MFG226464 - Introduction to Autodesk CFD Integration with Inventor

Dave Graves

Subject Matter Expert

AUTODESK. UNIVERSITY

About the speaker

Dave Graves

Dave is a Simulation Specialist on the Autodesk CFD team. He has a BSME from North Carolina State University and has spent time in Telecommunication industry before moving to the world of simulation and CAD. At Autodesk Dave has worked with various manufacturing solutions including Fusion 360 and has been involved with the Autodesk CFD product for over 15 years.

Agenda

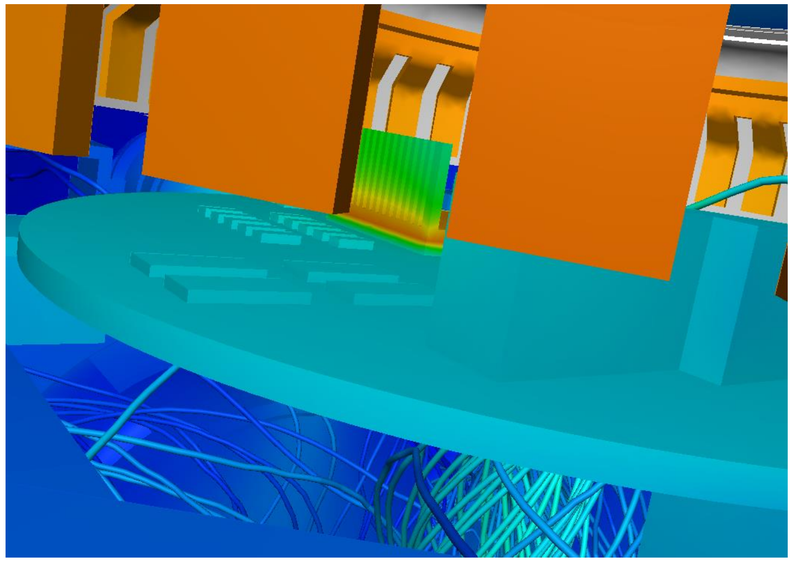
- CFD Overview
- CFD Process
- Inventor Tips and Trick
- Live Demonstration
- Questions

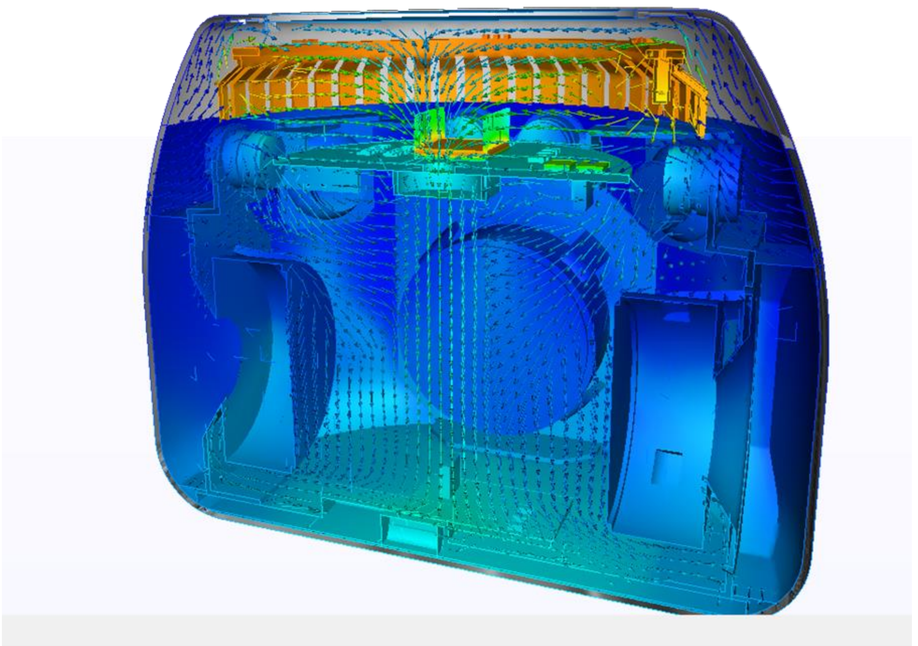
What is CFD?

- **C**omputational **F**luid **D**ynamics
  - Fluid: Liquids and Gasses
  - Dynamics: Movement

- Numerical analysis of fluid flow and heat transfer and the interaction with surrounding solids

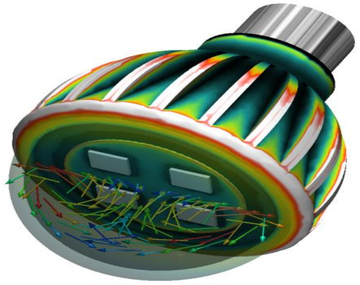
- Virtual wind-tunnel, flow bench, thermal test rig



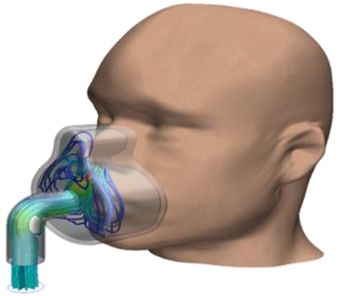


Applications for CFD

Blowers/
Fans



Lighting

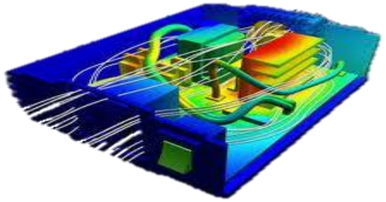


Medical

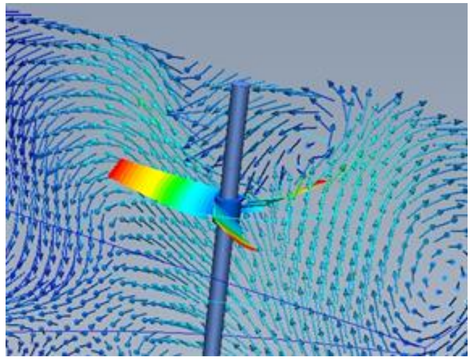
Automotive

Boilers

Electronics



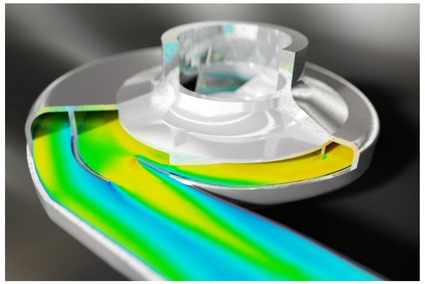
Building Ventilation
(HVAC)

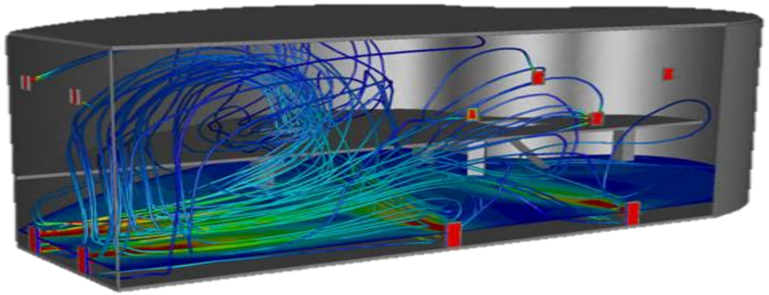


Mixing

Filtration

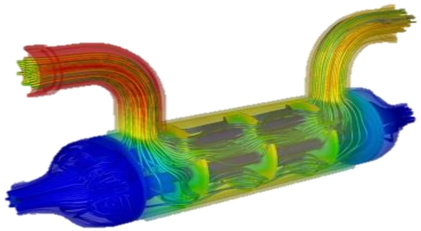
Pumps





Valves

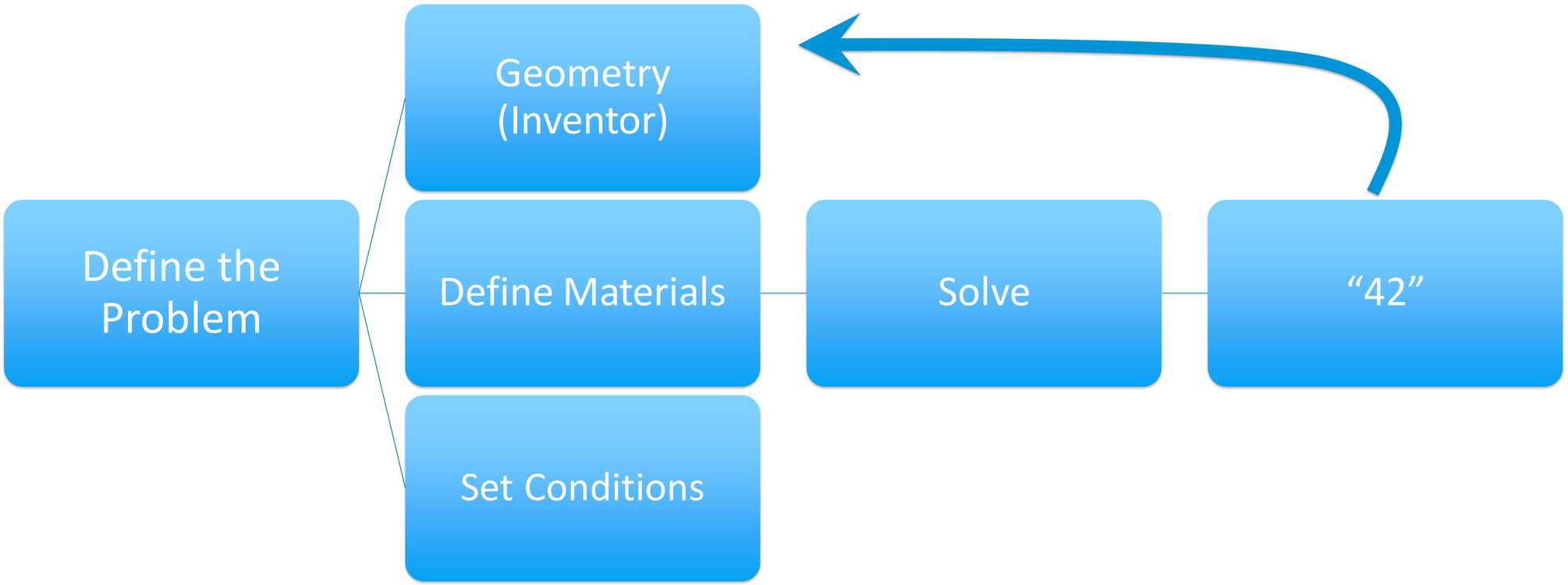
Heat
Exchangers



Common Misconceptions about CFD

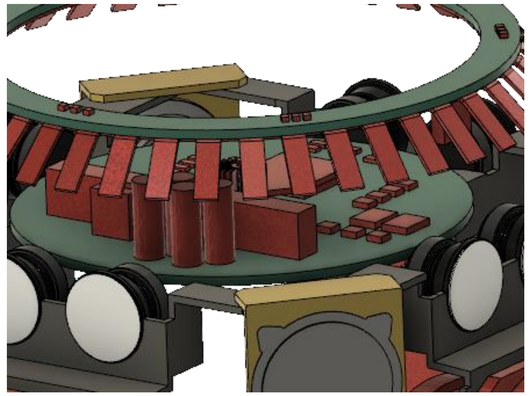
- CFD requires a specialist, usually a PhD, with a huge amount of experience
- CFD is for large companies that can afford the big hardware and software costs
- Results from CFD software take an expert to interpret
- CFD is best used after selecting a preferred design

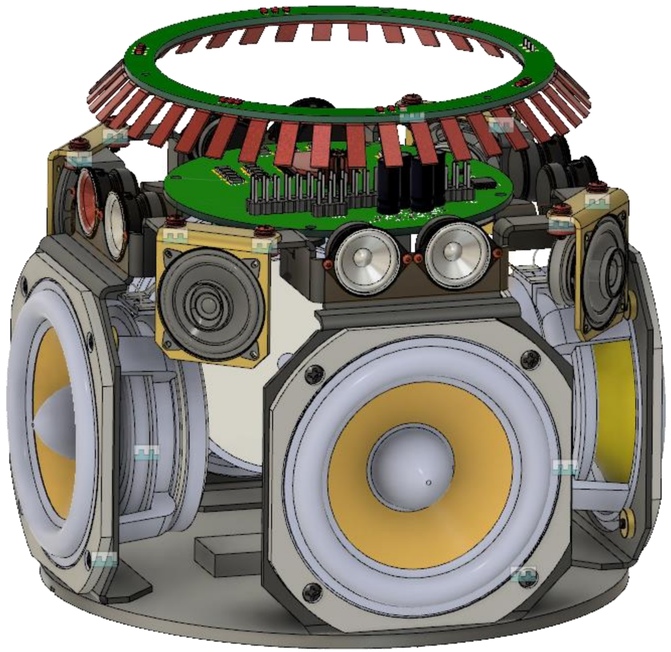
CFD Process


Define the Problem
Geometry (Inventor)
Define Materials
Set Conditions
Solve
“42”

Geometry Example

- PCB Components represented by primitive shapes
- Hardware Removed
- Sheetmetal Simplified
- Components Optimized for SIM
- Small, unnecessary gaps eliminated

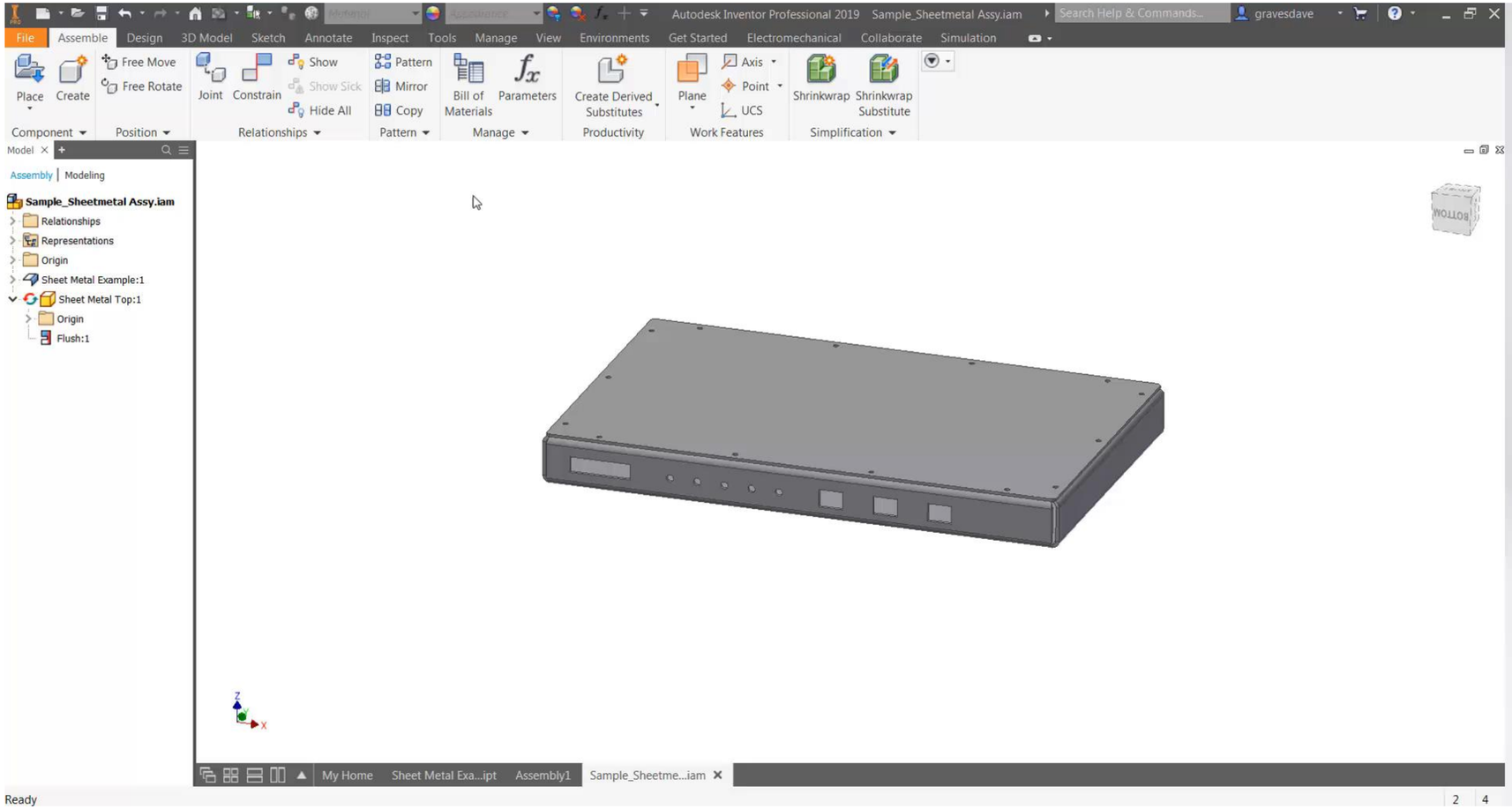




Re-Creating Geometry

Some times it’s easier to re-create geometry rather than try to simplify.

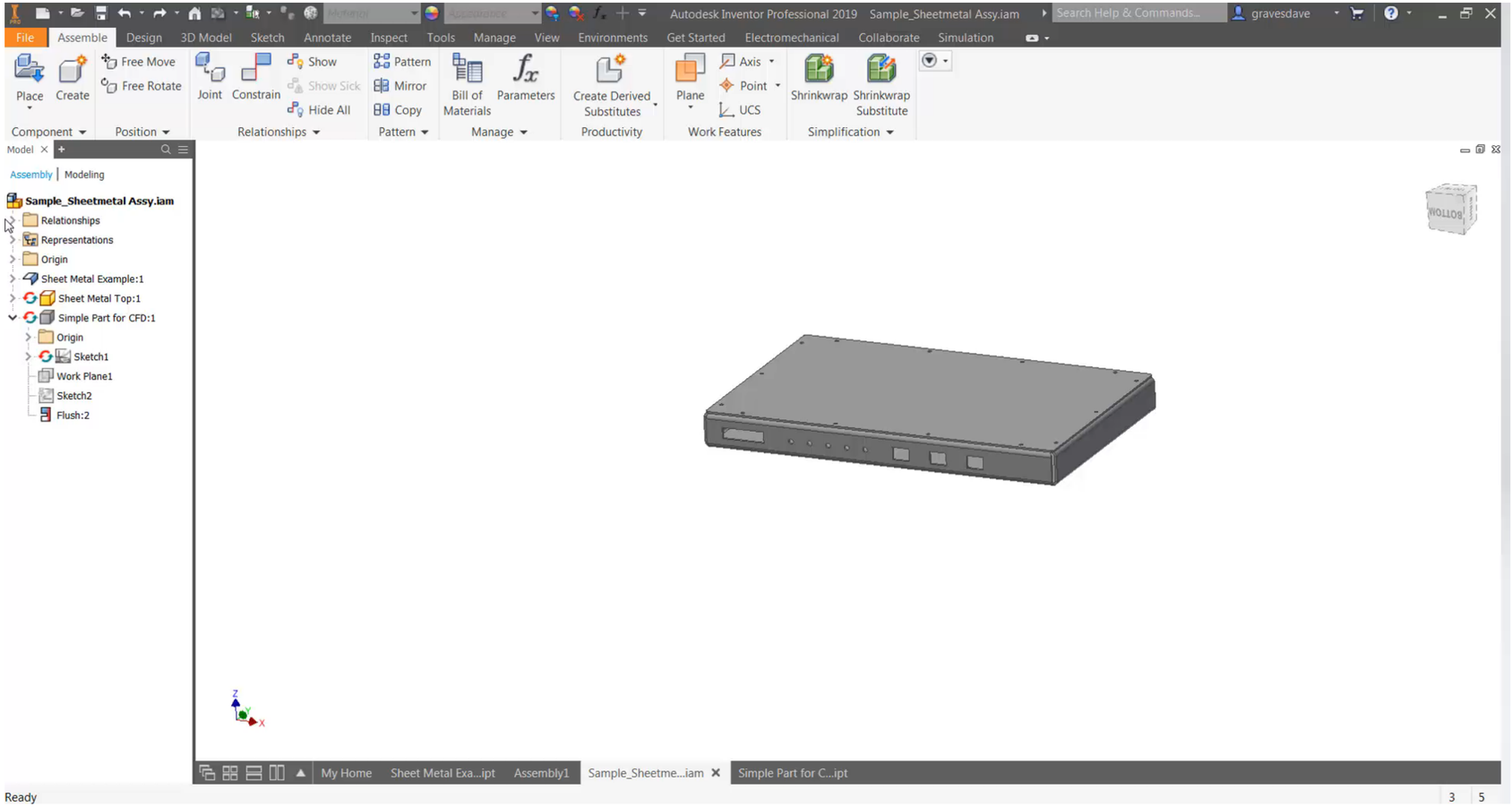
- Use Existing Geometry for Sketches and references
- Snap to
- Example include
  - Sheet Metal
  - Fans/Blowers

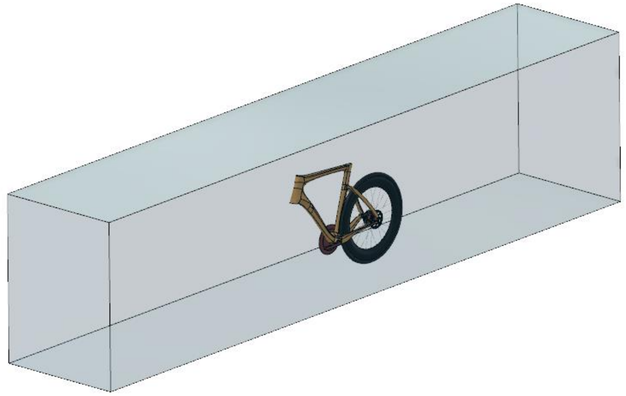


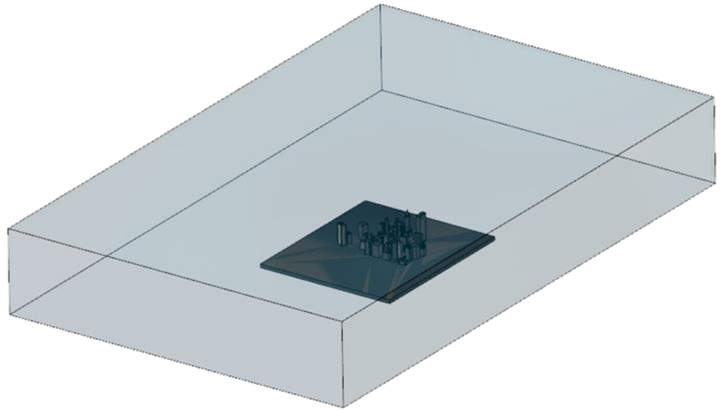
Simplification Existing Geometry Techniques

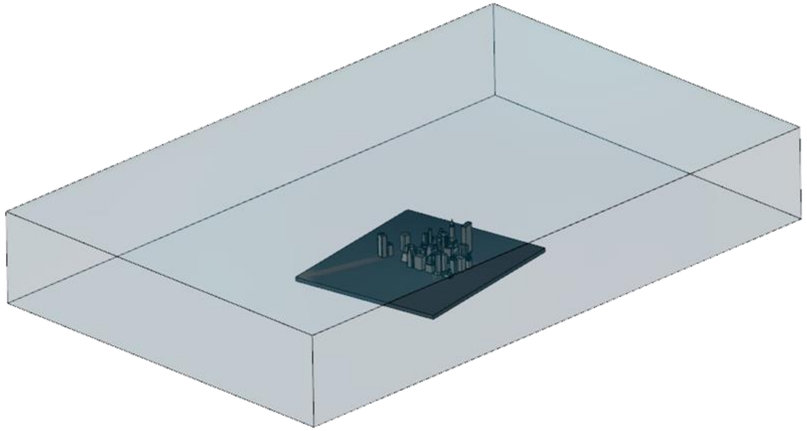
Inventor had integrated tools to assist with geometry simplification.

- Delete Face
- Direct Editing
  - Delete
  - Move Face
- Shrinkwrap





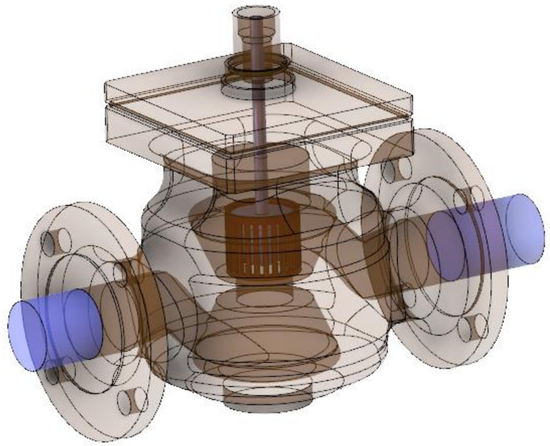


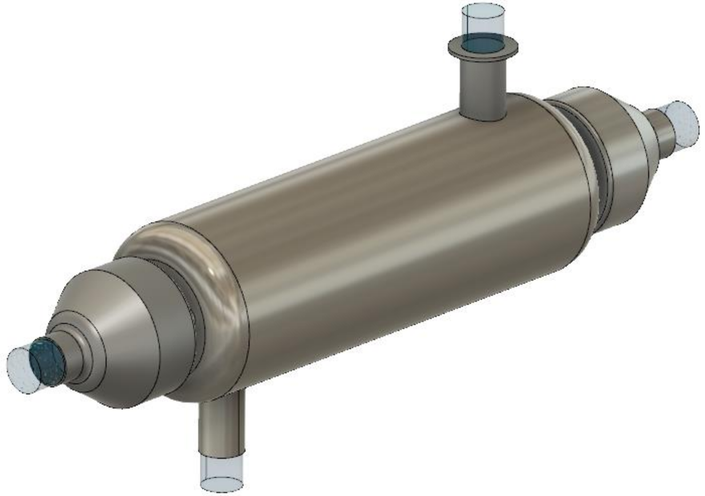


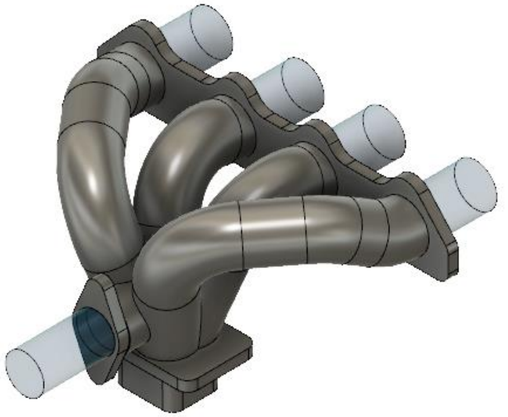
External Flow

Create a Box or other Volume to represent the external air

- Box should be 5x to 10x larger than geometry
- Box can be rotated for different wind direction
- Don’t worry about the interference





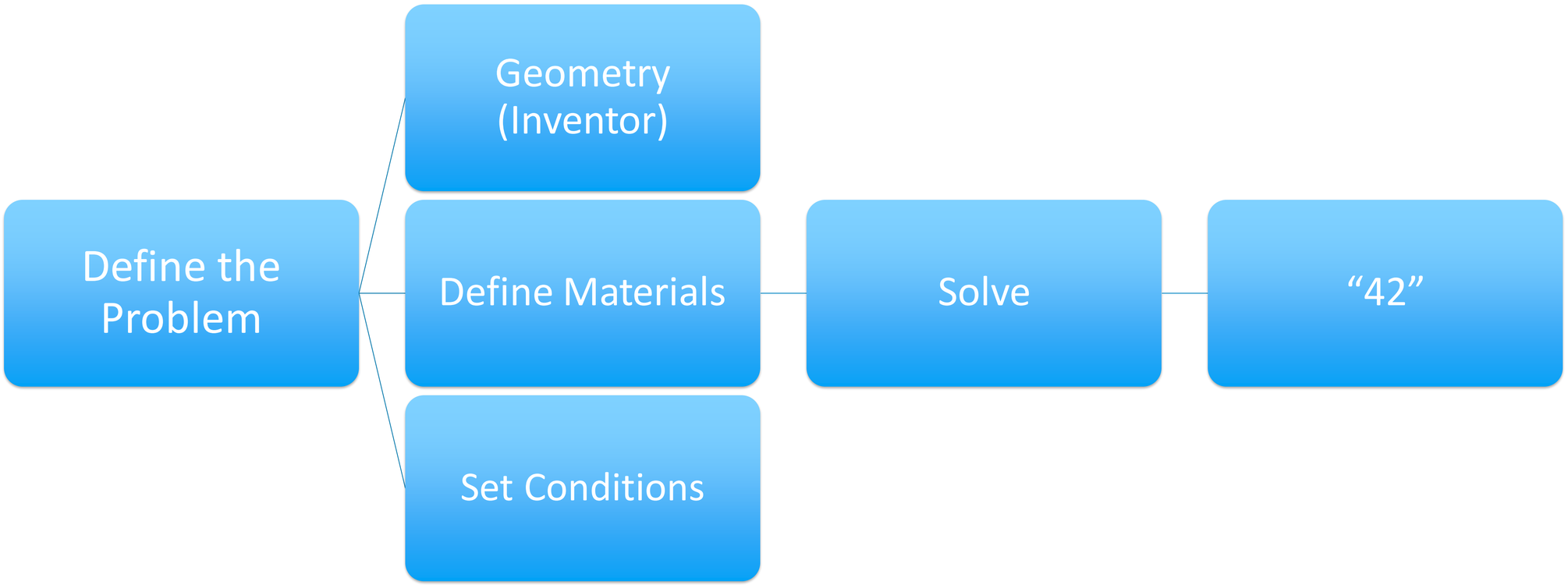


Internal Flow

Autodesk CFD will create an internal fluid volume if you make the geometry “Water” or “Air” Tight

- ‘Caps’ on inlets and outlets allow for flow development
- Box can be rotated for different wind direction
- Don’t worry about the interference

CFD Process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Product Demonstration

Image caption goes here

Questions

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Make anything™