GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17270

Break Strength Testing for Cam Caps

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard provides a procedure for break strength testing of aluminum cam caps. The procedure described in Section 4 provides a standardized, repeatable method for measuring the break strength of cam caps.

1.2 Applicability. This standard applies to both high pressure die cast and powder metal formed cam caps. These are typically aluminum components, but this procedure would apply to other materials.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 17025

2.2 GM Standards/Specifications.

GMW16530

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Mechanical Testing System capable of performing tensile/compression testing.

3.2.2 A 100 kN (22 481 lbf) load cell.

3.2.3 Load cell adapter with clevis pin.

3.2.4 Bend fixture rated for the load cell being utilized.

3.2.4.1 The base of the fixture shall have 2 supports for the test piece.

3.2.4.2 The upper fixture shall have an end form in the shape of a half-round rod that is approximately 90% of the diameter of the cam shaft that would be acting upon the cam journal. The actual diameter must be agreed upon between the GM Design Release Engineer (DRE) and the supplier of the cam cap.

3.2.4.3 The size of the supports on the base of the fixture and the width of the end form for the upper fixture shall be equal to or greater than the thickness of the cam cap.

3.2.5 Computer for data collection and retention with control software capable of outputting the collected data in a Microsoft Excel compatible/readable format.

3.3 Test Vehicle/Test Piece. This is a component level test. All testing shall be performed in the cam bearing region of the component. Depending on the design of the cam bearing support system (individual cap vs. ladder cap or cam carrier design), the cam bearing region of the component may need to be removed from the remainder of the structure for testing. If the cam bearing region of the component needs to be removed from the

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remainder of the structure, then this should be performed in such a manner that the bolt hole columns remain intact and that none of the surfaces immediately surrounding the cam bearing surface are affected.

3.4 Test Time. < 1 d.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. The requirements set forth in Section 5.2 of ISO 17025 shall be complied with.

4 Procedure

4.1 Preparation. In some cases, the area of interest may need to be extracted from the part as a whole, see Figure 1. If, based upon the part design this is not required, proceed directly to 4.2 for test conditions.

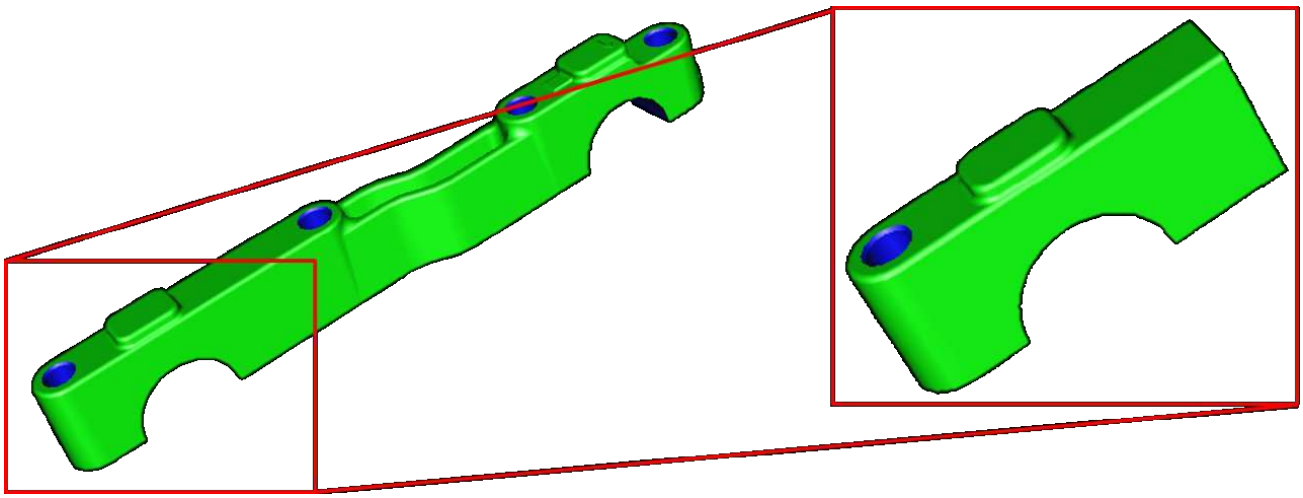

Figure 1: Illustration Showing a Large Component and How to Extract a Small Section for Testing

4.2 Conditions.

- The condition of the test piece shall be as-received at the engine plant/as-shipped from the supplier (i.e., any machining that the supplier performs shall be performed prior to testing).
- Test speed shall be set at 12.7 mm/minute (0.5 in/minute).
- Data collection time shall be set at 0.1 s.

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Place the test piece on a fixture such that the piece is oriented with the cam journal up and the piece is supported by the bolt holes, see Figure 2.

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