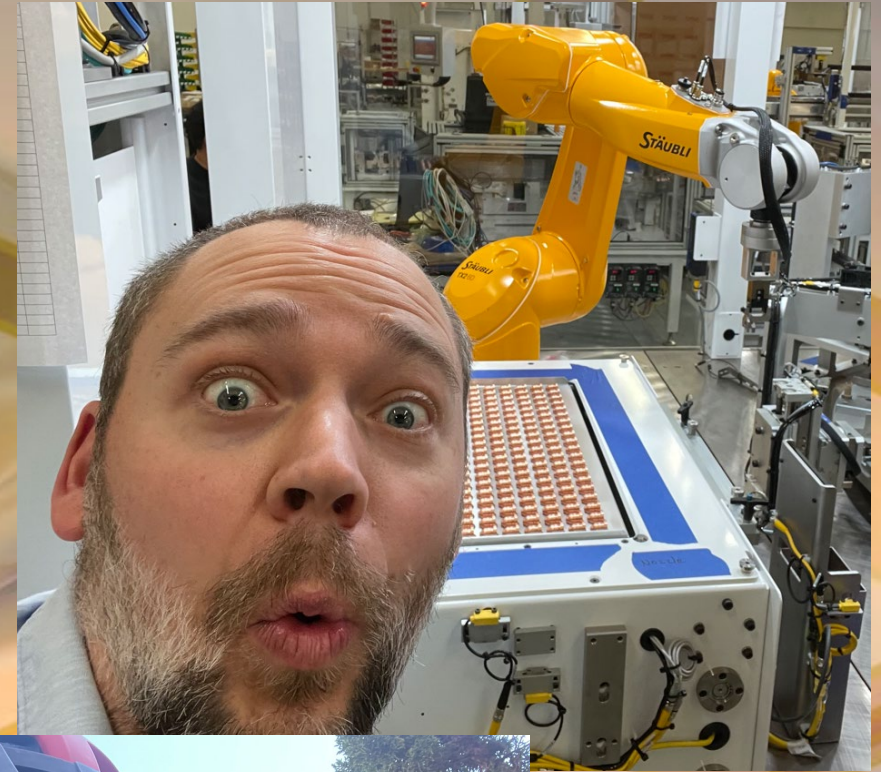


Influencing The Design

Design For Automation (DFAn)

Who is Andy Saemann?





Framing the Problem

- The Assembly Show has so many automated solutions, how do I take advantage of them?
- Can you “retrofit” an automated solution to an existing process?
 - Sometimes, but you may be leaving money on the table...
- Not another DFx!!!
- What is DFAn? Who should be responsible for DFAn?
- DFAn is a journey...

DFAn According to ChatGPT...



Tell me about design for automation in discrete manufacturing. Phrase your response in a 10-line limerick.



In discrete manufacturing, we aim,
To automate, it's not just a game.
Robots and tech we employ,
Efficiency we seek to enjoy.

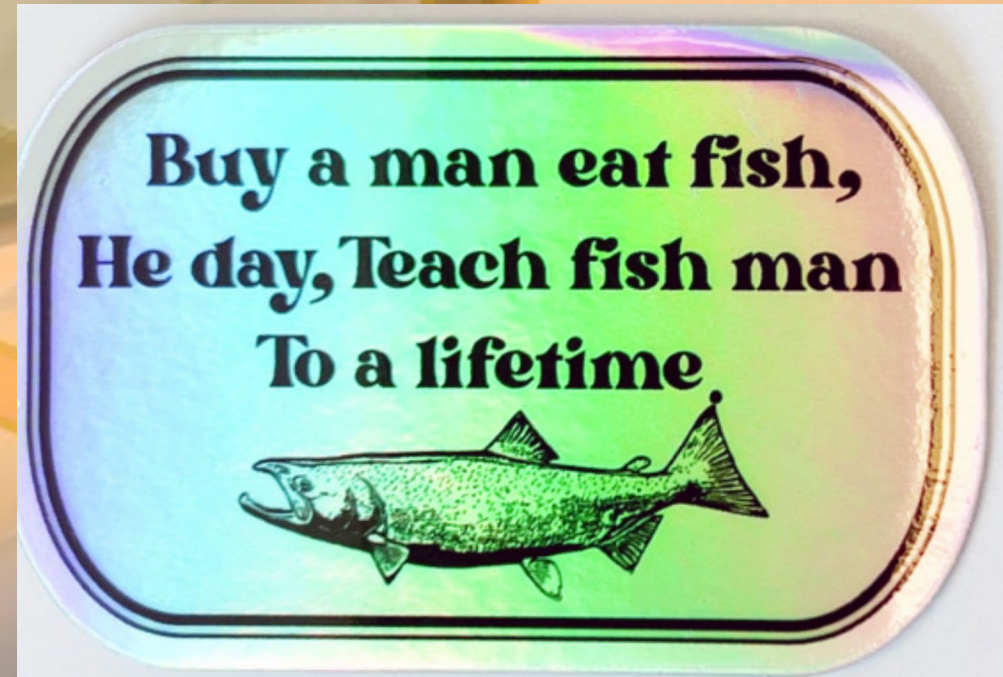
Quality and speed must align,
In our processes, well-defined.
Flexibility's key, adapt and sway,
Design for automation leads the way.



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DFAn In My Experience

- What is DFAn?
- Organizational considerations
- When to apply DFAn
- How to start
- Examples

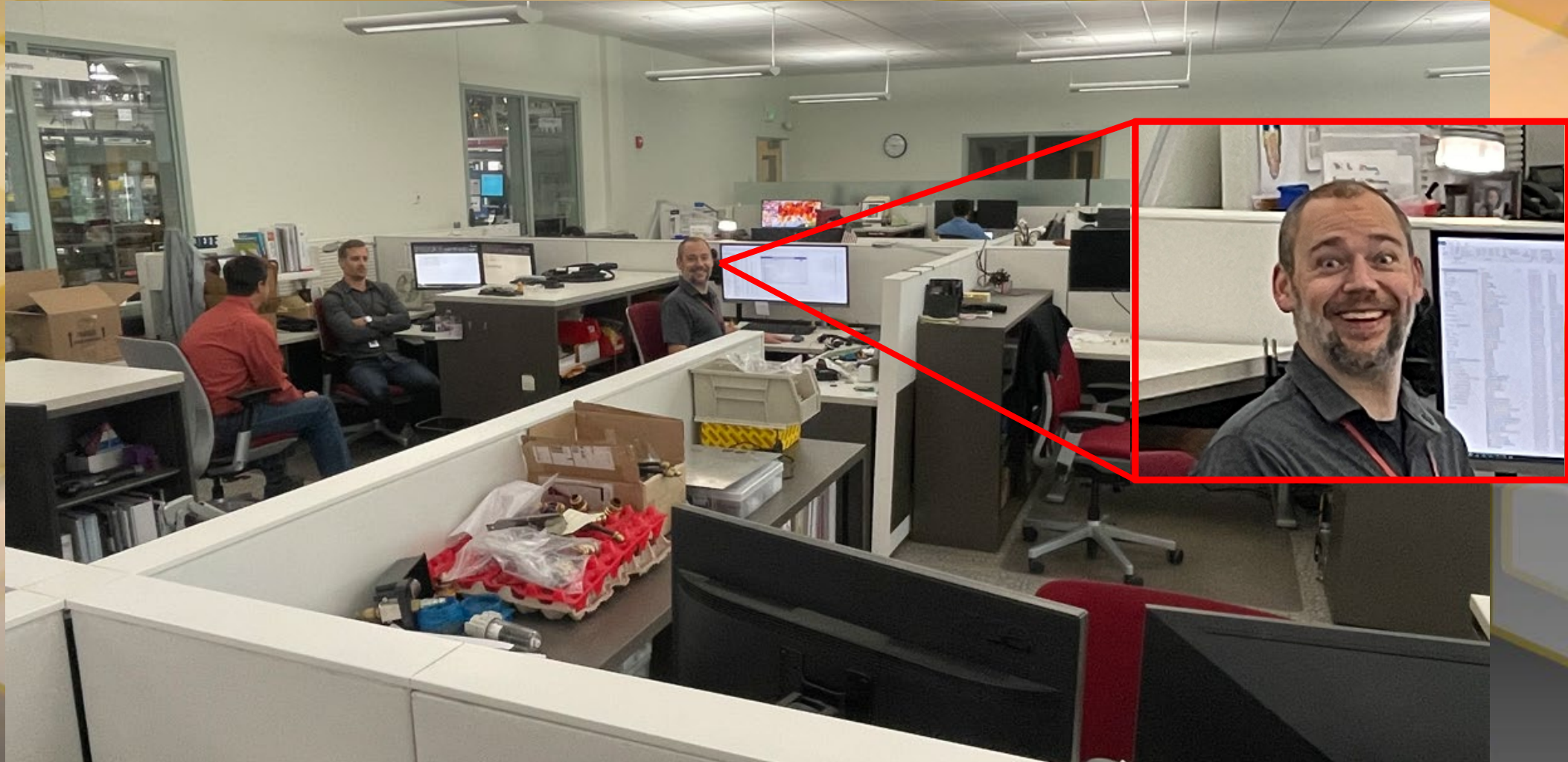


What is DFAn? Why should we care?

- DFAn is a method to influence product design for the purpose of:
 - Reducing part counts
 - Minimizing handling and reorientation of assemblies being built
 - Make feeding parts easier and more consistent
 - Make joining parts easier and more consistent
 - Make inspecting parts easier and more consistent
 - Make testing parts easier and more consistent
- To improve quality, increase throughput, and reduce cost!



Organizational Considerations

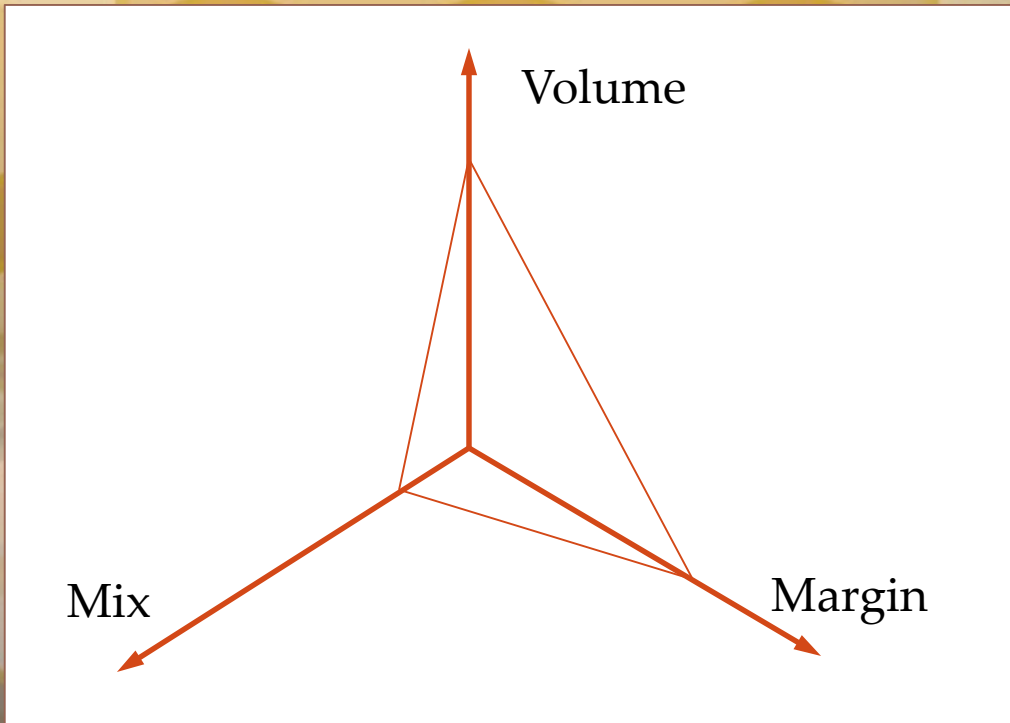


Book Recommendation:

- Designing the Future by Morgan and Liker
- Describes how to structure product design teams to eliminate waste in NPD
- LPPD – Lean Product and Process Development



When to Apply DFAn:

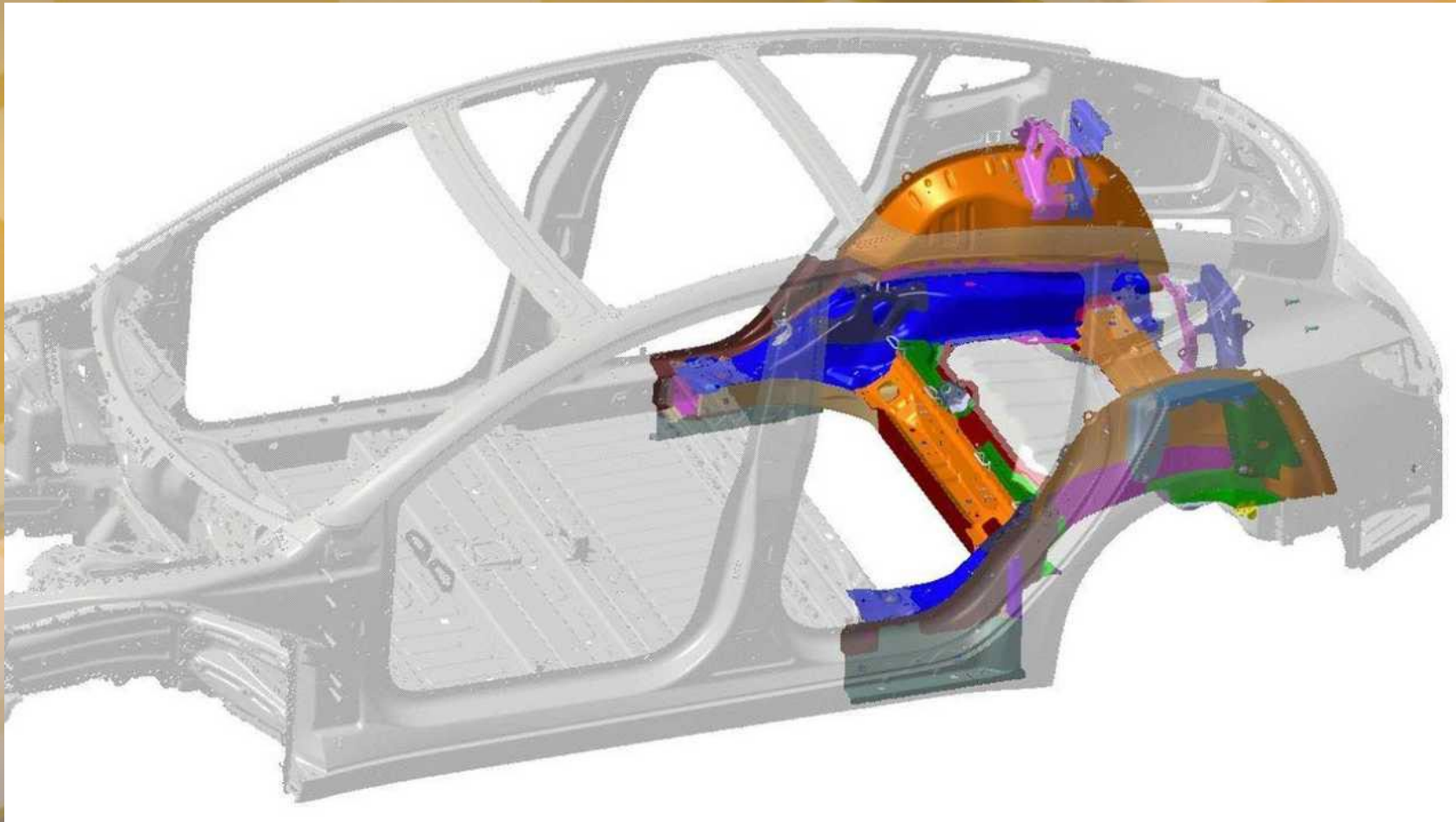


Where to Start:

- DFMA – Design for Manufacture and Assembly
 - Formal method invented by Boothroyd and Dewhurst
 - Emphasis is on minimizing parts counts
 - In a sea of design simplification tools, this might be the best bang for the buck...
 - Automating waste is still waste!



Example – Tesla RUB part reduction



Examples!

The interesting part of the talk

Example: Feeding small coil springs



Springs that nest easily can tangle...



Solution: Design springs that can't nest!

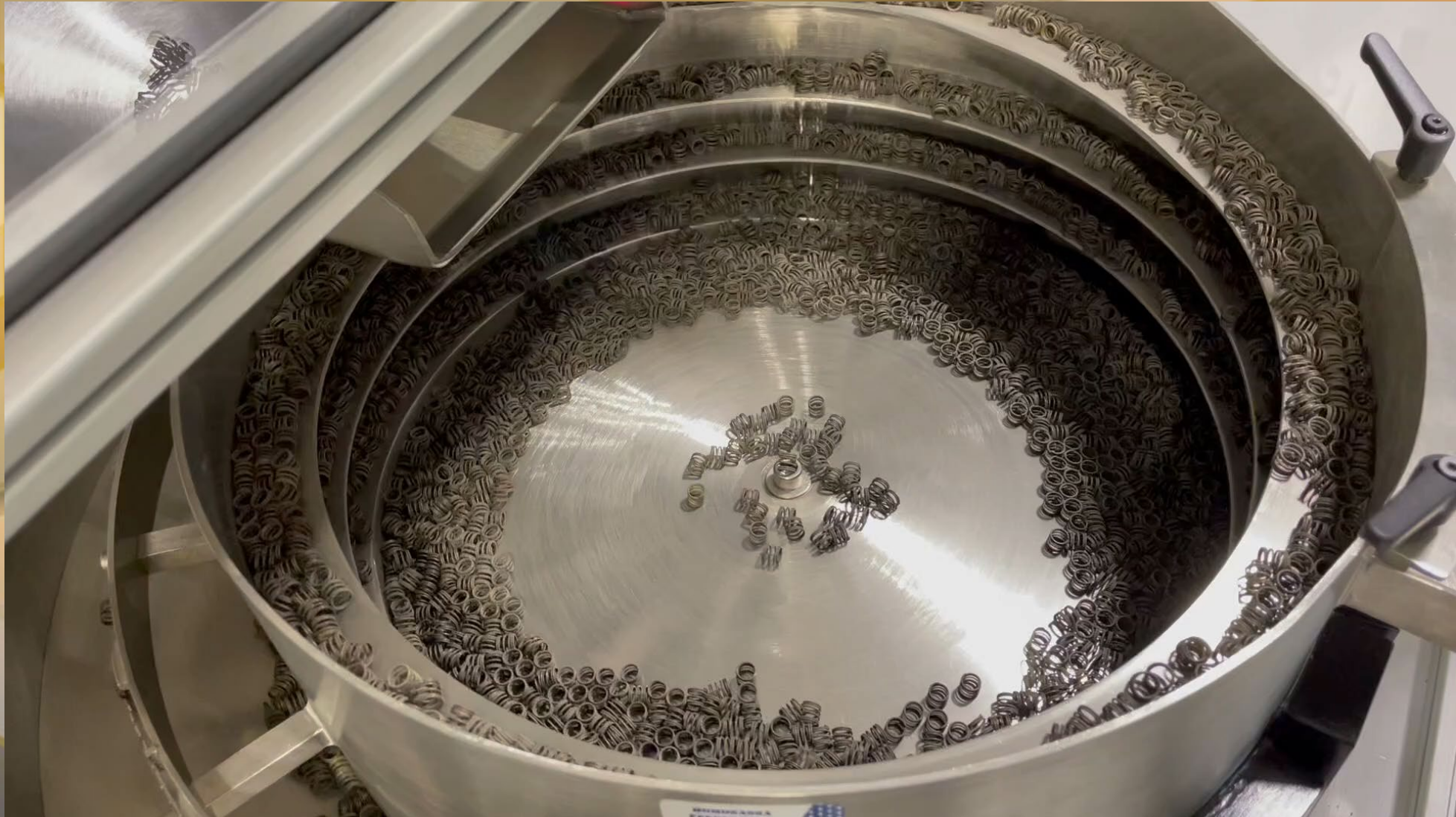


Old design at left,
New design at right



New design is less likely
to tangle

Spring feeding in action

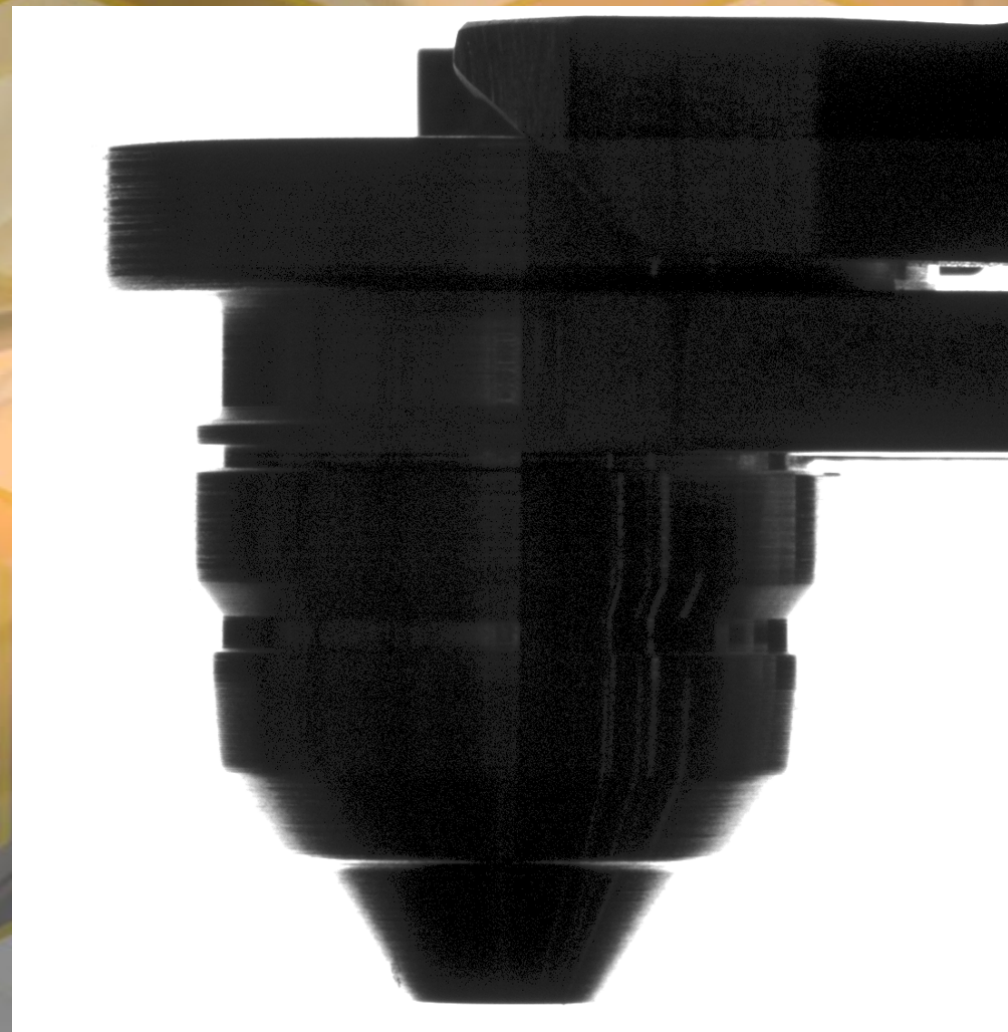


Example: Inspection features for orientation

- Notch molded into cap is used to locate center of laser mark field
- Notch can be seen from above the cap or from radial orientation



Example:
Inspection features for correctness



Using inspection features in action

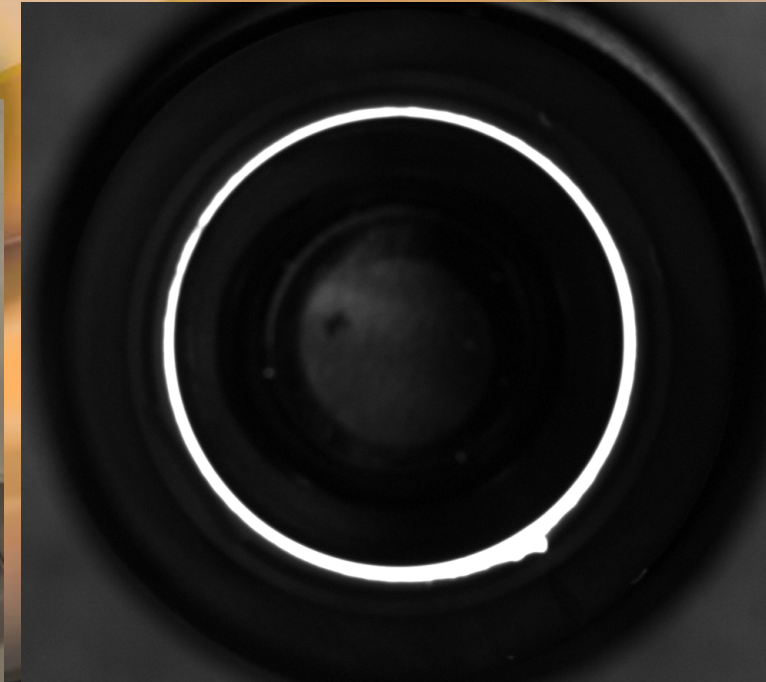


Example: Sealing a butt joint

- Vespel ring is assembled onto an over molded cap
- Need to prevent water ingress at the butt joint between the ring and the cap
- Product designers initially wanted to use RTV silicone...



Solution: Sealing a butt joint



Sealing operation in action



Summary

- DFAn is about reducing the cost of assembly
- Manufacturing engineers focused on DFAn should be embedded in project design teams
- When to apply DFAn will vary by company and project, but it's always a good idea to simplify assembly
- The Boothroyd-Dewhurst method of DFMA and minimizing part counts is a fantastic place to begin your DFAn journey
- Many automation solutions cannot be “unlocked” unless you design them in from the beginning



Questions?

Thank you!