SCOPE FOR DESIGN & DEVELOPMENT OF 2R EDGE TRIMMING MECHANISM & TOOL ADJUSTMENT

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ABSTRACT

The most relevant problem in wood-working Enterprises consists in an optimal selection of standard stock sizes and trimming of edges while finishing of the panels sheets according to specified requirements, so that the waste is minimized & finishing of the wooden panel took place. The efficiency of the production processes also depends on the organization of a good production scheduling and a fine operations sequence in order to minimize the time of operation & maximum number of production improving the automated material handling systems while visiting DATTA ENTERPRISES,MIDC, Butibori, Nagpur, we found a problem concern with the operation perform in the industry. This industry is based on wooden work which produces various types of wooden panels for making various wooden furniture like beds, tables, cupboards etc. and also for modular kitchen. At the edges of wooden panel the banding strip is to be glued. The excess banding strip coming out from the panel can be removed by using trimming operation. The trimming operation in the industry is perform by holding the machine in operators hand and it passes over the excess banding strip of the wooden panel so that it removes the excess material. But it consumes more time and is hazardous for the operator; also the operation is inaccurate in manner. On the basis of such conclusion, design & fabrication of the trimming machine is taken into the consideration. Machine is to fabricate to minimize fatigue to operator and making the operation safe and accurate, also which minimizes the operation time.

Key words: Trimming Machine, Banding Strip, Wooden Panel, Tool Adjustment Mechanism
1. INTRODUCTION
Traditionally, operations that were carried out manually depended on the designer's skill and experience, and it resulted in a very time consuming process [2]. Now a day, however, technology is evolving to meet challenges faced by manufacturers. Recent buzzwords in the industry include yield improvement, motion optimization, integration and automation, and range of solutions. In today's manufacturing challenges, the role of software is ever increasing in importance. The focus of nesting software is maximizing material utilization and improving processes and flexibility.

By visiting wooden furniture manufacturing industry named Datta Enterprizes, Butibori, MIDC, Nagpur. The industry perform various operations such as cutting, molding, pasting, edge banding, trimming etc. which are carried out by semi-automated, fully automated and some manual machines for production. The manually operated machine used in industry is edge trimming operation which is finishing operation. The operation performed by this manually operated machine is very time consuming and in accurate in manner as well as hazardous. Hence we decide to make such an arrangement for this operation so that the time required is much less than the previous procedure and also the operation become complete inaccurate and safe manner. The trimming operation is used for excess material from the edge of wooden panel of banding strip is edge trimming operation hold manually without fixing of wooden panel or the trimming machine. The finishing operation is performed manually is trimming which is done after banding. When banding of strip on the edges of wooden panel is take place. There is some excess material available throughout the edge of the panel this excess material is being removed, so it is difficult to operate the machine by any semi skilled worker. It required skilled operator to maintained time, quality and safety. The objective and problem identification is done for improving production with minimum time, accuracy and safety of labor. Hence we try to design the Cost Effective 2R Trimming Mechanism & Tool Adjustment. The above problem can be accomplished by designing a semi-automated edge trimming machine. It is decided to develop such type of machine which has low cost and time required for operation is less. In previous working operation, Manufacture can trim material from only one of the side of the wooden panel. Hence to minimize the time, we decide to trim the wooden panel from two sides at a time using 2R Trimming Mechanism with tool adjustment.

2. METHODOLOGY
Here no handling of router machine is required for trimming the wooden panel. The router machine is mounted on the table between which the wooden panel is passed. We are using two router machines for the trimming of edge of wooden panel from two sides at a time. In industry the trimming operation done manually by holding the machine by operator and passing it over the edges of wooden panel and it removes the excess strip from on the one side at each stroke. It is very time consuming operation that’s why we are selecting making of its edge trimming mechanism for helping the enterprises to minimize their operation time and it is completed in quality and accurate manner.
The below fig. shows the short procedure of our project, firstly we collect the all information regarding our project necessary and filter it. Then we are going for the CAD design of the edge trimming mechanism. After completion of the CAD diagram we are precede for the fabrication under the expert guidance. After fabrication we are going for the next procedure is assembly, we assembled all the parts of the machine and take a trial and examine the edge trimming mechanism.

**Figure** Short Procedure of the Project

**Figure** CAD Model
Scope For Design & Development of 2r Edge Trimming Mechanism & Tool Adjustment

Steps involve in working of 2R edge trimming mechanism and tool adjustment:

- The working of edge trimming mechanism start with starting router machine mounted on the table frame the trimming tool is mounted on the rotating shaft coming out from router machine.
- As the router machine starts the trimming tools also rotate with the same rpm i.e. 30000 rpm.
- The wooden panel is feed to the rotating trimming tools for removal excess material from the edges, with the help of rollers. The operator will have to pushes the panel towards the rotating trimming for trimming purpose.
- Firstly, the trimming is starts at the lower side of edge of wooden because of the machine place on the table frame.
- The trimming of upper edge will also carried out simultaneously by the next machine mounted on table frame.
- The removal of excess material from the upper and lower edge of the wooden panel is take place at a time as a result of arrangement of machines provided in fabricated mechanism.
- The second router machine which removed the upper edge material is adjustable with the help of tool adjustment mechanism according to the width of wooden panel which is to be trimmed.
- The output is taken out from the other side as finished wooden panel by operator.

**Figure** Block diagram of edge trimming mechanism & tool adjustment
3. REVIEW OF LITERATURE

1. Daniel L. Schmoldt, Hang Song, Philip A. Araman the paper entitled “Real-Time Value Optimization of Edging and Trimming Operations for Rough, Green Hardwood Lumber” To developed a prototype scanning system for rough green hardwood lumber, that can automatically describe a board and its defect. The initial grade and size of the board, set the limits of edging and trimming. Evaluate the grade and volume of each edging and trimming line combination.

2. A. Lynn Abbott, Daniel L. Schmoldt, Philip A. Araman. The paper titled is “Automatic Scannin... of Rough Hardwood Lumber” It is says that to improve the accuracy of edging and trimming operation by automatic scanning of rough hardwood lumber.

3. Vassil Jivkow, University of forestry Sofia, Bulgaria. The paper entitled “Influence of edge banding on banding strength of end corner joint from 18mm particle board”. Discuss about furniture, furniture joint, bending strength, edge banding in wooden panel making operation. To improve the bending strength under the compression test of end corner joint from 18mm laminated particle board.

4. Carmen Regalado, D. Earl Kline, Philip A. Araman, the paper entitled “Value of defect information in automated hardwood edger and trimmer system”. In this journal discuss about comparison manually operated edging and trimming system used in mills do not achieved the maximum obtainable value from the board being processed, and that significant increases in value can be expected through optimizing hardwood edger and trimmer system.

5. Jingxin Wang, William A. Goff, Lawrence E.Osborn, Gregory W. Cook in entitled “Assessments of hardwood lumber edging, trimming and grading practices of small sawmill in west Virginia”. In this journal investigated on two separate occasions to evaluate number edging, trimming and grading practice across West Virginia. Measurement for wane, clear wood, and defects were taken on 60 pieces of lumber prior to edging and trimming at each saw mill.
4. RESULTS AND DISCUSSION

Time Calculation
Calculation of time carried out by taking direct and continuous observation of a task, using a timekeeping device i.e. stop watch to record the time taken to accomplish a task.

For calculating the time required to perform an operation on wooden panel by existing and new method we use following procedure.

Procedure for calculating time is as follows:
- Take ten wooden panels which are of same size (say 300*500 mm).
- Divide the panels equally for existing and new method of operation.
- Perform the operation in both the ways and time is recorded with the help of stop watch.
- While performing operation by the new and existing machine, the time is recorded by stop watch in sec.
- The recorded time for performing operation is shown in table as follows:

<table>
<thead>
<tr>
<th>Panel No. (size 300*500 mm)</th>
<th>Actual time required by operator manually in sec</th>
<th>Actual time required by operator using edge trimming mechanism in sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63</td>
<td>27</td>
</tr>
<tr>
<td>2</td>
<td>68</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>5</td>
<td>67</td>
<td>32</td>
</tr>
<tr>
<td>Total average time required</td>
<td>65</td>
<td>31</td>
</tr>
</tbody>
</table>

5. CONCLUSION
The method of trimming the banding strip of wooden panel can be eliminated by designing the trimming mechanism. The wooden panel can be passing through the mechanism over the edges of wooden panel. The Time & safety of work can be increased also minimizes the time for the operation. In this way the scope for fabrication of cost effective multi-side 2R trimming mechanism can be found.

REFERENCES


[7] Andrew Nayler, Phil Hankney, “Review of wood machining literature with a special focus on sawing” peer-reviewed review article, bio resources, 2013


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