

Modification in Manufacturing Process of Rod K24 Leading to Reduction in Overall Manufacturing Cost By Spm, New Bending & Chamfering Operations

Harsimran Singh, Balpreetsingh

Lecturer Deptt of Mech Engg at Sant Baba Bhag Singh Institute of Engineering and Technology
Village Khiala P.O. Padhiana, Distt. Jalandhar

Abstract—A case study has been carried out on one of the automobile component i.e. K24 ROD used in Honda Activa with a view to reduce its existing cost. Value Engineering Job Plan with seven core step approach has been implemented. A detail study on the manufacturing techniques, cost and function has done to eliminate the unnecessary cost. The study highlights the poor value areas and need to improve the manufacturing processes. At last, changes has been suggested and implemented in manufacturing processes leading to 7.61% reduction in cost of the component.

Index Terms—Rod K24, Value engineering job plan, Evaluation of Manufacturing Process.

MAIN OBJECTIVES ARE

1. To Know About methods Of Lowering Cost In Manufacturing Of Rod K24
2. To Modify Bending Operation Of Rod While Operating On Single Press
3. To study Value Engineering Approach In Cost Reduction Techniques.

I. INTRODUCTION

The two great problems confronting the industry are:-

1. The high cost of equipment.
2. The achieving of suitable reliability.

The common denominator of these two problems is complexity of design. As a product design becomes more and more complex, the development and manufacturing costs rise not at a linear relationship, but an exponential rate. In other words, doubling the complexity may triple or quadruple the cost. Other factors such as field operation and maintenance also rise accordingly. These cost and reliability problems assume ever increasing importance to the government and industry as modern devices become highly technical in nature. Value Engineering is a comparatively new approach which has been found to be more effective than conventional long established cost reduction techniques. Cost reductions of the order of 30 per cent to 50 per cent and greater.

II. USE OF ROD K24 IN ACTIVA

ROD K24 shows in figure 1,2,3,4,5 are used in HONDA ACTIVA. It links left and right rear body cover with the foremost body. It acts as a link between the rear body cover and the foremost body



FIGURE1



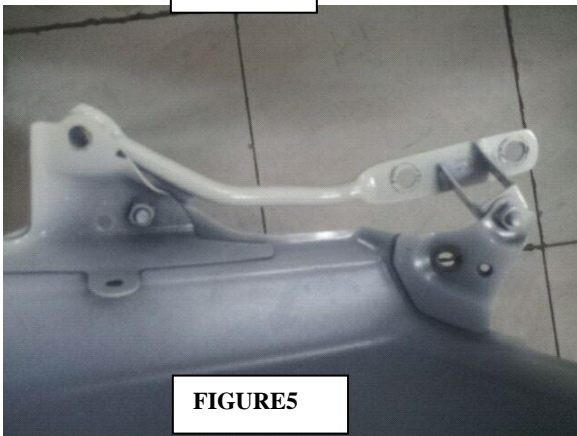
FIGURE 2



FIGURE 3



FIGURE4



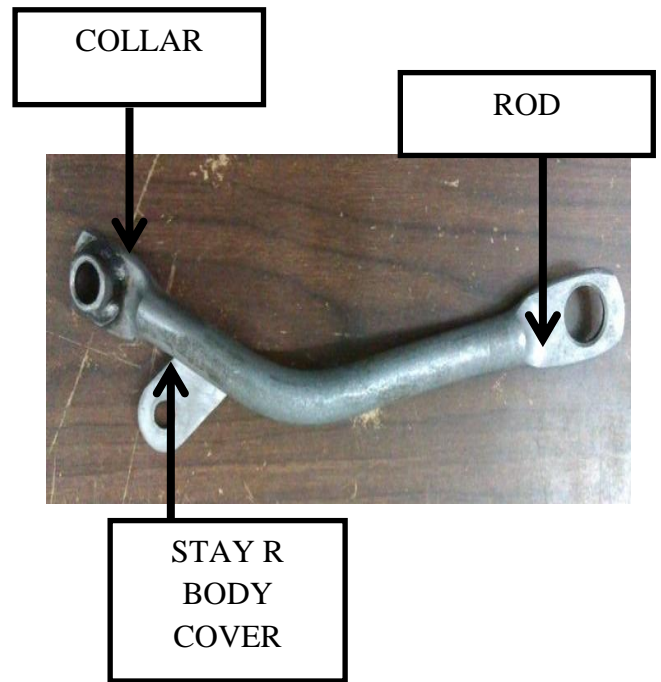
FIGURES5

III. MODULES OF PROJECT

Modeling: 3d Models Of Critical Components of Rod K24 And Bending Operation Press are Prepared Using (Solid Works). The Detailed Dimensions Are Taken From Its 2d Drawings. New Ideas Are Implemented On Manufacturing Taking In Consideration with New Design Of Bending Of Two Rods Machine And Having A Spm (Special Purpose Machine)



IV. OLD MANUFACTURING PROCESS AND COST



The manufacturing process of ROD K24 consists of assembling of three parts. ROD K24 consists of three assemblies:-

1. Rod
2. Collar
3. Stay R Body Cover

Both the collar and Stay R Body Cover welded with the Rod. All the parts are left hand and right hand welded with the left and right Rod.

Manufacturing Process for Left and Right Hand Rod

1. The rod is cut to 200 mm length from a long coil. Cutting is done with shearing tool in a mechanical press as shown in fig 7

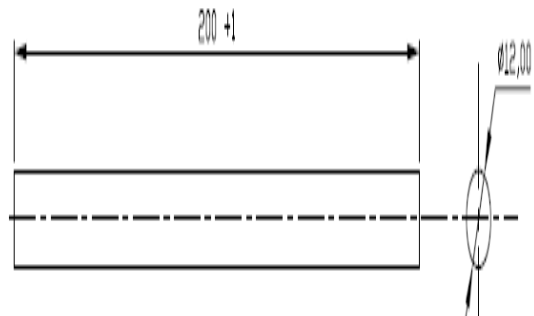


Fig 7

2. 1st bending at an angle of 158 is done to both of the left and right hand rod. Bending is done on a mechanical press of 30 ton.

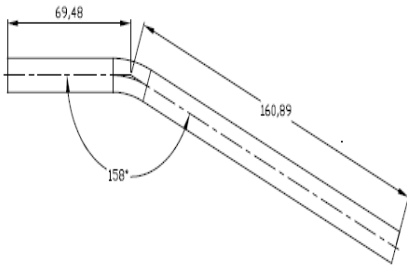


Fig 8

3. 2nd bending is done at an angle of 158 to both of the left and right hand rod. 2nd bending is done on a mechanical press of 50 ton

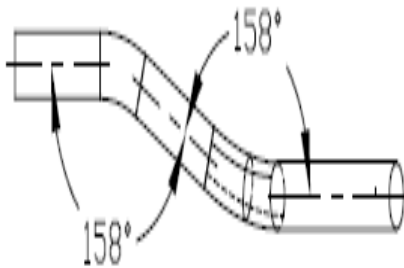


Fig 9

3. Pressing of both rods is done according to customer drawing. Pressing is done on a 600 ton mechanical press. Pressing is done to both of the left and right hand rod.

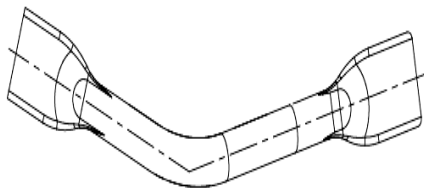
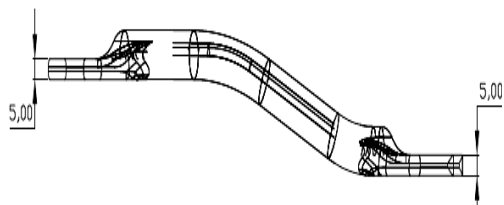


Fig 10

5. Next step in the manufacturing process is piercing and trimming at the both ends for the rods. Operations is same for both left and right hand rod



4.

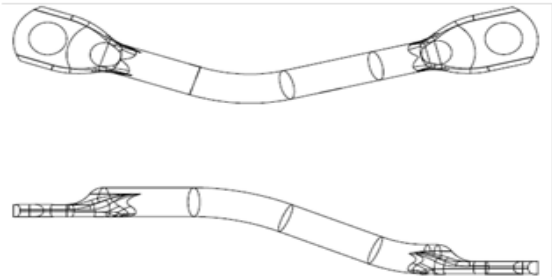


Fig 11

6. Stamping is done at 30 ton mechanical. L and R identification mark on left and right hand rod is done.

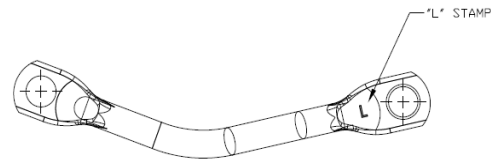


Fig 12

7. Chamfering is done on the one side of the rod and it is done with drilling machine manually by man.

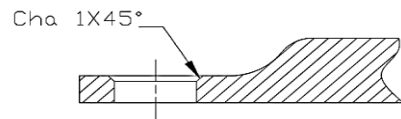


Fig 13

Chamfering is done to both of the left and right hand rod.

Manufacturing Process for Stay R Body Cover

1. The primary operation in manufacturing of stay body cover is blanking and piercing.

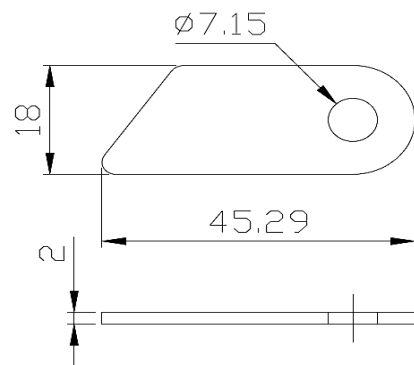


Fig 14

2. Then the bending tool is used for further operation. An angle is given to the stay r body cover according to the specifications in the customer drawing.

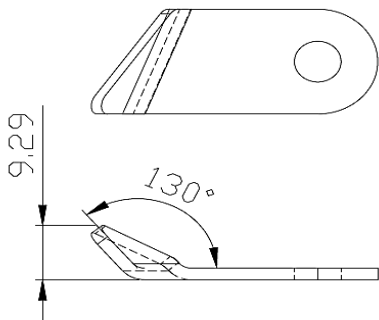


Fig 15

Assembling

1. The collar welding is done at one side of the both rods required in the drawing. The welding is done to the both of the right and left hand rod.

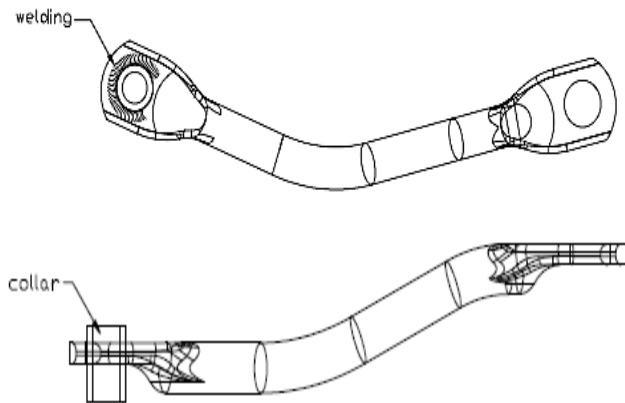


Fig 15 and fig 16

2. The welding of stay r body cover is done to both of the left and right

hand of the component.

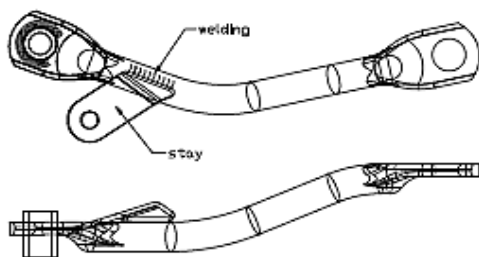


Fig 17

PART NO.	QTY.	PART NAME/ ACTION	MATERIAL/ PROCESS	GROSS WT. (kg)	SCRAP WT. (kg)	GROSS COST (Rs.)	SCRAP COST (Rs.)	NET VALUE
1	2	ROD	ST42	0.356	0.0289	16.02	0.578	15.40
2	2	COLLAR	C35					5.60
3	2	STAY R BODY	CRC	0.032	0.010	1.45	0.25	1.20
MACHINING								
4	2	CUTTING	PRESS(50 TON)					1.00
5	2	1 st BENDING	PRESS (30 TON)					0.40
6	2	2 nd BENDING	PRESS (50 TON)					1.00
7	2	FORGING	PRESS (600 TON)					3.00
8	2	PIERCING TRIMING	PRESS (100 TON)					2.00
9	2	STAMPING	PRESS (30 TON)					0.40
10	2	RESTRICKING	PRESS (50 TON)					1.00
11	2	CHAMFERING	DRILLING					2.00
12	2	STAY R BODY	BLANKING (50 TON)					1.00
13	2	STAY R BODY	BENDING(20 TON)					0.30
14.	2	STAY R BODY	WELDING					0.82
15.	2	COLLAR	WELDING					1.65
TOTAL								36.77

Bill of Material and Cost of parts before modification

AS WE CAN SEE TOTAL COST COMING OUT IS 36.77

V. MODIFIED MANUFACTURING PROCESS AND COST

1. SPM (SPECIAL PURPOSE MACHINE) could be preferred over the cutting tool in a mechanical press for cutting of rods. The drawings are prepared showing the

details of modified and new added parts. For clarity of the proposals which can be used during implantation.

1. Spm is installed for cutting of ROD

Spm is installed for cutting of rods. Spm of 1KWH motor is installed. Coil is mounted on the machine by the worker. Automatic cutting of rod after the initial setting of rod cutting is done.



Fig 18 A New Spm for Cutting Operation

2. Bending of two rods is done at a same press:-1st bending of two rod is done simultaneously on a same press and done by one worker instead of two.in fig 19 and fig 20



Fig 19

3. Chamfering, re-striking and stamping are done on a single press tool.

A new press tool is designed keeping in mind the three operations i.e. chamfering, re-striking and stamping is done on a same press. By combining all these operations on a single press tool instead of being doing them individually keeping in mind to reduce the overall cost. New press tool is done at 60 ton press machine. When the tool is press the re-striking, chamfering and stamping operations are done on the rod.

3-D model of new press tool is shown in figure 20

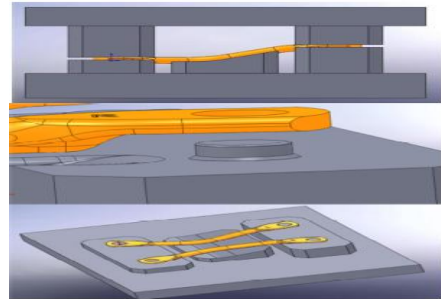


Fig 20

VI. RESULTS

Cost equivalent after VE=Cost before VE- Cost before VE =36.77-33.9 =2.80 Percentage saving = (2.80/36.77)*100 =7.61% The company was already selling 3000 pieces of the ROD K24 in a month i.e 36,000 pieces per year, which implies, annually saving = Rs. 2620800.

COST COMPARISON

S.NO.	PART NAME/ACTION	COST OLD (Rs)	COST NEW (Rs)
1.	Rod	15.40	15.40
2.	Stayr body cover	1.20	1.20
3.	Collar	5.60	5.60
Machining			
4.	Cutting	1.00	0.60
5.	1 st bending	0.40	0.20
6.	2 nd bending	1.00	1.00
7.	Forging	3.00	3.00
8.	Piercing and trimming	2.00	2.00
9.	Stamping, Re-striking, Chamfering	3.40	1.20
Total cost		36.77	33.97

VII. CONCLUSION

- 1 Total .Cost Of Product Has Been Reduced from 36.77 to 33.97.
2. Implementation Of Special Purpose Machine, New Ways Of Adopting Bending Operation And Chamfering Operation Are Justified.
3. The Annual Saving After Value Engg Is Rs 2620800.
4. Spm, New Bending Operation And Chamfering Operation Could Be Implemented For Manufacturing For Other Products Also.

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AUTHOR BIOGRAPHY



Balpreet Singh (Mechanical Engg)

Lecturer Deptt Of Mech Engg At Sant Baba Bhag Singh Institute Of Engineering And Technology Village Khiala P.O. Padhiana,Distt. Jalandhar

My Area Of Interest Is Designing(Autocad,Solidworks,Ansys)Cost Reduction Techniques And All Mechanical Core Subjects.Uniquekalra@Rediffmail.Com,Balpreetkalra@Rediffmail.Com



Harsimran Singh ((Mechanical Engg)

Lecturer Deptt Of Mech Engg At Sant Baba Bhag Singh Institute Of Engineering And Technology Village Khiala P.O. Padhiana,Distt. Jalandhar

My Area Of Interest Is Cost Reduction Techniques and All Mechanical Core Subjects. Harrybbsbec@Gmail.Com