Design for Manufacturing & Assembly (DFMA)

Problem How to make products easy to construct?

Difficulty

Work with an SME

Design for Assembly (DFA) is concerned with reducing product assembly cost

Design for Manufacturing (DFM) is concerned with reducing overall part production cost

DFMA has many benefits

- Minimizing the number of parts and extra sizes reduces inventory and confusion during assembly
- DFMA optimizes trade-offs between assembly, part, and life cycle costs.





Asymmetric part requires alignment

Symmetric part makes assembly easier



Methodically apply the DFMA principles

- 1. Minimize the number of parts
- 2. Minimize the use of fasteners
- 3. Standardize
- 4. Avoid difficult components
- 5. Use modular subassemblies
- 6. Use multifunctional parts
- 7. Minimize reorientations
- 8. Use self-locating features
- 9. Avoid special tooling
- 10. Provide accessibility
- 11. Minimize operations & process steps

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DFMA – Examples – Manufacturing

Make parts self-aligning

Use gravity when possible



Figure credits

- https://www.allaboutlean.com/dfma-6/dfma-self-locating-2/
- https://www.allaboutlean.com/dfma-6/dfma-upside-down-mounting/
- https://www.allaboutlean.com/dfma-6/dmfa-assemble-from-one-side/
- https://www.allaboutlean.com/dfma-6/dfma-symmetry/
- https://www.allaboutlean.com/dfma-4/dfma-plastic-snap-joint/

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Make assembly from one side



Improve access for assembly



Simplify fasteners



DFMA – Notes

Slide 1

- 1. DFMA has a set of principles, each reduces the cost of a product's manufacturability and assembly.
- 2. DFMA can be key to profitability.
- 3. While the DFMA principles are all simple, and sound simple, seeing examples is the best way to understand their intent.
- 4. Asymmetric parts are bad since they may need to be re-aligned during assembly; symmetric parts do not have that issue.
- While applying the DFMA principles is straightforward, having a DMFA SME review your improved design is always useful – you may have missed some improvement opportunities.

Slide 2

- 1. This page includes several simple examples.
- 2. The bottom right image illustrates a simple way to join two pieces.
- 3. For each of the other images, the left subimage is not as good as the right sub-image, from a DFMA point of view.