

# Nozzle Marking on Shell

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**Abstract**— In pressure vessels, nozzles are attached for various purposes, marking a nozzle cut out on pressure vessel is very difficult operation. The objective of the paper is to optimize the diameter of set in nozzle for a pressure vessel. Geometrical parameters of nozzle are considered while marking a cut out on shell. However nozzles are placed on the circumferences of pressure vessel which disturbs the symmetry of the vessel, attachment of nozzle causes eccentricity. For simplicity of operation, adjustable trammel tool is used for marking a profile although this method reduces effort for marking which in turn helps in saving operation time. By this apparatus the total operational cost is inversely affected.

**Key words:** Nozzle Cut-Out, Shell, Trammel Tool, Efficient

## I. INTRODUCTION

A trammel is used to draw circles and arcs too large to be made with a divider.

A trammel consists of two sliding heads with scriber points mounted on a long, thin rod called a beam. One of the heads is fitted with an adjusting screw. Extension rods can be added to the beam to increase the capacity of the tool.

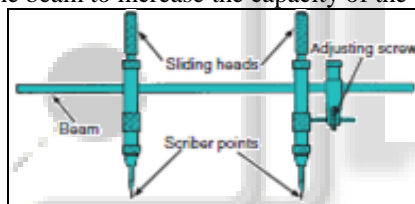


Fig. 1: Trammel Tool

Adjustable trammel tool is used for creating a profile on shell for e.g. Nozzle profile on shell. The adjustable trammel tool differs from the trammel tool in following aspects: adjustable punch and three leg stands. The main purpose of this tool is to mark a circular profile on curved surface.

The tool comprises of following components:

### A. Hollow Pipe with Slotting

This component consist of slot for varying the diameter within a particular range .the material preferred for this portion is stainless steel.

### B. Coupling with Locking Mechanism

It is guided through hollow pipe. The main purpose of this tool is to fix the range of diameter. The material used for this component is mild steel

### C. Centre Punch

For marking a profile on shell.

### D. Three Leg Stands

For providing the stability of tool on curved surface. The material preferred for this portion is aluminium.

### E. Spring & Rod Assembly

Spring is used to adjust the centre punch according to the curved surface

### F. Guide Ways

This are used to guide the spring and rod assembly. It restricts the motion of assembly only in longitudinal direction



Fig. 2: Adjustable Trammels Tool

## II. PROBLEM STATEMENT

To mark a profile for nozzle cut out on shell with ease in operation. The marking should be done in shortest possible time and accuracy should be maintained. The marking should be done at least cost so it will be optimum for industry.

## III. OBJECTIVE

To make an adjustable trammel tool that can be used for marking profile on shell. So that time will be reduced for marking as compared to previous method of marking by using CAD software.

## IV. METHODOLOGY

A simple prototype is made from the concept of trammel tool which is been used in company. The tool is adjusted with the help of spring and better handling is achieved with the help of tripod stand. The marking is easily done with the help of spring from compressed position to the tensile position

## V. SYSTEM FLOW

Methodology used for whole processing of Drainage adjustable trammel tool is given below; this methodology gives way about how work is to be carried out in systematic way. It is standard process of describing process, how it is done in simplest manner.

### A. System Design

Framework configuration is for the most part concerns the different physical limitations and ergonomics, space

prerequisites, game plan of different segments on casing at framework, man-machine collaboration, no. of controls, position of controls, workplaces, of upkeep, extent of change, weight if machine from ground level, add up to weight of machine and significantly more.

### B. Mechanical Design

Mechanical outline stage is imperative from the perspective of originator as entire achievement of venture relies on upon the right plan examination of the issue. Numerous preparatory options are killed amid this stage. Creator ought to have sufficient learning about physical properties of material, load stresses and disappointment. He ought to recognize all inside and outer powers following up on machine parts.

## VI. FABRICATION OF MODEL

Basically during fabrication of the model the hollow pipe was spotted by milling machine, after this coupling was induced on hollow pipe. The coupling is drill for locking mechanism. A centre drill is done on coupling to insert spring and rod assembly. A guide way is welded at the top of the coupling such that the axis of coupling and guide ways coincides. Spring and rod assembly is made to pass through the coupling. A centre punch is welded at the bottom of the rod by using a washer as a stopper, On the other side of the hollow pipe a hole is drilled for connecting the three leg stand by using a nut and bolt arrangement. A bush is inserted in the hole for tightening.

## VII. ADVANTAGES

- Developments of materials are locally accessible.
- Time is saved, which in turns increase the productivity of plant
- It is Portable and can be easily assemble and disassemble on the site
- Production cost is very low.
- Its operation and manufacturing is simple.

## VIII. DISADVANTAGES

- Difficult to handle while marking, because while marking it shatters due to three legs in contact
- Specific tool is restricted to specific diameter range of marking
- It cannot be operated by single person for marking, minimum two people are required
- Accuracy is less as compare to automatic 5 axis machine
- Proper grip is not available to hold the tool for marking

## IX. FUTURE SCOPE

Vibrations which are produced during the practical application can be reduced. The better stability is achieved by using four legs stand instead of three legs stand. For proper fixing at the time of fixtures can be used. Material which has high endurance strength should be selected. Magnetic or vacuum grippers can be mounted on stand for better gripping.

## X. CONCLUSIONS

Design and development of nozzle marking on shell is successfully implemented. In this domain we analysed marking methods which were used in industry for marking nozzle. To mark a profile in easy way we made a adjustable prototype of trammel tool.

The tool was successfully designed and manufacture for a specific range of diameter and the practical application was performed in presence of industry employees. The results were noticed and verified from previous methods. In this way we increased the accuracy of marking and saved time consumed by method which was practised by the industry

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