

DESIGN OF A COMPONENT FOR COMBINING TWO PRESSING OPERATIONS

Aringale Aditya¹, Chavhan Sachin², Bangal Saurabh³, Bhaskar Sachin⁴, Khadke Yuvraj⁵

¹ Student, Mechanical Engineering, Matoshri College Of Engg, Maharashtra, India

² Student, Mechanical Engineering, Matoshri College Of Engg, Maharashtra, India

³ Student, Mechanical Engineering, Matoshri College Of Engg, Maharashtra, India

⁴ Student, Mechanical Engineering, Matoshri College Of Engg, Maharashtra, India

⁵ Professor, Mechanical Engineering, Matoshri College Of Engg, Maharashtra, India

ABSTRACT

A wheel hub bearing unit is an important part of your car's wheel assembly, enabling your wheels to turn freely and playing a crucial role in the safety and handling characteristics of your vehicle. Though you may never even see the hub assembly but any problem in that affect the performance of vehicle a lot. By designing the tonner ring press plate it made possible that to combine the two pressing operation. By implementing this solution one whole pressing operation that is tonner ring pressing machine is completely eliminated. It will result in very huge cost saving.

Keyword : Wheel hub, Tonner ring ,press plate, etc.

1. INTRODUCTION

Basically wheel hub assembly consists of parts such as hub, bearing, bolts, circlip etc. A wheel hub bearing unit is critical to your car's performance, from the smoothness of the ride to fuel efficiency, noise etc. So any defect in the hub assembly causes chattering at the corresponding wheel, increase chassis vibration and generate high noise level inside the car cabin during running condition. There are two press machines which are used in hub assembly operation namely ,Wheel bolt and bearing press machine and second one is toner ring press machine .Aim of this work is to combine these two machine operations by making such arrangement .So that it will result in reduction no. of machines required and also in reduction of cost.

1.1 Problem Statement:

To make an arrangement for combining two operations on a single press machine.

1.2 Objective

According to the problem definition our objective is as follows

- Combining of two pressing operations on a single press machine.

1.3 Concept of proposed system

Company assembly department consist of two pressing machines in order to carried out operations separately. So we had designed a toner ring press plate which can be used to combine these operations on a single press machine.

2. DESCRIPTION AND WORKING OF MACHINE

- Wheel Bolt and bearing press machine



Fig.2.1 Wheel Bolt and bearing press machine

○ Working :

This machine is used to pressed the bolt, bearing and circlip into the hub in their respective position. First of all placed the hub on the fixture. After that the five bolts are placed into the holes of the hub and get pressed by pressure upto 40 - 100 bar. In the similar way bearing also pressed into its position which is then followed by pressing of circlip. Circlip is used to avoid the removal of bearing from the hub due to the high running speed of vehicle.

□ Toner ring press machine



Fig.2.2 Toner ring press machine

The operation of pressing of toner ring on hub assembly is carried out by this machine.

2.1 Why to combine these two pressing operations ?

In order to reduce the cycle time and also the cost associated with the toner ring press machine it's desirable to make an arrangement by means of which the toner ring also pressed on xylo wheel bolt and bearing press machine. Therefore to satisfies this purpose we designed a simple plate which will combine this two operations.

2.2 Design of press plate Analytical design of press plate

Analytical design of press plate

- Inner Diameter (d) = 86.5mm
- Outer Diameter (D) = 135mm
- Area of plate $A = (\pi/4) * (D^2 - d^2)$
 $= (\pi/4) * (0.135^2 - 0.086^2)$
 $= 8.505 * 10^{-3} \text{m}^2$
- $P_{\text{max}} = 100 \text{ bar}$
- $P_{\text{min}} = 40 \text{ bar}$

- $P_{mean} = (P_{max} + P_{min})/2$
- $P_{mean} = (100 + 40)/2 = 70 \text{ bar}$
- $F_c = P * A$
 $= (70 * 10^5) * (8.505 * 10^{-3})$
 $= 59535.53 \text{ N}$
- Compressive stress (σ_c) = F_c/A
 $= (59535.53)/(8.505 * 10^{-3}) = 70 * 10^5 \text{ N/m}^2$
- Factor of safety = 3
- Compressive strength (S_{ut}) = (Compressive stress) * (F.O.S)
 $= (70 * 10^5) * (3)$
 $= 21 \text{ Mpa}$
- Hence material selected is = FG150
- Modulus of elasticity (E) = 100 Mpa
- Specific gravity (S) = 7.05
- Poisson Ratio (μ) = 0.26

2.3 Analysis of toner ring press plate in ANSYS

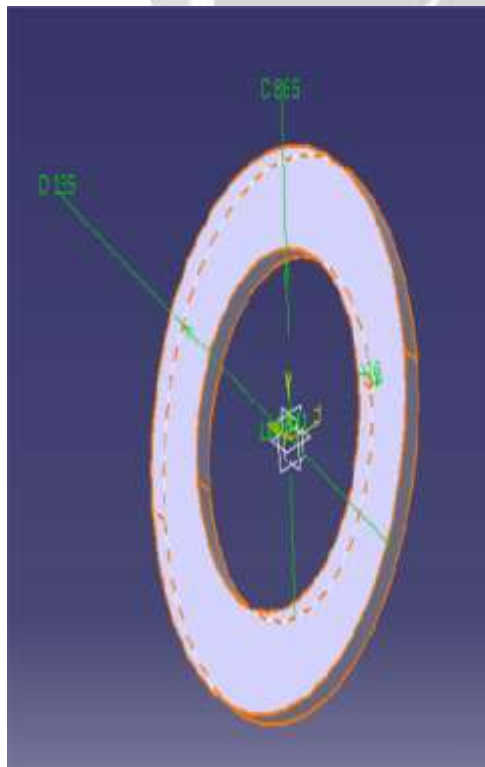


Fig2.3.1 Toner ring press plate model

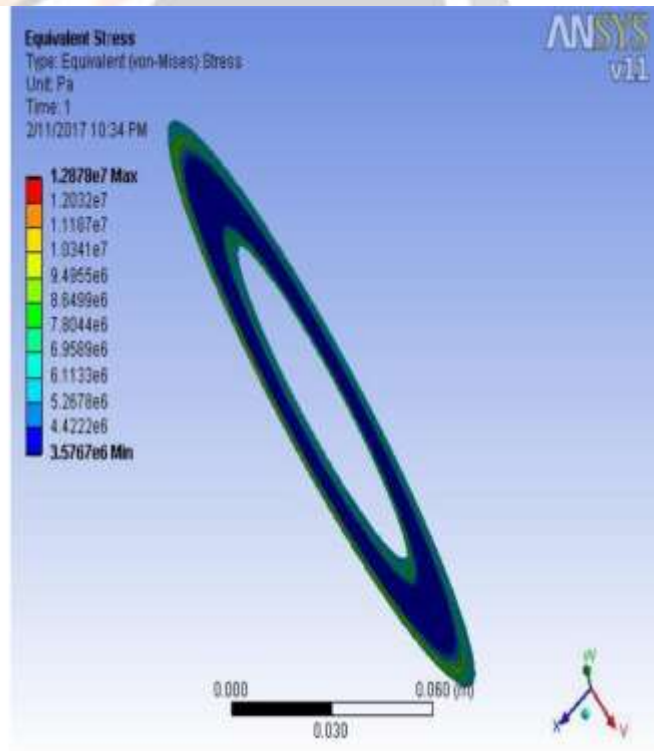


fig. 2.3.2 Equivalent stress distribution

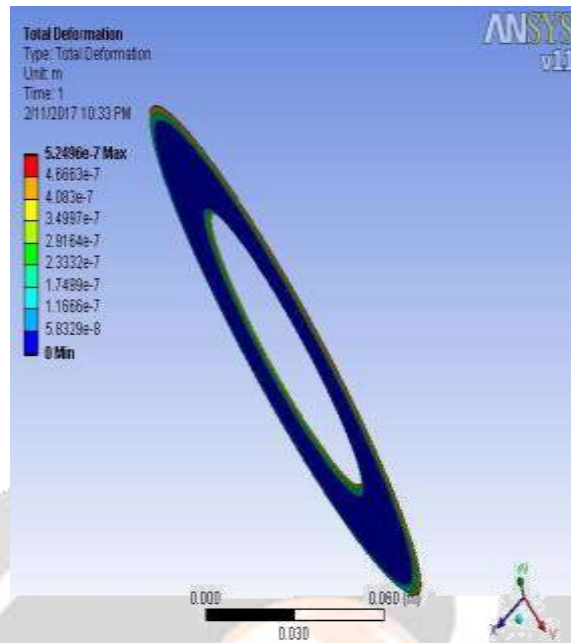


Fig 2.3.2 Total Static deformation

- Result of toner ring press plate

Sr No	Part		Max	Min
1	Toner ring	Total Deformation	$5.2496 \times 10^{-7} \text{m}$	0
2		Equivalent Stress	$1.2878 \times 10^7 \text{Pa}$	$3.5767 \times 10^6 \text{Pa}$

3. CONCLUSION

- The problem of combination of two press operation is solved by using toner ring press plate.
- Cost saving as below,
 - Fixed cost = Rs 3,25,000
 - Labour cost = Rs 12000/Month
= Rs 144000/Year

4. REFERENCES

- [1].ALDERIGHI, M., CENTO, A., NIJKAMP, P. and RIETVELD, P. (2007), "Assessment of New Hub-and-Spoke and Point-to-Point Airline Network," *Transport Reviews*, Vol.27, No.5, pp.529–549.
- [2].BERGQVIST, R. and TORNERG, J. (2008), "Evaluating locations for intermodal transport terminals," *Transportation Planning and Technology*, Vol.31, No.4, pp.465–485.
- [3].BOK, M.D. (2009), "Estimation and validation of a microscopic model for spatial economic effects of transport infrastructure," *Transportation Research Part A*, Vol.43,pp.44–59.

