



## Scope

An aftermarket replacement Valve Cover for OE part number 11 12 7 552 281, sold by company noted as OTHER, was reviewed using the tools, measurement equipment and quality verification processes in use at APA Industries. This report itemizes non-conformances found with the OTHER Valve Cover when compared to cover 11 12 7 552 281 from the original equipment manufacturer (OEM).

The notable issues are as follows:

- Valve Cover failed test fit due to incorrect bolt pattern dimensions and fastener sleeve incompatibility
- During unboxing, fasteners fell out of the assembly with no external force
- Valve Cover casting has obvious and unattractive tooling marks
- Valve Cover surface has a mottled, matte appearance in areas, suggesting use of regrind (recycled) plastic
- Camshaft Adjuster Gasket substrate is aluminum (OEM is magnesium)

## Finding

The OTHER brand Valve Cover 11 12 7 552 281 does not pass APA Quality Inspection.

## Contents

### Section A:

Part Fit: pages 2-5

CMM Data Review: page 6

### Section B:

Fastener Retention: page 7

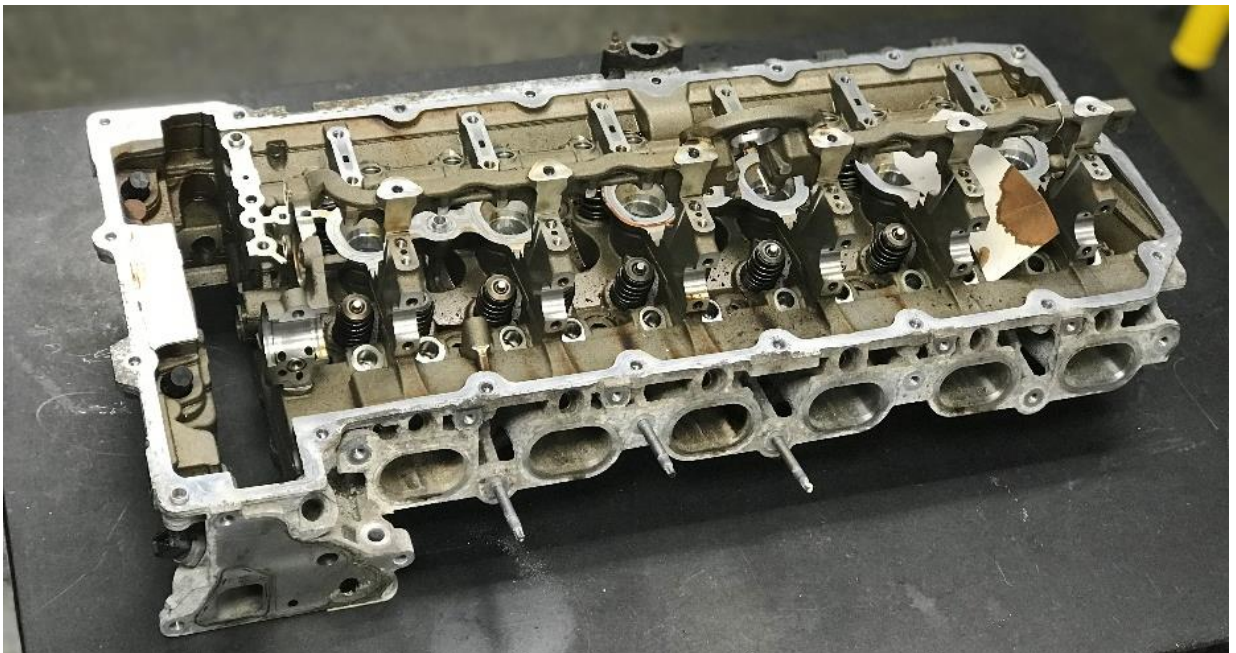
### Section C:

Part Appearance: pages 8-9

## Section A: Part Fit

The OTHER valve cover was attempted to be installed on the OE Engine Head Shown in Figure 1. Installation was attempted by 4 other members of the engineering staff with the same result. The OTHER Valve cover does not fit the OE Engine Head properly. The installation attempts revealed 2 bolts that could not achieve proper fit and torque, shown in Figure 2 and Figure 3.

Figure 1: OE Engine Head



Author: Matt Barnhouse, BSME

Date: 8/27/2018

### Section A: Part Fit

Figure 1a: OTHER valve cover seated on OE Engine Head without fasteners

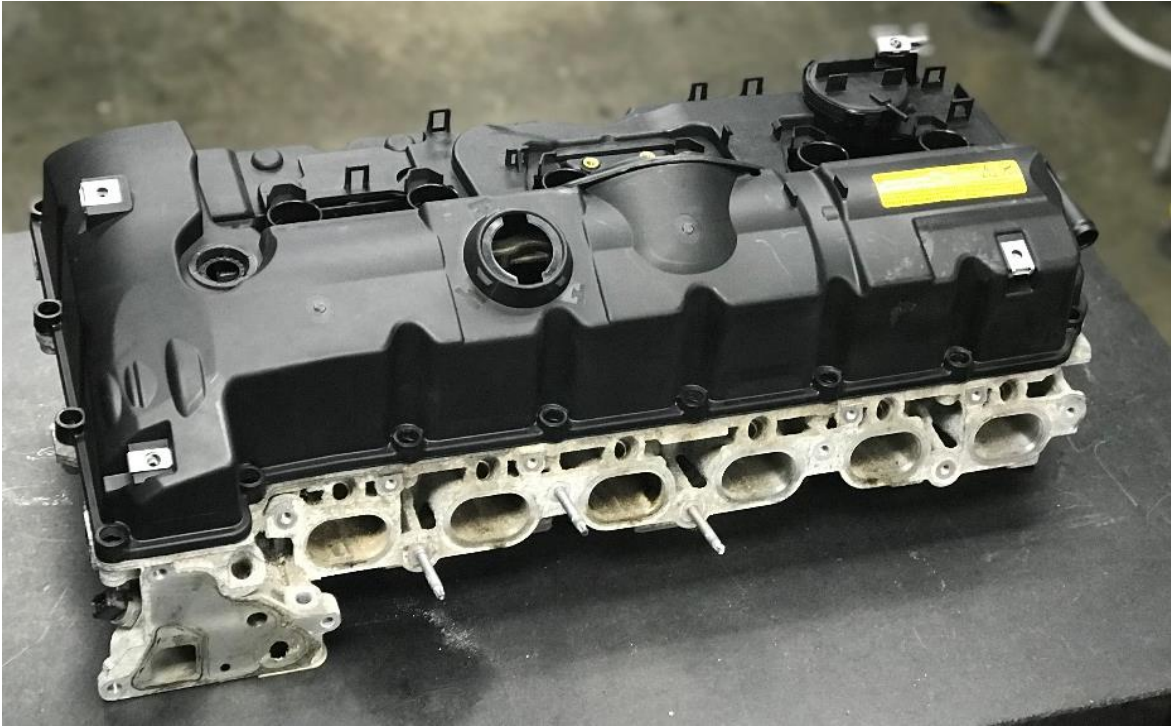


Figure 2: NG part fit location #1



### Section A: Part Fit

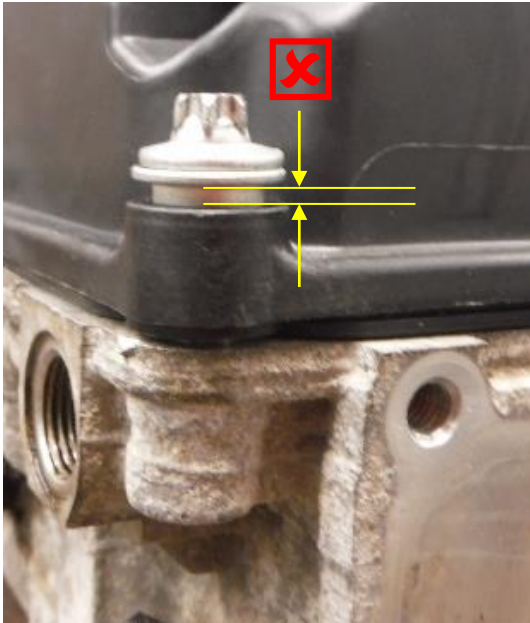


Figure 2a: Electric impact tool achieved specified torque, yet gasket was not compressed due to sleeve stand off.

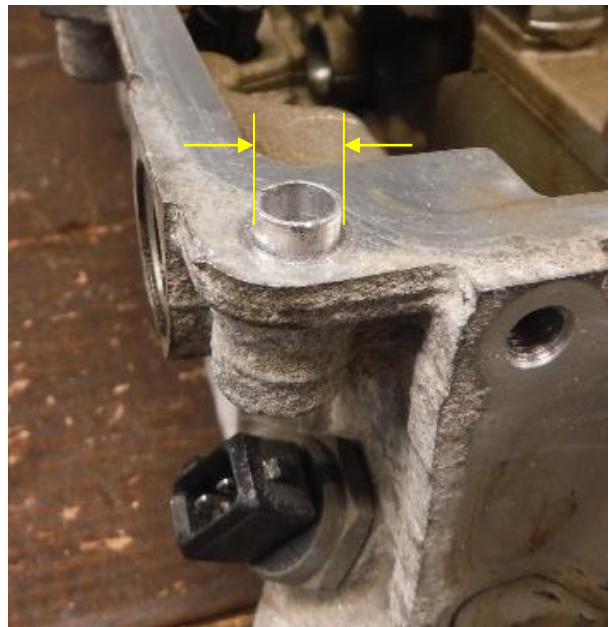


Figure 2b: Locating feature on engine head has larger OD than fastener sleeve ID.

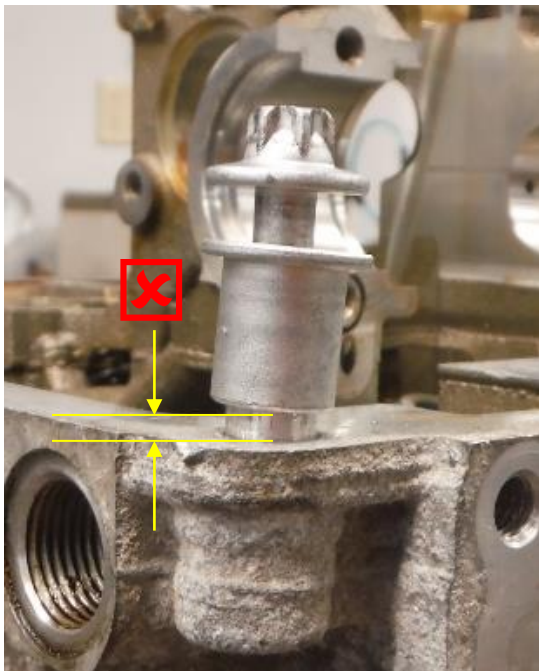


Figure 2c: Female fastener sleeve could not accommodate male locating feature.



Figure 2d: Valve cover without bolt or sleeve. Housing must be forcibly deformed by installer to align fastener holes.

### Section A: Part Fit

Figure 3: NG Part Fit Location #2

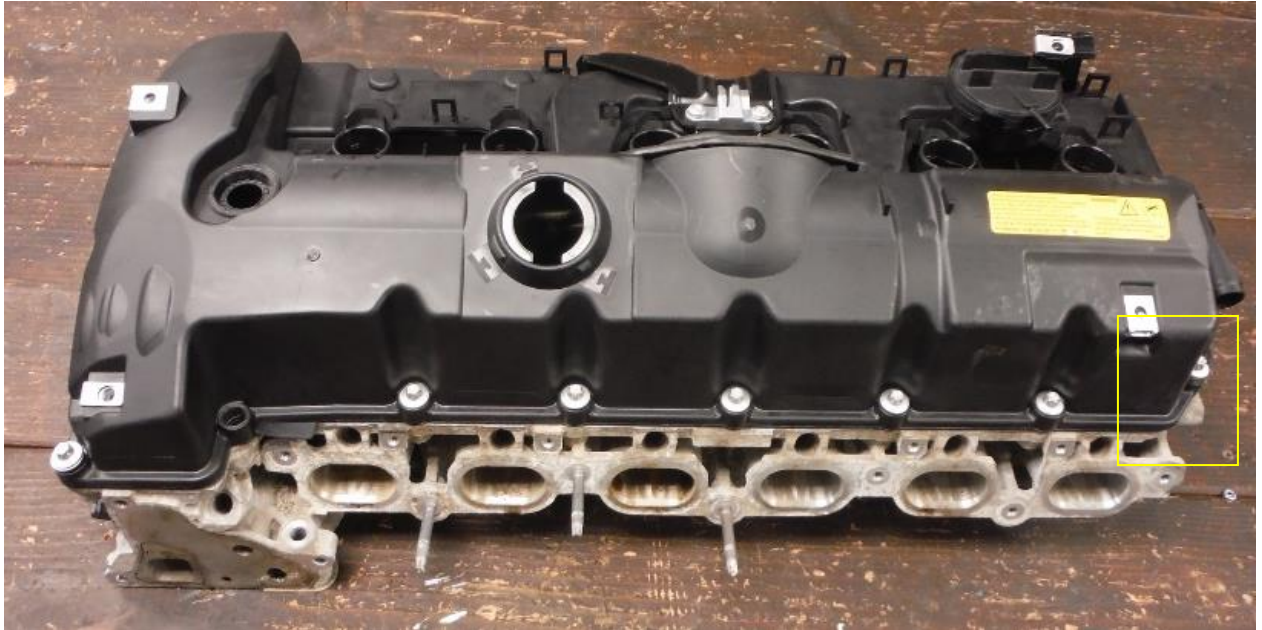
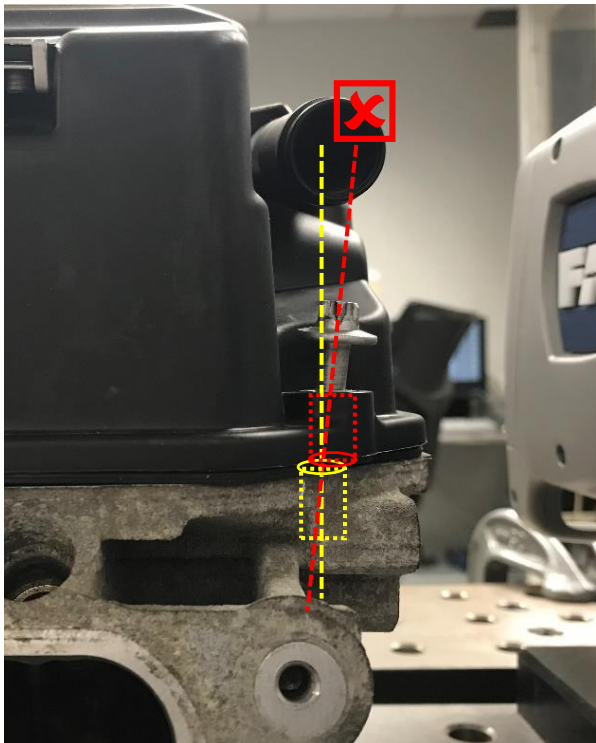


Figure 3a: NG Part Fit Detail: bolt did not achieve specified torque due to part dimensions.

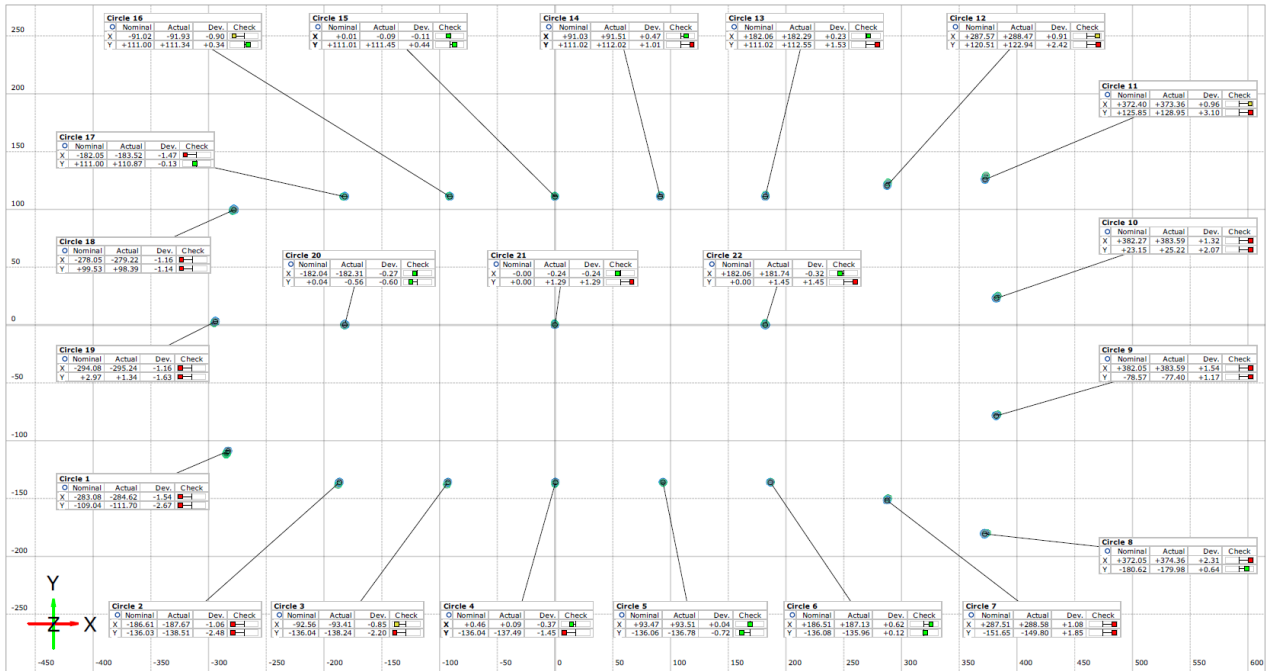


Valve Cover hole location creates a NG bolt angle (in red), which did not allow the fastener to be installed to proper torque.

### Section A: CMM Data Review

The press-fit fasteners were removed and the hole locations were measured using the FARO Arm, and then related to the corresponding location on the Engine Head.

Figure 4: CMM DATA: FARO ARM



Applying a positional tolerance on each point of  $\pm 1.0\text{mm}$ , the OTHER valve cover has 17 out of 22 holes with a NG hole position in either the x-direction, y-direction, or both.

Additionally, the holes on the left side of the image, holes 18, 19 and 1, are off location in the X negative direction. The holes on the right side of the image, holes 11, 10, 9 and 8, are off position in the X positive direction. This is an additive situation. If you install a bolt into one end of the valve cover, all of the error is pushed to the other end of the part, causing the NG install experienced during the part fit activity.

### Section B: Fastener Retention

#### Section B: Fastener Retention – Spacer Sleeves Fall Out

Upon unboxing, the fasteners shown in Figure 5 fell out of the valve cover assembly with little or no outside influence. This is not acceptable for customers. The cover molding must have a proper press-fit/interference fit between the valve cover main body and the fasteners.

Figure 5: Fasteners Falling Out

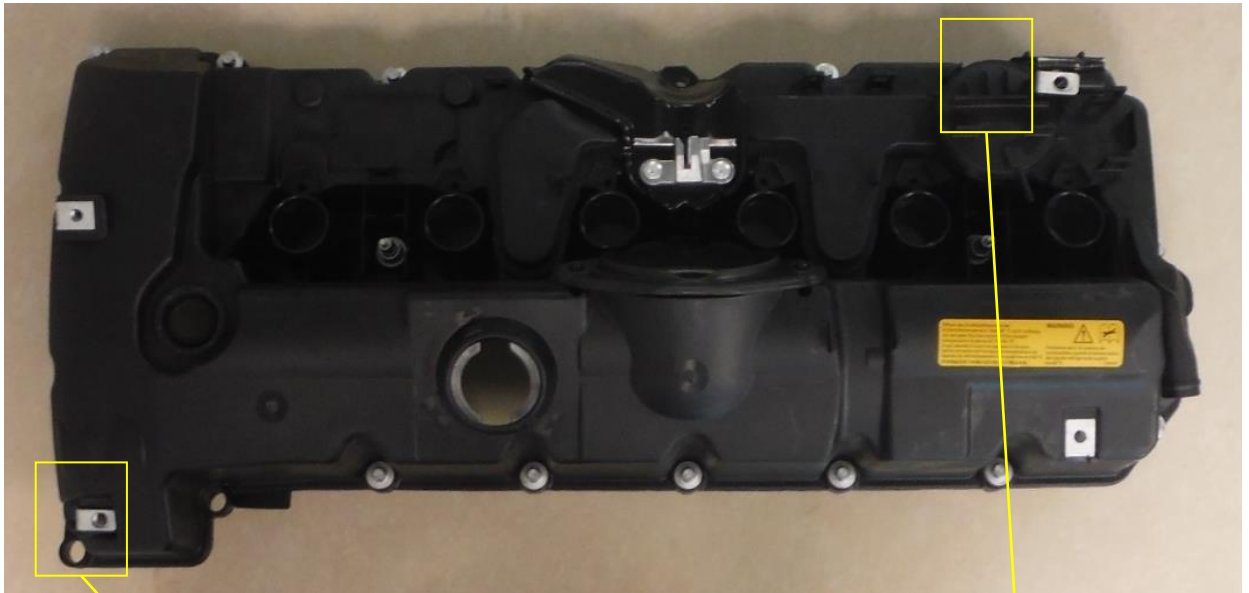


Figure 5a

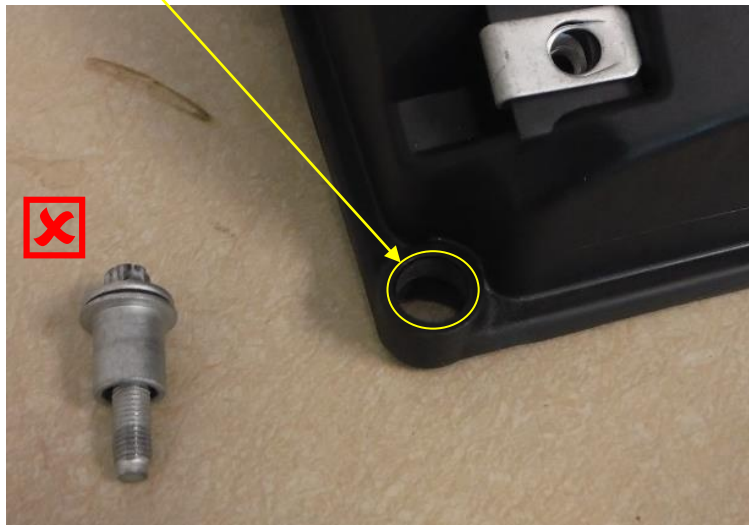
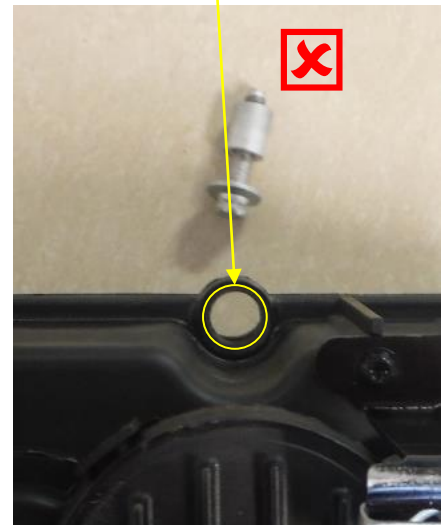


Figure 5b



### Section C: NG Appearance

#### Section C: NG Appearance - Tooling Marks

The main molding of the valve cover has rough tooling marks from the injection molding process. These marks are located on the top of the part, where they are visible in the engine bay of the automobile. This is an NG appearance for the customer.

Figure 6: NG Appearance - Tooling Marks

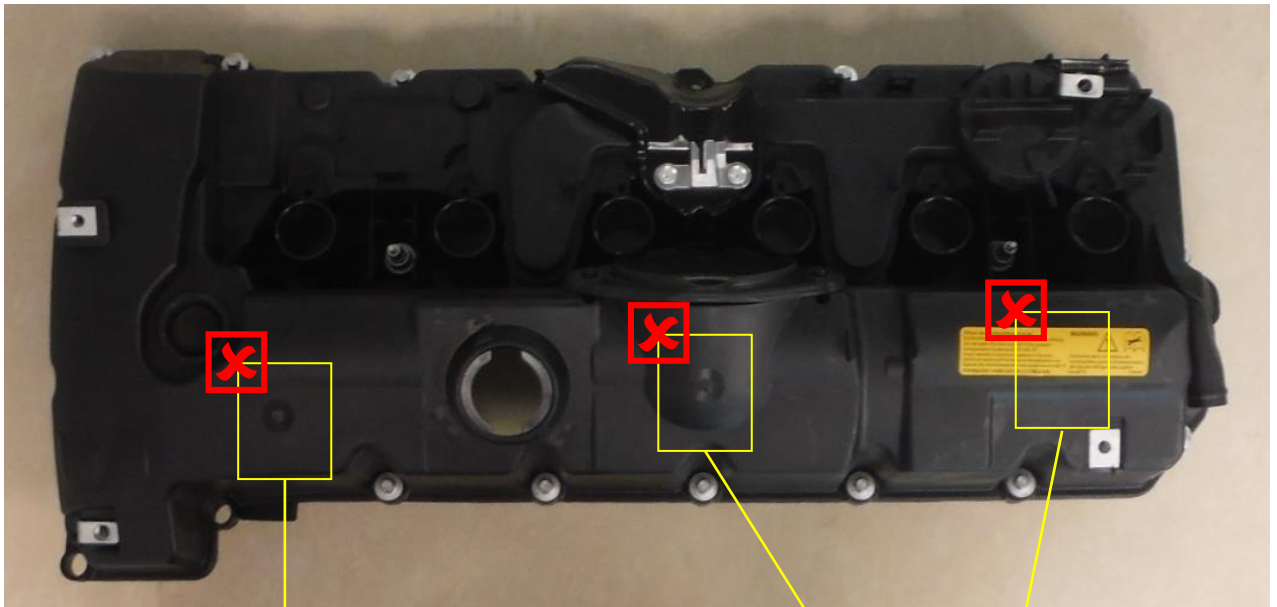


Figure 6a

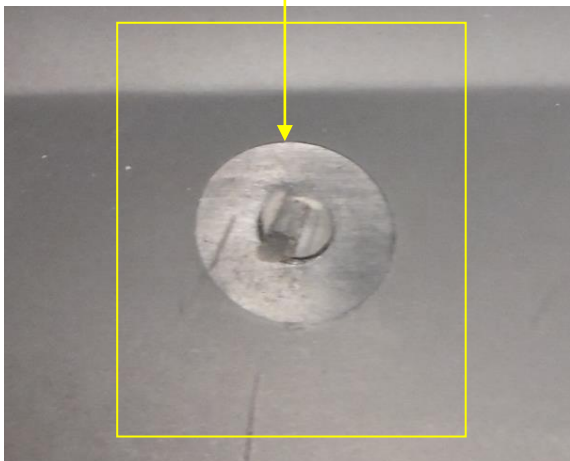
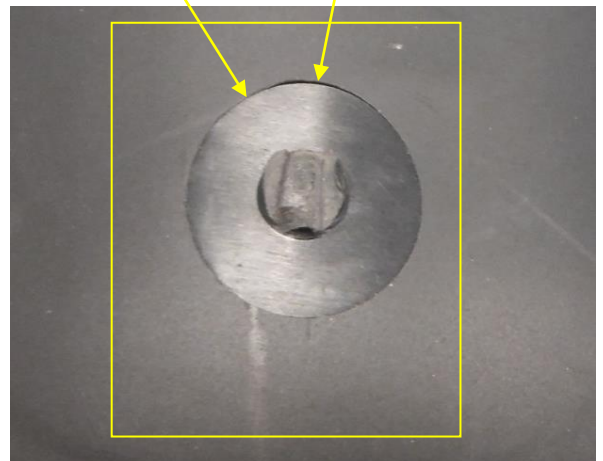


Figure 6b





### Section C: NG Appearance – Surface Finish

The surface of the OTHER Valve Cover has a mottled, matte grey appearance in areas, which suggests a high percentage of regrind (recycled) plastic. The OEM Valve Cover is an even black color, which is consistent with the use of virgin plastic. (A recycled plastic can never achieve the full mechanical properties of its virgin form.)

Figure 7: NG Appearance – Surface Finish

