# COMPUTERISED APPROACH FOR FASTER PRODUCT LAUNCH

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**Abstract:** As in today's dynamic environment, faster product launch is a key tool for success of the organization. Brakes are the very important parameter in vehicle designing. So, design of brakes should provide product quality, safety, reliability, optimum field performance, easy to manufacturing, less time consuming, good quality, very close to accuracy with in economical conditions. So to achieve this goal of Faster Product Launch (FPL) by using computer we adopted Unigraphics tool. Which has accelerated today's new product development cycle very economically. This paper gives an overview of how we approached the design and launches the product and has been successful in achieving its target, giving a clear edge in manufacturing stream.

Key words: Casting, Unigraphics, Brake and Caliper.

## 1. INTRODUCTION

Brake system[1-4] is the very important and most critical component in the vehicle. It has to face stringent quality and safety regulations[5-7]. Hence brake castings are tested for soundness, porosity, microstructure etc [8-10]. Castings are integral part of the brake systems. The process of casting developments has to be designed such that accuracy and repeatability are assured [11-14]. For satisfying the above conditions CAD/CAM stream is the only one available to fulfill the requirement.

## 2. DESIGN METHODOLOGY

For designing the product, it should be satisfy the all requirements of the customer as well as supplier. And this design methodology is categorised for this product design into 3 stages. In which the first one is design of castings. This is directly reflects on raw material cost, machining time, labour cost, safety, reliability of product and cutting tool cost. Secondly concentrated on designing of a casting, for this the designer should consider the optimum wall thickness, weight, strength, fillets and tapers considering the flow of molten metal to reduce internal cracks, blow holes, porosity and chamfers to reduce machining time and deburring time. Finally, the designer should consider the practical approach of manufacturing in foundry, that is, parting line, core and prints design, core locks, sand gutters, crush pads and shrinkage allowances in all directions mounting on match plates and gating system etc.

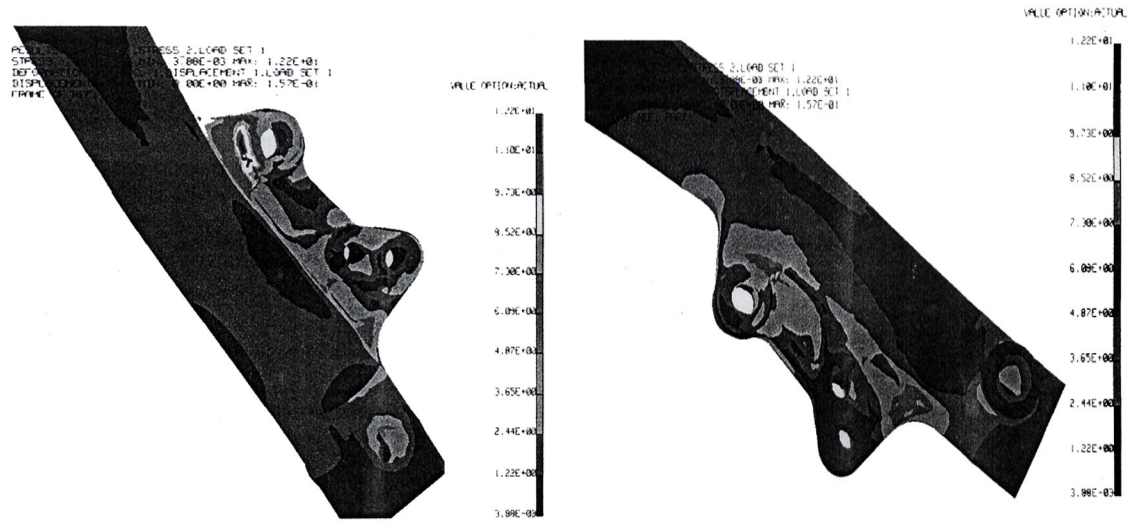
Fig.(1). Front Assembly

## 3. ANALYSIS APPROACH

The geometry was taken from the part which has been modeled in Unigraphics [15] of single bore caliper holding fork and support. Because the concurrent engineering capabilities of Unigraphics, it will be suit to modeling the

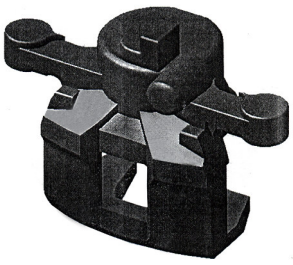
product and the same solid model was translated to analysis package, Ansys through the translator IGES. Material of fork and the support fork as shown in Fig(1) were Aluminum and Steel respectively.
The meshing was carried out with solid mesh. And point load was applied at the support part. The load applied to simulate the practical conditions of the fork in x-direction and y-direction were 3540N and 7300N respectively at the anchor nodes. The constraints applied were, one at the top face of the tube and the other at the face of hole where tube is assembled to the wheel, with all these boundary conditions the problem was solved in analysis soft ware called Ansys and the results are shown Fig.(2).

## 4. COMPARISION OF COMPUTERISED METHOD WITH THE CONVENTIONAL METHOD OF DESIGNING THE SINGLE BORE CALIPER

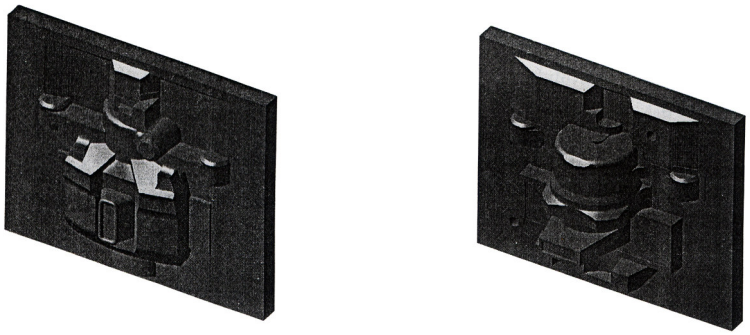


a. Deflection Mode b. Displacement Mode

Fig.(2) Load Analysis



(a). Single Bore Caliper-Model



(b). Single Bore Caliper-Cope (c). Single Bore Caliper-Drag

Fig.(3) Single Bore Caliper

**Table (1). Conventional Approach**

| | | Single Bore Caliper | |
|---|---|---|---|
| **S.No** | **Description** | **Time (Hrs)** | **Cost (K)** |
| 1. | Design & drawing of patterns/core boxes | 42 | 7 |
| 2. | Making of a wooden pattern | 60 | 18 |
| 3. | Casting blanks for finished pattern | 35 | 7 |
| 4. | Pattern machining | 100 | 25 |
| 5. | Inspection of pattern | 20 | 3 |
| 6. | Trail production of casting | 25 | 3 |
| 7. | Correction of master pattern | 25 | 7 |
| 8. | Duplications sets of pattern and finishing | 210 | 65 |
| 9. | Labour cost (machining, pattern making) | - | 38 |
| 10. | LH/RH cost | - | 52 |
| 11. | Finishing cost | - | 5 |
| 12. | Development cost | - | 16 |
| 13. | Ancillary | - | 10 |
| **Total** | | 517 | 256 |

**Table (2). CAD/CAM Approach**

| | | Single Bore Caliper | |
|---|---|---|---|
| **S.No** | **Description** | **Time (Hrs)** | **Cost (K)** |
| 1. | Making a 3D model | 25 | 5 |
| 2. | Model checking & modifications | 2 | 2 |
| 3. | FEA and model modification | 10 | 3 |
| 4. | Solidification / Hot spot checking | 3 | 1.5 |
| 5. | Patterns machining | 15 | 7 |
| 6. | CAM generation | 18 | 15 |
| 7. | Core Boxes machining | 35 | 40 |
| 8. | Inspection | 5 | 1.5 |
| 9. | Duplication of sets of patterns | 120 | 88 |
| 10. | Labour cost (machining, pattern making) | - | 9 |
| 11. | LH/RH cost only CAM cost | - | 15 |
| 12. | Finishing cost | - | 2 |
| 13. | Development cost | - | 4 |
| 14. | Ancillary | - | 0 |
| **Total** | | 233 | 193 |

**Table (3). Net savings**

| | | Single Bore Caliper | |
|---|---|---|---|
| **S.No** | **Description** | **Time (Hrs)** | **Cost (K)** |
| 1. | Conventional Approach | 517 | 256 |
| 2. | CAD/CAM Approach | 233 | 193 |
| | Net Difference | 284 | 63 |

## 5.CONCLUSION

From the Table (3) we can conclude that net difference in time consuming of conventional method to the CAD/CAM method is 284 (Hrs) and the cost is 63 (K) respectively. Because of this much of savings computerised approach provides a better way for faster product launch and the same time we can avoid the product failures at validation testing, resulting in tremerendous time and cost savings and the same time we can maintain the wall thickness, weight optimization. Modification of designs at any stage is very easy and faster. By this computerised approach once the tool path is generated, any semi skilled CNC operator, who can machine the component without any difficult we can maintain the surface finish and accuracy. Any intricate and complex shapes can be machined very fast and easily. Whenever required duplication of patterns are very fast and cost effectively produced. Ultimately we can prove that the life of the components. Which are manufactured by the computerized method that is, CAD/CAM approach will give long span and we can avoid the breakdowns to near about 78% and time consuming up to 45% and cost to 75%.

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