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Analysis Of Axial Ball Socket In Automotive Headlamp

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Abstract: Headlamp are playing important role in the design of lamps. The headlamp assembly receives a vibration from engine and road which then transfers to the internal mounting location. It is important to understand the dynamic characteristic and the components sensitive to vibration. The purpose of vibration failure analysis is determining the strength of mounting. A lamp tested in electrodynamic shaker. When a vibration test finished then a check a lamp and identified in any parts are damage. Make proto to reduce a part failure in lamp at vibration test.Finally, vibration test passed in all axis.
Keywords: Headlamp, Vibration test, failure time,Proto.

I. INTRODUCTION

Automotive design has always been driven by aesthetical choices. On this path technology plays the important role to solve all the problems leaded by stylist needs and design solutions. Aerodynamic and curved shapes, new materials and coatings often contrast with economical and productive needs. Headlamp mounted in front of the vehicle to illuminate the road during night time or low intensity. Design and development of automotive headlamp in systematic manner by considering manner by considering post failure can avoid as much as modification cost and rejection cost as possible and can meet customer requirement. In the design and development stage for automotive products. It is important to determine the test specification to discover defects early and improve reliability. Headlamps vibration behavior need to predict the design phase to anticipate two types of issue. One of the main function of headlamp I to provide a light beam on the road at night. However, beam vibration while driving on paved road is to be avoided for the driver visual comfort. This can be done by predicating and shifting the first frequency above a required frequency. The second issue is to design a robust headlamp which must not fail during the customer vibration specification. The time spend in the design phase solve frequency or stress weakness, gives more confidence in the design before the launch the tool. As a consequence, the time spent during validation phase to solve vibration issue on prototype is then reduced. Those design improvement by calculation must be based on reliable finite element results. The validity of headlamp vibration model has been verified by performing correlation between experimental and model analysis.Nilesh K. Rhataval and Dr. C. S. Patahak[1]The structural system under ambient or operational condition. The structural dynamic deal with the behavior of structural under dynamic loading. Dynamic analysis is used to determine operating deflection modes and fundamental frequency. Before manufacturing a lamp checked its quality and reliability in analysis. Theoretical value and experimental value are checked.RobertTamburo, Eriko Nurvitadhi, Abhishek Chugh, Mei Chen,Anthony Rowe, Takeo Kanade and Srinivasa G. Narasimhan1[2] Light glare and intensity is controlled with use of ultra low latency reactivity visual system. It sense an environment condition. This system improver driver visibility during snowstorms, increase a contrast of lens. Marking and early visual warning of obstacles are demonstrated.Wei- LunChang,Ken-Yuan Lin and Chin-Duo Hsueh[3]The accelerated vibration specification and investigate the specification under customer usae with reliability. Analysis the fatigue vibration parameter of the material were then estimated from Were the estimated from various condition. The benefits of the paper approach is that we could quickly obtain the material parameter of complex plastic under bench test specification to accelerate the effect.Mr. SurajkumarKharche , Mr. Sachin Kulkarni and Mr. Prashant Karajagi[4]The purpose of vibration analysis is to determine the strength of mountings. Practically natural frequency of each part should never match with engine excitation frequency over this range. But at some points we cannot avoid it, which will lead into resonance condition. For this we need to find not only natural frequencies but also the vibration amplitude at that point. To compare working frequency with natural frequency for validation purpose.

II. METHODOLOGY

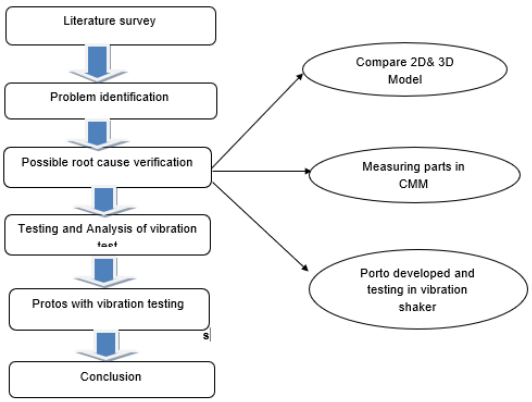


Fig.1Methodology

III. SINE VIBRATION TESTING METHOD

Frequency is fixed in vibration testing.

Vertical - 5Hrs
Transverse - 3Hrs
Longitudinal - 3Hrs
Frequency - 41-66 Hz
Acceleration - 45m/s2

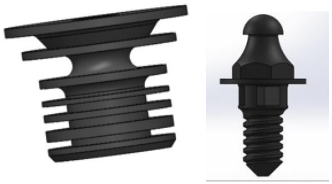
Fig.2Vibration test machine

3.1. Condition at vibration test

High, low, fog and DRL beam is continuous lighting condition.
Cornering lamp is ON and OFF in each 5mins.
Turn signal is flashing condition.

3.2. Vibration failure Identification

When a vibration test conduct in headlamp white capsule was sheared. Check a 2D and 3D model. Compare the coordinate points in housing and reflector parts in actual and CAD model.



3.3. Visual inspection

Shack a lamp and identified any internal parts loose.
Damage in outside of housing and lens.

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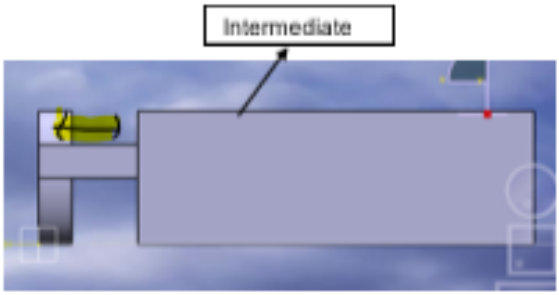
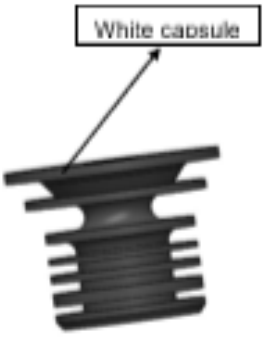
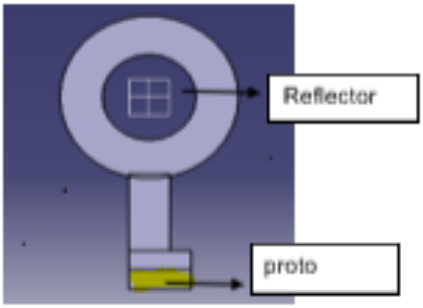
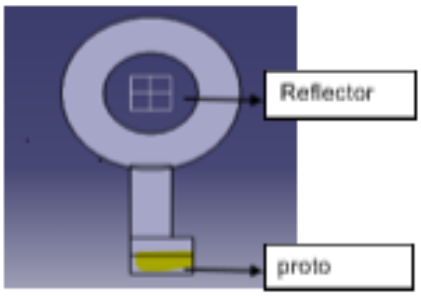
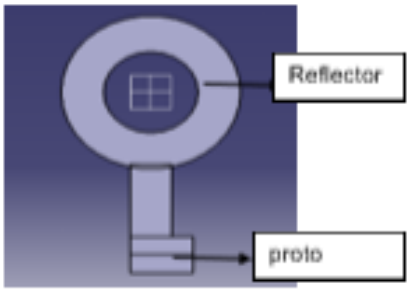
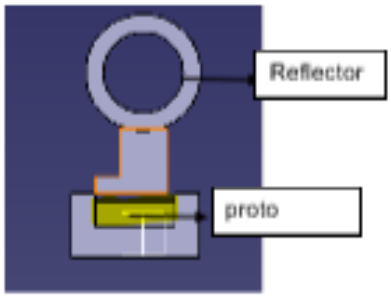
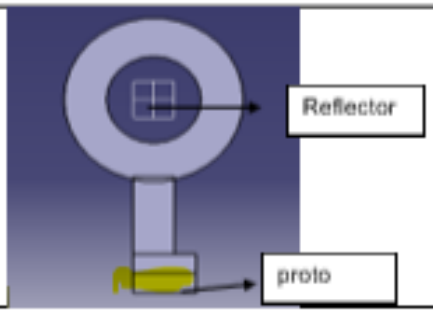
Check the cut-off stability before and after testing.
Check a connector before and after vibration testing.
we glow all blub and recheck a performance of bulbs.

3.4. Non-visual inspection
Any damage in inside of parts. A damage is not visible so cut the lamp and identified the damage areas.

IV.PROTO RESULT

Proto	Design	Before test	After test
1		Lamp assembles without lens. We corrected Housing and leveler mating area	No damage in axial ball socket was observed. Vibration test passed Without lens.
2		We put a same dimension in proto test 1	Vibration test failed with lens
3		Re-study of reflector was done	Z-axis passed but Y-axis failed. Intermediate with small capsule came out of leveler motor. Recheck of 2D and 3D model in intermediate actual part.

Proto	Design	Before test	After test
4		We arrest a intermediate with small capsule. We applied a glue in intermediate with small capsule.	Reflector was shaking during vibration test White capsule was damaged
5		Compared the India and China white capsule. China capsule was assembled in our reflector with our lamp.	Reflector was shaking during vibration test White capsule was damaged
6		1mm proto glued in bottom of reflector.	No reflector shaking and capsule not damaged.

Proto	Design	Before test	After test
7		Confirmed and rechecked the same design model in proto of test 6	Vibration test passed in all axis. No reflector shaking and capsule not damaged.
8		Lamp assemble same design in proto test 7	Glue place was damaged. We need further modification for feasibility.
9		A proto was glued in housing at white capsule support and lamp housing meeting area.	Vibration test conducted without lens. Vibration test passed on Z axis
10		0.8mm metal sim(proto) glued on reflector surface.	Vibration test passed in Z axis. Then check an aiming condition in reflector.

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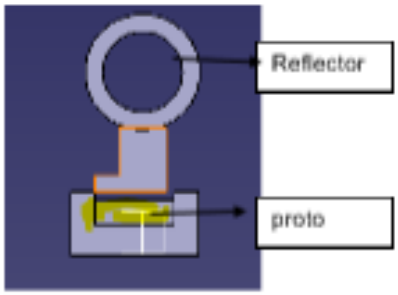
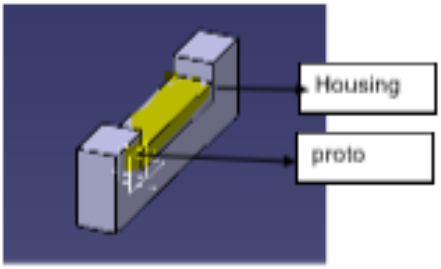
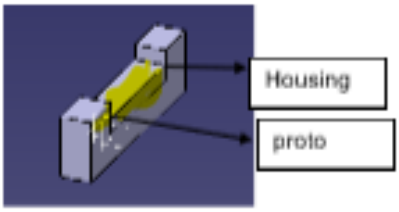
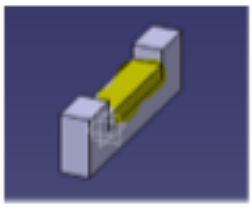
Proto	Design	Before test	After test
11		1mm proto is glued in housing. LD motor and intermediate gap in as per CAD data.	Reflector was shacked in Z axis condition. Reflector resonance was checked with LED module.
13		A proto is glued a housing in Z axis. proto is glued a housing in Z axis.	Z axis passed but Y axis failed. Pivot and white capsule data checked from suppliers.
14		A proto is glued a housing surface in Z axis	Z axis passed but Y axis failed. Module bracket loosen.
15	 	The lamp assembled with lens. Vibration test conduct with Standard capsule	During test in Z-axis Module bracket shacked.

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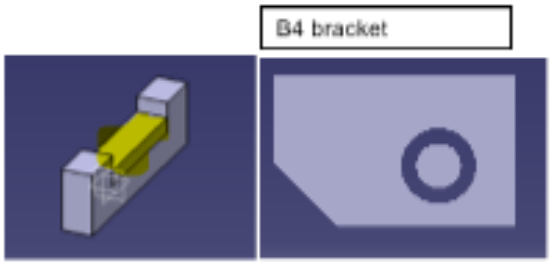
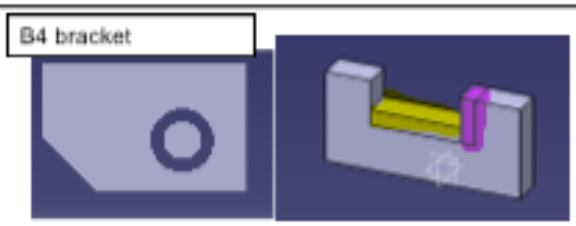
Proto	Design	Before test	After test
16		A proto is glued a housing surface in Z axis. Vibration test conduct without B4 bracket mounting	Z axis passed but Y axis failed. Module bracket loosen.
17		A proto is glued in X and Y axis in housing.	Vibration passed.

V.CONCLUSION

The vibration test of lamp depends on frequency. A CAD model and actual model are in same dimension there is no issued. The deviation in actual model also affect all parts lamps. Vibration failure affect a cut-off stability in lamp that a driver car in night time. The co-ordinate measuring machine and video measuring machine use to check dimension variation in 2D and 3D model. Vibration failure part identified in non-visual inspection that cut the lamp then identified a damage part. Restudy a 2D and 3D model vibration analysis. Made a proto for vibration test. The proto reduced a risk of vibration failure. Finally, a vibration achieved in all direction.

VI.REFERENCE

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