

# BAJA -Chassis Fixture for Manufacturing

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**Abstract**— In an All-Terrain Vehicle(ATV), chassis plays a very prominent role. Using a fixture will help us to build a chassis without any errors in manufacturing. The fixtures that I'm currently working on are 'Tare' designed for the flexible manufacturing of any structural members, like chassis or any two members. These fixtures are designed in such a way that the members are clamped together precisely and always stay in place relative to each other. In machining, fixtures will minimize work piece deformation which causes due to clamping and cutting forces essential to maintain the machining accuracy. The various methodology for clamping operation used in different application by various authors are reviewed in the paper. Fixture is required in various industries according to their application. This can be achieved by selecting the optimal location of fixture elements such as locators and clamps. The fixture set up for component is done manually. For that more cycle time required for loading and unloading of the material. So, there is need to develop system which can help in improving productivity and time. Fixtures reduce operation time, increases productivity and high quality of operation is possible.

**Keywords**— Chassis Fixture, ATV, BAJA.

## I. INTRODUCTION

A fixture is a work-holding or support device used in the manufacturing industry. Fixtures are used to securely locate (position in a specific location or orientation) and support the work, ensuring that all parts produced using the fixture will maintain conformity and interchangeability. Using a fixture, improves the economy of production by allowing smooth operation and quick transition from part to part, reducing the requirement for skilled labor by simplifying how work pieces are mounted, and increasing conformity across a production run.



Fig: 1 Fixture Components

A fixture's primary purpose is to create a secure mounting point for a work piece, allowing for support during operation and increased accuracy, precision, reliability, and interchangeability in the finished parts. It also serves to reduce working time by allowing quick set-up, and by smoothing the transition from part to part. It frequently reduces the complexity of a process, allowing for unskilled workers to perform it and effectively transferring the skill of the tool maker to the unskilled

worker. Fixtures also allow for a higher degree of operator safety by reducing the concentration and effort required to hold a piece steady.

Economically speaking the most valuable function of a fixture is to reduce labor costs. Without a fixture, operating a machine or process may require two or more operators; using a fixture can eliminate one of the operators by securing the work piece.

## II. FIXTURE COMPONENTS

A Fixture set contains of

S No	Description	Qty
1	Seamless Pipe	1
2	Square Blocks	2
3	Cylindrical Blocks	2
4	Locking Screws	2
5	Set Screws	8

As shown in Fig:1

### 2.1 Seamless pipe:

It is used for structural support in Fixture kit because it will take maximum amount of compressive loads when compare to seamed pipes. Variable Lengths of pipes are selected for suitable support. The seamless pipe is shown in Fig:2

S No	Description	Length	Qty
1	Ø22x2mm thick	2 m	2
2	Ø22x2mm thick	1 m	4
3	Ø22x2mm thick	0.5 m	4

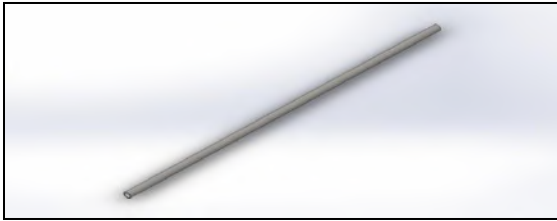


Fig: 2 Seamless pipe

### 2.2 Square block:

Cube of 50mm has been considered for holding the structural member of chassis by having a slot of width 30mm and height 20 will be made on the side face of cube as shown in Fig:-3.

Gripping surface has been made on the inner surface of cube by making rough machining.

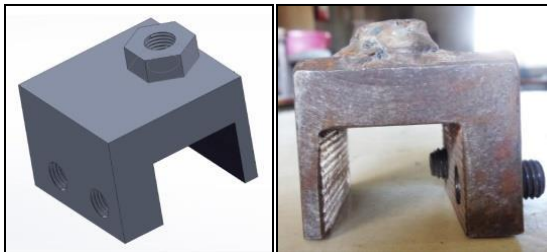


Fig: 3 Square block

Two Taped holes of M10 on the other side of the slot which will help to lock the fabricating members with the hexagonal set screws.

M10 nut is going to be weld on top of the block for locking the cylindrical block

### 2.3 Cylindrical Block:

Cylindrical block  $\text{Ø}40 \times \text{ID } 23 \times 50$  Length will be done by boring operation on a lathe machine which produces a rough surface and this will act as gripping surface between cylinder block and seamless pipe.

Cylindrical block has undergone milling operation to make two adjacent surfaces with 90 deg angle between them. Bottom surface of cylindrical block comes into contact with the cube top surface which helps to gain more stability and more friction due to increase in area of contact.

Flat side surface of the cylindrical block helps to increase weld bead contact area between cylindrical block and hexagonal bar having a 10mm through hole to lock the cylindrical block which is adapted from lathe square toolpost.

Opposite side of the cylinder weld bead two M10 tapped holes are apart which will gives a locking mechanism between seamless pipe and cylindrical block with the help of hexagonal set screws. As shown in Fig:-4

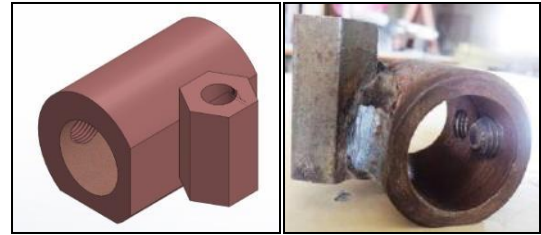


Fig: 4 Cylindrical Block

### 2.4 Locking Screws:

M10x60 Hexagonal Headed screws of  $\text{Ø}10 \times 100$  mm length rod is welded on top of hexagonal bolt head as shown in Fig:5 and it gives easy lock/unlock of the cylindrical block to cubical block without use of tools



Fig: 5 Locking Screws

### 2.5 Set Screws:

M10x15mm and M10x10mm length set screws will help to lock the fabricating members in a slot of square block and also locks the cylindrical block on seam less pipe as shown in Fig:6

Set screws are selected for this function as they have a gripping surface on their bottom which will help to hold the pipe in a study position.



Fig: 6 Set Screws

## III. CONSTRUCTION PROCEDURE

Assemble the cylindrical block and square block by the help of locking screw, then tight the set screws by placing it on the end of the seamless pipe. Now this semi-assembled parts (Fixture) is placed on the structural pipes for the further locking of the members. This is obtained by placing the structural member-1 in the given rectangular slot on the square block. So that we can lock the square block and structural member at desired position and tightened with the help of set screws. Now insert the semi- assembled fixture part by inserting through other end of the seamless pipe. Now position the structural

member-2 as per design and follow the same locking procedure as structural member-1.

Now lock the both locking screws so that the positions and this assembly are shown on fig:7 the members will be secured and rigid this assembly is shown on fig:7.

Now weld the structural members and these fixtures helps to lock the positions of weld members and also helps to protect the members from thermal expansion or contraction by welding.

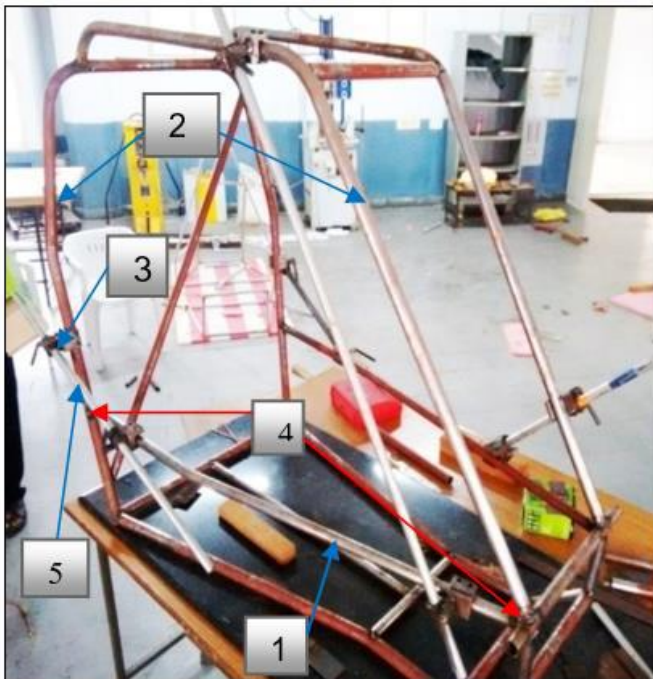


Fig: 7 BAJA chassis members are set for welding with the help of these fixtures

Figure:-7 Details.

- 1-Structural member-1
- 2-Structural member-2
- 3- Semi assembled part (fixture)
- 4- Joint to be weld.
- 5- Seamless pipe.

#### IV. RESULTS

Following are the results observed by using our customized fixture when compared with conventional fixture.

- 360 degrees lock
- Easy to access
- Light in weight
- User friendly
- Less cost



Fig: 8: Complete fixture set with assembly

#### V. CONCLUSION

By using these fixtures, it will provide very good precision and manufacturing easiness with improvement in welded structural member strength. It can be easily adaptable for any Structural engineering assembly which involves tubular frame.

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