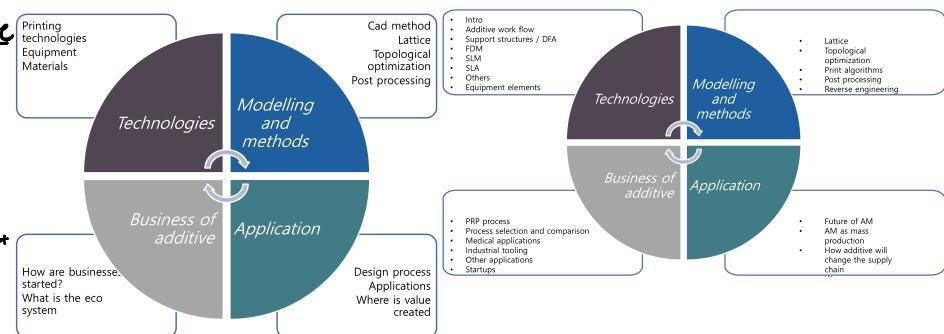


Introduction to Additive

- how do printers chemically and physically work?
- big difference between what you model and what you actually get



Some manufacturing processes:

1. Material removal

- Lathe, milling



2. Forming

- Stamping
- thermoforming



3. Layering Materials

- composite
- wood laminate

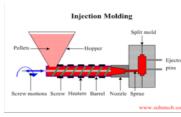


4. Sintering/powder

- clay
- XXX

5. Solidification

- injection mold, casting



6. Joining

- welding, mechanical joining, soldering



7. Finishing

- electroplating, grinding, etching



8. Additive

- SLA, FDM, SLS
- we have to think about how this relates to other processes



3-D Printing vs. Additive Manufacturing

↑
what the press uses

↑
this is the correct term to use

"A process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies
- ASTM F2792-12a Standard Terminology for Additive Manufacturing Technologies

* also called: additive fabrication, additive processes, additive techniques, additive layer manufacturing

AM Myths

- anything can be printed
- don't need to think about the process
- you get exactly what you CAD
- software won't generate errors
- just take it off the machine and use it
- it is essentially free
- it is the same as machining

Why Additive?

Other than it is really cool, there's also great financial reasons!

- combining parts
- complex geometry
- weight reduction



- testing geometries
- design validation
- bridging production shortages



- geometries that can't be mfg.
- unique material properties



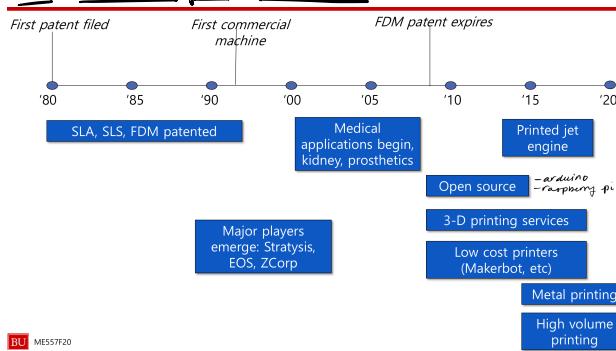
- custom fixtures
- low volume tooling



- mass customization



AM Technologies Timeline

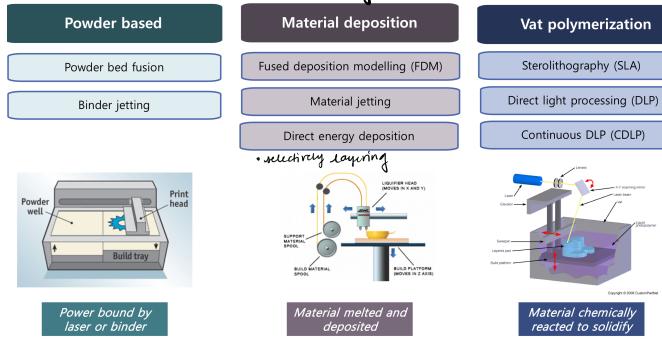


It is the wild west out there

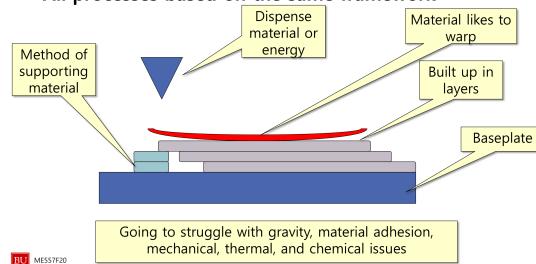
- Technology is moving faster than the research
- Everyone is experimenting
- New companies are cropping up all the time
- There is no "law." Mostly recipes
- Everything will change in a year
- Software is terrible



3 main Additive Technologies to Focus On



All processes based on the same framework



AM: New Design Paradigm

Only use material where you need it

Don't think in terms of material, think in terms of function and loads

- do you really need that material? Material is expensive! Minimize material!
- are you using that shape because it is easy to CAD or because it solves a function?
- how are you going to avoid using supports?