

## **Dana Global Casting Quality Requirements**

These requirements are in addition to any requirements identified in Dana Engineering Specifications identified on the Dana Approved Product Drawing or included as a part of the purchase agreement.

### **Casting Development Requirements:**

- a) The supplier shall utilize 3D modeling software for casting development.
- b) All casting development runs are to be sectioned, analyzed and documented. Sectioning a sufficient number (target is 10%) of the parts produced in any developmental run to clearly establish the location and level of any internal characteristic that may be evident in ongoing production runs and ensuring the product is within all functional and specification requirements.
- c) The supplier shall utilize in-house non-destructive test capability for the validation of all casting integrity during the product development stage. If the supplier does not have the in-house capability they shall contract an ISO/IEC 17025 (or national equivalent) certified external source, which shall need Dana SQD approval.
- d) The supplier shall conduct on the 1st Production Run a Process Series Review (PSR) with:
  - i) A minimum of 1 piece (3 samples total) from the beginning, middle and end of the production run must be sectioned, analyzed and documented to validate process stability & consistency with the development runs and within specification limits.
  - ii) Dana Casting SME and/or assigned Dana SDE must be present for PSR.
  - iii) This shall be conducted and approved by Dana SME/SDE prior to PPAP submission.

### **PPAP Submission:**

- e) One additional sample from the initial production must be x-rayed and documented evidence supplied with the PPAP Submission that shows the results correlate with all development modeling, Pre-PPAP sectioning and analysis or the PPAP will be rejected.
- f) The PPAP submission must be based on data taken from the initial production run and must include –
  - i) A copy of the solidification modeling results, Photos of the sectioning results conducted in the developmental runs & initial production run,
  - ii) X-Ray report & films from the part evaluated in the 1st production run.
- g) No production parts from the initial production shall be shipped to Dana prior to the supplier receiving a signed PSW indicating PPAP approval has been issued by the Dana using location.

### **Ongoing Production/Process Change:**

- a) The Suppliers Control Plan must include specific on-going process integrity checks at a minimum from the beginning, middle and end of each production run to ensure the process is maintained under control to ensure internal casting quality integrity as demonstrated in the development stage through PPAP and this plan shall be approved by Dana.

b) Any process change at the supplier must be re-verified starting with the 1st Production Run of the change. A PSR is not required, however the PPAP must be updated and approved before any product can be shipped to a Dana facility or supplier