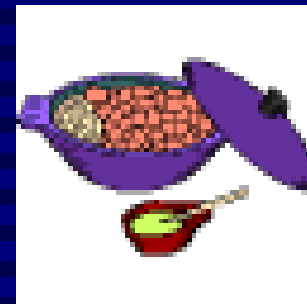


# Injection Molding DOE Case Study

- The product is a plastic bowl with a cover, however it is not a bowl of beans as shown! Conceptually, that is the idea.
- The cover is being ultrasonically welded to the bowl. It must seal to withstand liquid penetration. Being a commercial product, it must be nice to look at too.
- This project came to us from a former St. Thomas Design of Experiments (DOE) class student.



# Injection Molding – Background

- **New product was being shipped but found that some were leaking**
- **They tried tweaking the manufacturing process within vendor recommendations but could not achieve the requirements.**
  - This was going on for 6 to 9 months. Always just “one step away” from it working.
- **Customer grew frustrated that it was taking so long. Threatened to cancel the project, costing the supplier (my client) about \$150k of investment.**
  - Could negatively impact other current and future projects. This was an important customer.

# Injection Molding – Situation

- **Goal: Predicting where to operate would be great! It was unclear if the requirements were even possible. Need to rebuild trust with customer and move forward.**
- **Response/ measurement: leakage (weld quality) and appearance**



# Injection Molding – Solution

- **Approach: Executed first DOE at vendor recommended ranges**
  - Sample size was determined mathematically, and by knowing what the customer would think is enough
  - The measurement system was developed to maximize learning
  - Set up of the test was reviewed to ensure proper execution and confirmation of measurement system

“Perry has a unique ability to provide practical solutions for complex technical and business situations. His clear, focused approach to our business problem allowed us to save our reputation with a significant customer. Thanks Perry!”

- Project Leader

# Injection Molding – Phase 1 Results

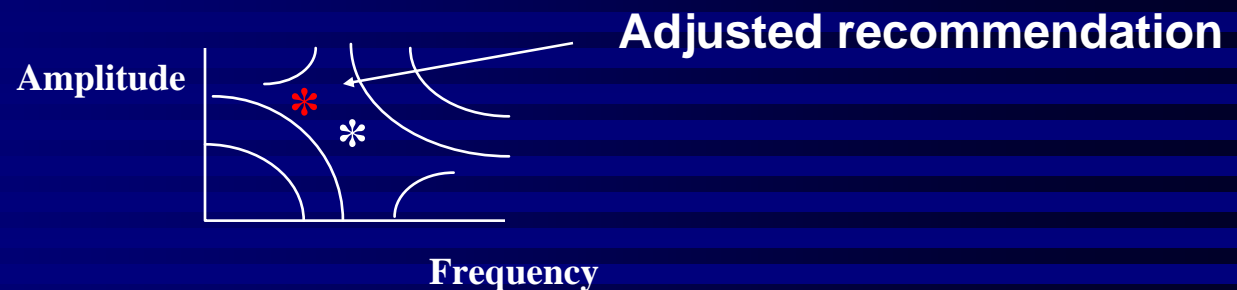
- Found “bad” and “ok” areas; could predict better area!
  - Because this predicted well outside of the tested design space, it was too risky to just guess again. More testing was needed – internally and per the customer expectation.
  - This Phase 1 test was used as the foundation for the next stage of testing



\* Predicted operation area

# Injection Molding – Phase 2 Results

- **Phase 2 DOE Approach:** We proved operation in new area with confidence by centering new test at previously predicted operation area (shown in white).
- **Result:** While original prediction was ok, a better point of operation was determined (shown in red). Process adjusted to this new point. Solution continues to work after 7 years.



# Perry's Solutions, LLC

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