



Wohlert's Associates, Inc.  
**Three-Day DfAM Course Outline**

Date	Topic	Details
Day 1		
8:00-8:15	Introduction	Introduction to the course and attendees.
8:15-9:15	The state of the AM industry	Recent AM growth trends and developments around the world.
9:15-9:45	Intro to design for AM	Benefits of AM in the context of DfAM, how AM is being applied, and how certain parts can be designed for AM.
9:45-10:00	Break	
10:00-10:30	Intro to AM continued	Benefits of AM in the context of DfAM, how AM is being applied, and how certain parts can be designed for AM.
10:30-11:30	AM process: from CAD to part	Examining the complete AM process chain, from CAD part creation, to part production. Attendees will gain an understanding of the entire process chain and how it helps them to design better AM parts, file formats, and working with STL manipulation software. Opinions and commentary on the major AM processes, materials, companies, and products.
11:30-12:00	Lunch	
12:00-1:30	AM design optimization exercise	Thought processes behind DfAM. In this exercise, we will design a hydraulic manifold while considering print orientation and support material.
1:30-1:45	Break	
1:45-3:45	Design for mass-customization exercise	Hands-on exercise to design a custom product using a combination of CAD, 3D scanning, and STL editing software. This exercise introduces attendees to the idea of working with multiple software tools and technologies to produce parts optimized for AM.
Day 2		
8:00-9:00	AM process: from CAD to part (continued)	Opinions and commentary on other popular AM processes, materials, companies, and products.
9:00-9:30	Designing for metal AM	Specific issues and guidelines around designing for metal AM, including anisotropy, process constraints, general guidelines related to wall thicknesses, hole sizes, tolerances, angles, etc. Close look at metal AM post-processing and material properties.
9:30-9:45	Break	
9:45-10:45	Designing for metal AM continued	Specific issues and guidelines around designing for metal AM, including anisotropy, process constraints, general guidelines related to wall thicknesses, hole sizes, tolerances, angles, etc. Close look at metal AM post-processing and material properties.

10:45-11:30	Lattice structure exercise	An exercise in which a solid part is transformed into a shell filled with a lattice structure.
11:30-12:00	Lunch	
12:00-12:45	Economics of AM	When does it make sense, or not make sense, to use AM for production quantities? What determines AM costs and can we design to minimize cost?
12:45-1:30	Designing for polymer AM processes	Specific issues and design guidelines surrounding polymer AM (material extrusion, LS, SL, etc.), including post-processing.
1:30-1:45	Break	
1:45-3:45	Topology optimization	Session on designing topology-optimized parts for AM, and creating light-weight parts using software such as Inspire from solidThinking. The general workflow of topology optimization, setting up multiple load-cases, and then using the generated ideas to produce a final design.
Day 3		
8:00-8:45	Tooling applications of AM	AM beyond direct part production: Tools for injection-molding, sheet-metal forming, cutting and drilling, extrusion, jigs and fixtures, etc. Adding fixtures to parts to ease mounting on CNC machines for more efficient post-processing.
8:45-9:30	Part consolidation exercise	Implications of part consolidation for AM. Hands-on exercises in part consolidation.
9:30-9:45	Break	
9:45-11:30	Putting it all together	Hands-on exercise to design a product that can be printed in metal with minimal support material and post processing. The exercise applies what has been learned over the past three days.
11:30-12:00	Lunch	
12:00-1:15	Panel Session	AM experts offering opinions and answering questions from attendees.
1:15-1:30	Break	
1:30-2:30	AM in the near future	Looking at where AM and design software tools are headed in the near future and the implications they will have on DfAM.
2:45	Conclusion	

