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# MANUFACTURING OPTIMIZATION OF EDM ELECTRODE

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***Abstract*--**Manufacturing of aluminum casting die in tooling industry is very lengthy and cumbersome process. The manufacturing processes always flow in the fixed sequence. These activities cannot be altered because these are placed in increasing order of metal removal. Any wrong input at any stage may create may lead to creation of the extra manufacturing activities in the next lined up stages. This creates a bottle necks, choking of the system which finally to lead increase in the manufacturing rope length of the die. Total summation of increase in the manufacturing rope length will finally kill the buffer period, paying penalty for not completing and dispatching on time.

***Keywords:*** *EDM, Electrodes, cluster plates,*

## I. Introduction

Proposed methodology aims in adding, optimizing and innovating manufacturing ideas to the system. This helps to accelerate the manufacturing activities and eradicate it out of the manufacturing [1] system. Optimizing the manufacturing parameters is proposed to increase production and profitability.

Following objectives are coin for the die casting of automobile components viz:

- Optimizing the manufacturing processes for minimization of cost developing automobile engine components.
- Reduce the manufacturing rope length of the die cast products.
- Reduce the manufacturing rope length of the die casting die.
- Increase the productivity.
- Increase the overall profit.

## II. Assembly Machining Concept

The designing of the above process will kill the lead time of manufacturing as well shorten the manufacturing length. The main concept in assembly machining is that the entire electrodes that are designed in the both the insert are segregated as per the heights. All electrodes having the same height or a height of +/- 5mm will fall under one group and are assembled by the electrode designer on a flat plate called as the cluster plate. This plate is as simple plate having simple holes or oblong holes on equidistant pitch. Depending upon the height of the electrode the distance between the electrodes is maintained when electrodes are placed on the cluster plate. The pitch which is maintained between the oblong slots is 20 mm. When such electrodes are placed on the plate and machined from a single block, which will be same as that of a single electrode that will be manufactured from a single block. The idea behind assembling all the electrodes are that we get "X" number of electrodes at the cost of operations of one single electrode. Actual saving of manufacturing time will be, the time needed to execute Y number of operations for "X-1" electrodes. Savings of such kind of operations in a manufacturing line will save a high amount of manufacturing hours and decrease the manufacturing rope length of the component [2].

The following test is carried by assembling two blocks of different heights on the cluster plate. These two blocks are physically two electrodes which are programmed simultaneously. Figure 1.1 a shows the number initial old electrodes of the bench marked project. Solid model of the cluster pate designed in Pro Engineer is shown in figure 1.1b. Physical setup of all electrodes on the cluster plate is shown in figure 1.1c. Similarly the programming of the same is done in Delcam machining [3] software are shown in figure 1.2. Figure 1.2a, 1.2b and 1.2c shows the IGES imported in the Delcam interface, the top flat generated by flat finishing program, optimized 3D finishing respectively.

 

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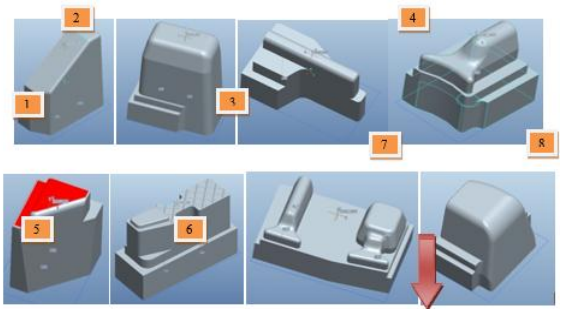



Fig 1.1a: Old bench marked electrodes.

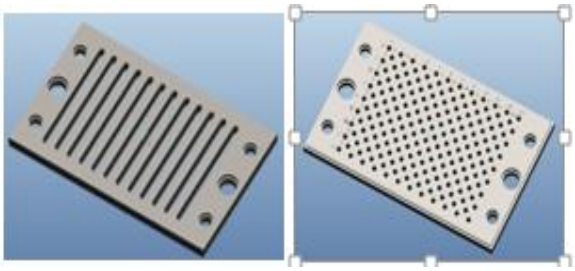


Fig 1.1 b: New designed cluster plate

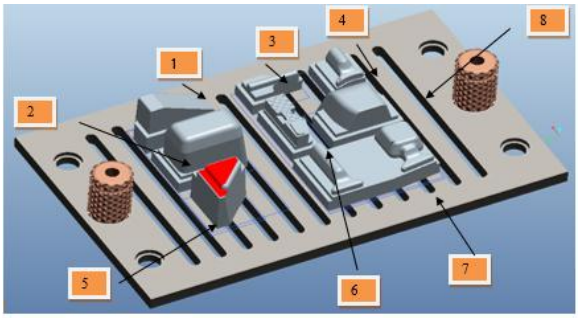
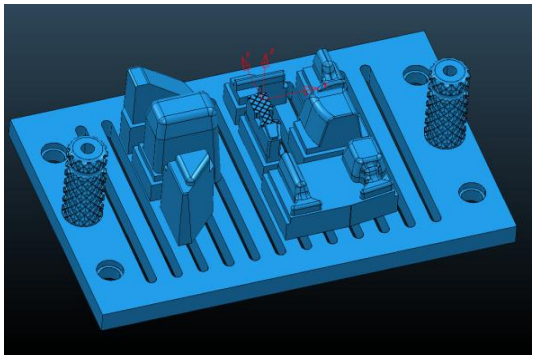
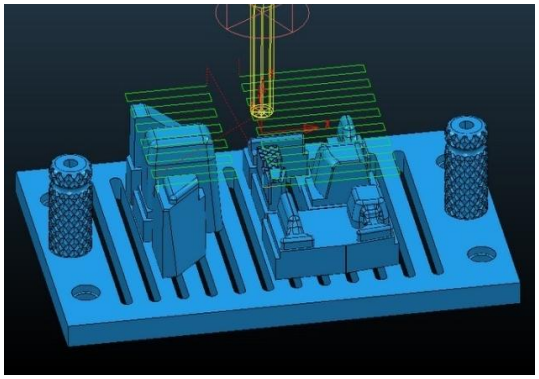



Fig 1.1 c: Cluster plate design.

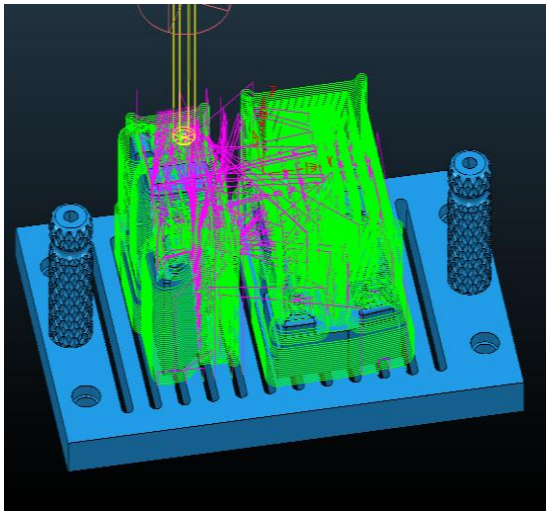
**Fig 1.1: Old bench marked electrodes V/s Cluster plate machining**



1.2a: IGES file in Delcam interface



1.2b: Top flat generated by flat finishing program



1.2c: Optimized 3D finishing.

**Figure 1.2: Cluster plate machining in Delcam software**

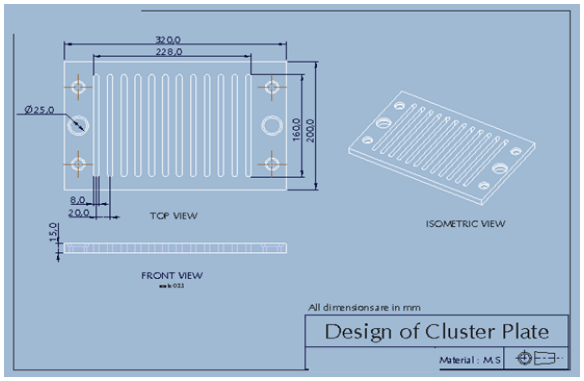



**Figure 1.3:** Cluster plate construction details.

Table gives the detail comparative assessment of all manufacturing processes in terms of number of actual hours saved per station. Final value of saving is arrived by calculating the number actual hours saved X hourly rate of that respective machine.

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## III. Result

| NET SAVINGS USING ASSEMBLY MACHINING/CLUSTER PLATE DESIGN. | |
|---|---|
| SUMMARY OF THE ALL THE PROCESSES | NET SAVING IN RUPEES |
| 1. DESIGN OF ELECTRODES. | 98.61 |
| 2. PROCESS SHEET GENERATION. | 175.00 |
| 3. BAND SAW CUTTING REQUIRED TO CUT THE ROUGH BLOCK. | 400.00 |
| 4. TIME REQUIRED FOR SETTING THE BLOCK ON CNC MACHINE. | 200.00 |
| 5. AVERAGE TIME FOR PROGRAMMING WITH TOOL LIST. | 600.00 |
| 6. ACTUAL TOOL LIST TIME FROM DELCAM OUTPUT. | 796.66 |
| TOTAL COST. | 2,270.28 |
| NET SAVING IN CLUSTER PLATE DESIGN VS INDIVIDUAL OLD ELECTRODE = Rs 2,270.28 | |

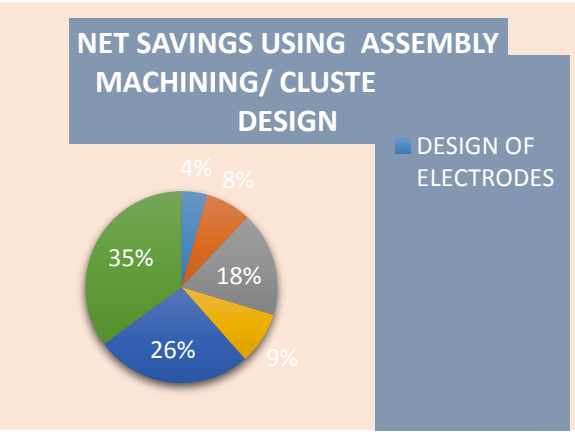


**Fig 1.4 Result**

## IV. Conclusion

Cluster plate machining results shows that more number of programs can be generated by the electrode programmer increasing the manufacturing efficiency. Parallel generation of the electrodes on cluster plate will release some CNC capacity which can be used to machine some more electrodes. Overall productivity is increased.

## References

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