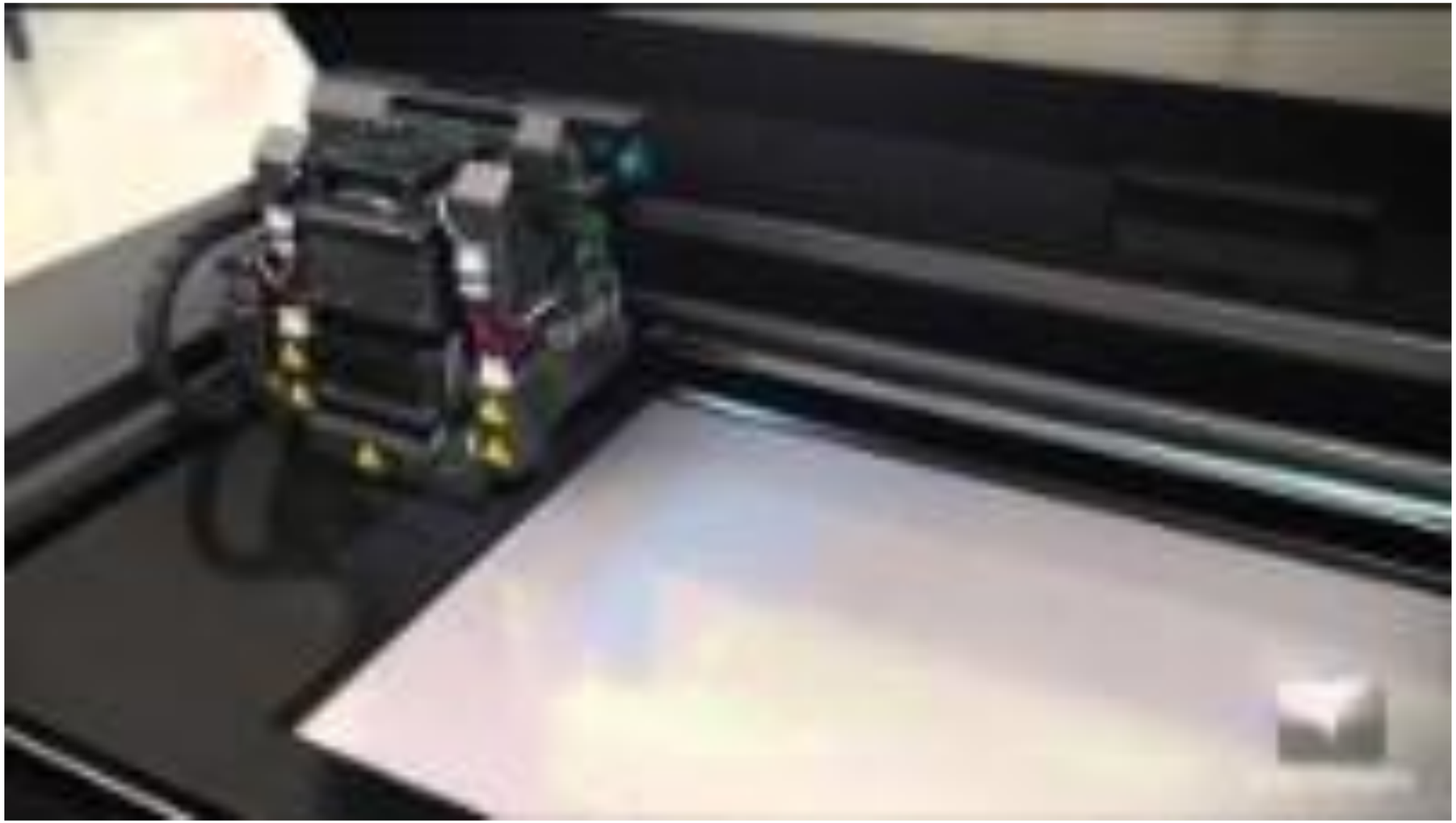


Source: Oliver Wyman modelization & analysis

Additive manufacturing by Industry Sectors

- Functional complexity
- Geometric complexity
- Multi-material parts
- Cost-sensitive storage
- Time-to-market
- Frequency of design changes
- Customization

Material Jetting



Powder bed fusion

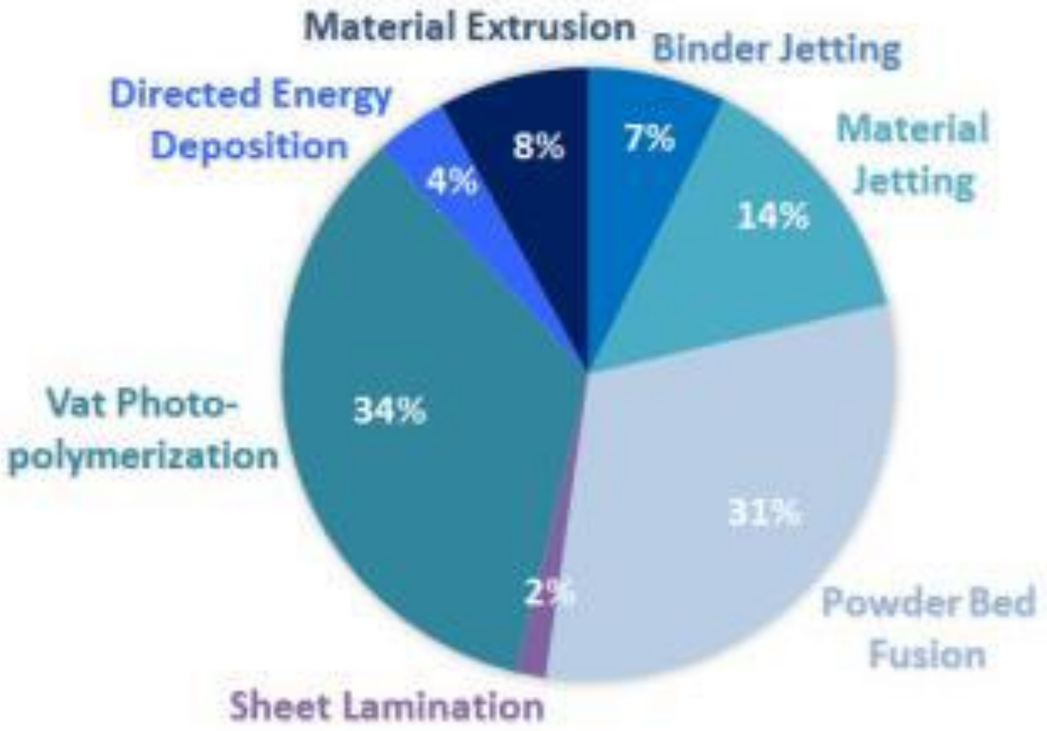
Directed energy deposition

Sheet lamination

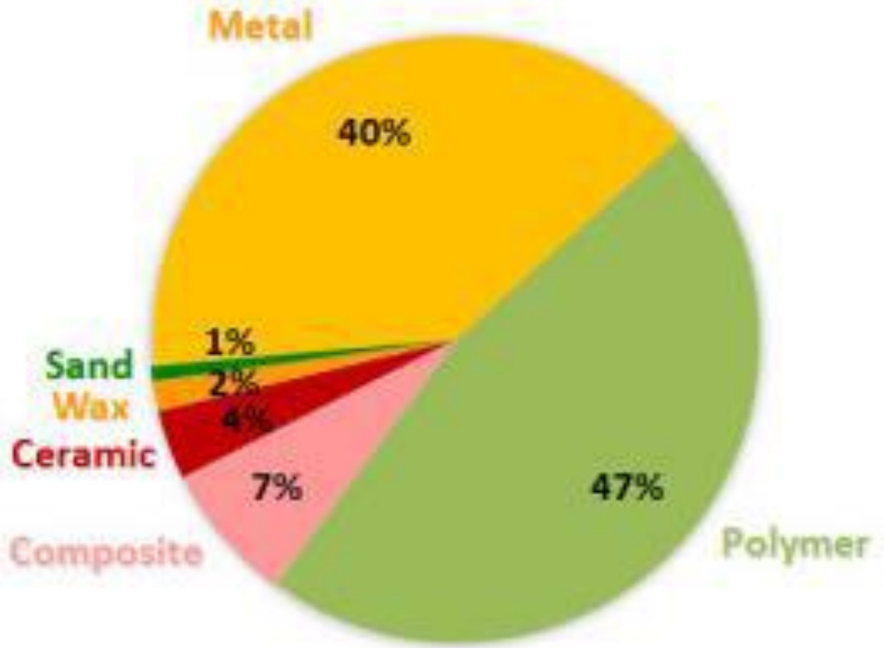
Materials

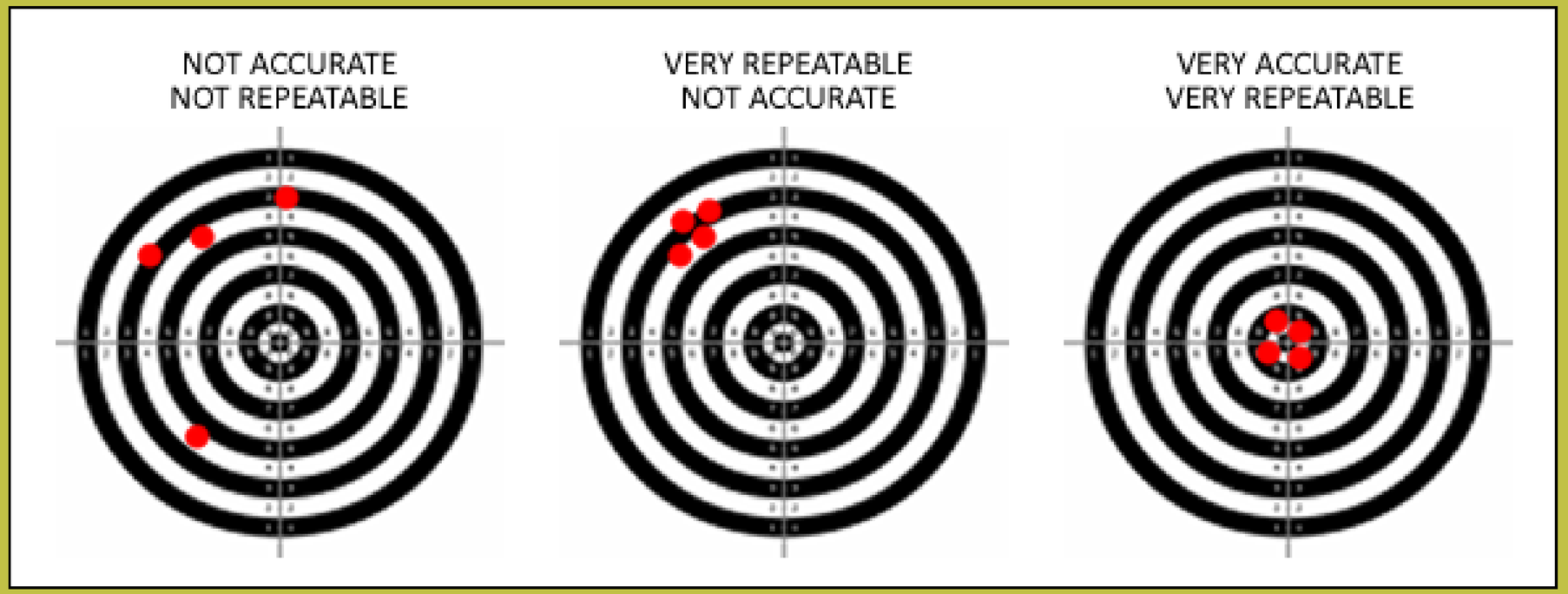
Materials	Example materials	Process categories						
		Vat photo-polymer-ization	Material jetting	Binder jetting	Powder bed fusion	Material extrusion	Directed energy deposition	Sheet lamination
Thermoset Polymers	Epoxies and acrylates	X	X					
Thermo-plastic polymers	Polyamide, ABS, PPSF		X	X	X	X		X
Wood	paper							X
Metals	Steel, Titanium alloys, Cobalt chromium			X	X		X	X
Industrial ceramic materials	Alumina, Zirconia, Silicone nitride	X		X	X			X
Structural ceramic materials	Cement, Foundry sand			X	X	X		
Note: Combinations of the above material classes, e.g. a composite, are possible								

Additive Manufacturing Machines by Process



Additive Manufacturing Materials by Material Type





ACCURACY
Degree of comformity of a measurement to a standard or known value

REPEATABILITY
The closeness of aggreement amoung a number of consecutive measurements

RESOLUTION
The smallest degree of movement that a scale can detect

Accuracy

	Layer thickness(mm)	Accuracy (mm)
Stereolithography	0.05 - 0.3	0.01 - 0.2
Layered Object Manufacturing	0.1 - 1	0.1 - 0.2
Fused Deposition Modelling	≈0.05	0.130 - 0.260
Selective laser sintering	≈0.08	0.03 - 0.4

Other general information

Technology	SLA	SLS	FDM	Wax Inkjet	3D printer	LOM
Max Part Size (cm)	30x30x50	34x34x60	30x30x50	30x15x21	30x30x40	65x55x40
Speed	Average	Average to fair	Poor	Poor	Excellent	Good
Accuracy	Very good	Good	Fair	Excellent	Fair	Fair
Surface finish	Very good	Fair	Fair	Excellent	Fair	Fair to poor
Strenghts	Market leader, large part size, accuragy, wide product	Market leader, accuracy, materials, large part size	Lab on desktop, price, materials	Accuracy, finish, lab on desktop	Speed, lab on desktop, price, color	Large part size, good for large castings, material cost
Weaknesses	Post processing, messy liquids	Size and weight, system price, surface finish	Speed	Speed limited, materials, part size	Limited materials, fragile parts, finsh	Part stability, smoke, finish and accuracy

Other general information

Machine	Cost	Material	Application
Fused Deposition Modeler 1600 (FDM)	$10/hr	ABS or Casting Wax	Strong Parts Casting Patterns
Laminated Object Manufacturing (LOM)	$18/hr	Paper (wood-like)	Larger Parts Concept Models
Sanders Model Maker 2 (Jet)	$3.30/hr	Wax	Casting Pattern
Selective Laser Sintering 2000 (SLS)	$44/hr	Polycarbonate TrueForm SandForm	light: 100%; margin: 0">Casting Patterns Concept Models
Stereolithography 250 (SLA)	$33/hr	Epoxy Resin (Translucent)	Thin walls Durable Models
Z402 3-D Modeller (Jet)	$27.50/hr	Starch/Wax	Concept Models

Thank You