



Wohlert's Associates, Inc.

**Two-Day DfAM Course Outline**

Date	Topic	Details
Day 1		
8:30-8:45	Introduction	Introduction to the course and attendees.
8:45-9:30	State of the AM industry and intro to design for AM	Recent AM growth trends and developments around the world. Benefits of AM in the context of DfAM, how AM is being applied, and how certain parts can be designed for AM.
9:30-10:15	Intro to design for AM	Continuation of previous session
10:15-10:30	Break	
10:30-12:15	Design optimization	Thought processes behind DfAM. In this exercise, we will design a hydraulic manifold while considering print orientation and support material.
12:15-12:45	Lunch	
12:45-14:30	Topology optimization	Designing topology-optimized parts and creating light-weight structures.
14:30-15:15	Economics of AM	When does it make sense to use AM for production quantities? What determines AM costs and can we design to minimize them?
15:15-15:30	Break	
15:30-16:30	Designing for polymer AM processes	Specific issues and design guidelines surrounding polymer AM (material extrusion, LS, SL, etc.), including post-processing.
16:30-16:50	Design for mass-customization	An introduction to working with multiple CAD, 3D scanning, and STL editing tools to produce custom parts optimized for AM.
16:50-17:00	Summary	Summary of first day
17:00-18:00	Cocktail reception	

Day 2		
8:30-10:00	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.
10:00-10:15	Break	
10:15-10:45	Designing for metal AM	(Continued)
10:45-11:15	Lattice structure	A solid part is transformed into a shell filled with a lattice structure.
11:15-12:00	Design to reduce residual stress	Redesign of a metal AM part in order to minimize the potential residual stress that could cause distortion
12:00-12:30	Lunch	
12:30-13:15	Expert panel	DfAM and AM experts offer opinions and answers

		questions from participants.
13:15-14:00	Tooling applications of AM	AM beyond direct part production: Tools for injection-molding, sheet-metal forming, cutting and drilling, extrusion, and jigs and fixtures. Adding fixtures to parts to ease mounting on CNC machines for efficient post-processing.
14:15-15:00	Part consolidation exercise	Implications of part consolidation for AM. Hands-on exercises in part consolidation.
15:00-15:15	Break	
15:15-16:30	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.
16:30-17:00	AM in the future	Looking at where AM and design software tools are headed in the future and the implications they will have on DfAM.
17:00-17:15	Conclusion	Certificates of completion and course evaluation

