

Assumptions and Biases

- Every design and system has multiple phenomena operating at the same time
- This has several consequences
 - Parts must be designed and tested separately and then tested together
 - Analytical models and simulations will not be able to encompass all the important things that could happen or must be understood
 - A “digital” plug-play or modular approach will not work and may not even lead to a good design

Things That Are Important

- Geometry, geometric relationships, and visualization
- Mass and space occupancy
- Motion (dynamic space occupancy, acceleration loads)
- Forces, loads, load paths
- Tight coupling that's unavoidable: propagation of loads, heat, fluid, vibration, fatigue - generally linkage of effects and time-driven effects
- Ever-present constraints
 - Generic: the laws of physics
 - Specific, often enterprise-driven: space, weight, cost in this particular design

Things We Usually Don't Think About Because They Won't Happen

- A theory that will tell us the right way to design something, tell us how far off the optimum we are, or tell us what to do to get to the optimal design
- The idea that it will be right the first time
- The idea that we will have time to be sure it is right
- The idea that you can get it done without someone who really knows what they are doing