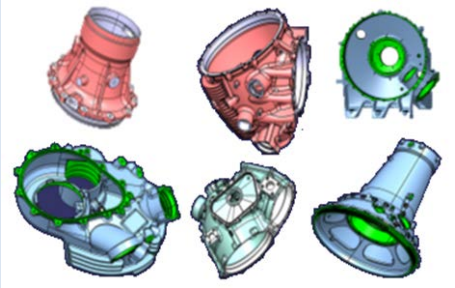
CH-53K Casting Distortion Root Cause Investigation

Project Snapshot



Project Leads:

Sikorsky

Project Dates:

Jul 2019 – Aug 2022

Objectives:

Investigate and pilot optimum solutions that can mitigate distortion issues identified in aluminum cast parts

Estimated Savings:

- $40K per CH-53K
  - Reduce part re-work
  - Reduce scrap rate
  - Reduce defects per part

As a metal part cools after being machined and worked, the part will begin to relax and allow the internal residual stresses to be released. This material relaxation occurs in all metal parts, but can vary drastically depending on the toughness, stiffness, and material of a part. Due to this effect, many parts are within tolerance after the initial machining process, but will check out of tolerance once subsequent machining has been done on the part. Once this movement of the part happens, the parts must be reworked or scrapped depending on how drastic the changes are.

It is believed that a significant cost of poor quality can be attributed to distortion of the aluminum as the root cause. The *CH-53K Casting Distortion* project aims to gain a better understanding the residual stress in aluminum alloy castings. and how it effects distortion. Through this learning, Sikorsky will be able to determine the best manufacturing process changes and/or design changes which will reduce the distortion and part movement. With a better understanding of how the aluminum parts distorts, the distortion experienced by the part can be mitigated and part re-work can be reduced.

The project will be executed in two phases. Phase 0 will focus on data gathering and the use of simulation tools to quantify and characterize the distortion experienced during the baseline manufacturing process. Phase I will be executed to evaluate and validate the down-selected distortion mitigation technologies and processes on the two selected part numbers. The results from Phase I will result in recommended process and/or design changes for implementation after successful demonstration. Once implemented, the process and/or design change is anticipated to provide a 5-year savings of $3.9M for the CH-53K platform.

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