



MANUAL DEL DISPOSITIVO  
DE MEDICIÓN  
FIXTURE AND GAGE

Metrology School



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## Introduction

This document shows an user manual for a measuring device, this device will be designed for measuring the dimensions of the 'Tail Light' for the 1994 chevy cars. The device functionality consists on measuring attributes and variable data.

## Objective

The Project objective is to use knowledge about metrology, design and ergonomics to develop a device capable of measuring 'Tail Lights' dimensions, giving the user a work tool that is ergonomic and functional according to his and the industry's necessities.

In the automotive industry it's very important the quality of measurement in the manufactured products and the manufacturing time reduction. Propose of this device it's to provide a fast solution with high quality to improve metrology area problems.

## Project Develop

### 1. Manufacturing Process

Tail Lights manufacturing process consist of next steps:

- a) Injection: both parts (external and support) starts with injection process. The material (polymer) is melted in an injection machine, this one inject the material inside a mold with the form of every part. Specifically with the exterior part, it takes an especial injection process called 'Multi stage injection', that process gives the opportunity to make pieces multicolor.
- b) Cleaning: in exterior part case, this part is subjected to a careful cleaning process. In the support case, it is subjected to a sanding process to remove existing burr.
- c) Enamel: exterior part is subjected to enamel process to make it resistant to scratches.
- d) Pasted: support is mounted in the inferior part of a press, is applied adherent material in the edge while in the top part of the press is mounted the exterior part. Then, the press close slowly and unify both parts in one. Is important say that adherent material is an epoxic glue, then when there are contact between both parts it produces a heating process.



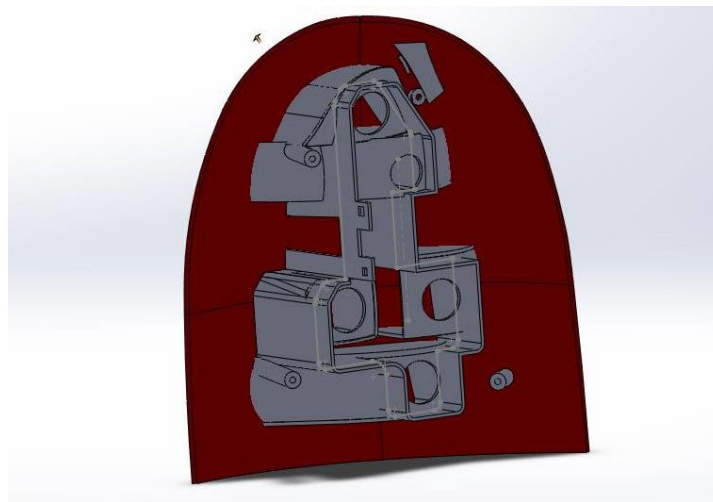
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The material used to manufacture this parts are ABS for support and PMMA for exterior part

## 2. Piece Modeling

Modeling is making by using pictures of the piece, that pictures give references to make basic curve lines. After this, by using surfaces tool it generates curve zone, then it use the back part of the Tail Light to generate lines and give dimensions to curve part, at the same time that we are modeling the support of the Tail Light. In the next picture it shows the finished tail lights model.

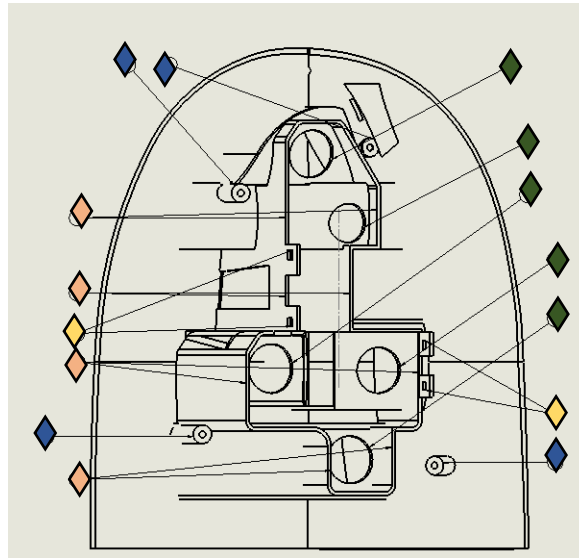


Measuring Characteristics



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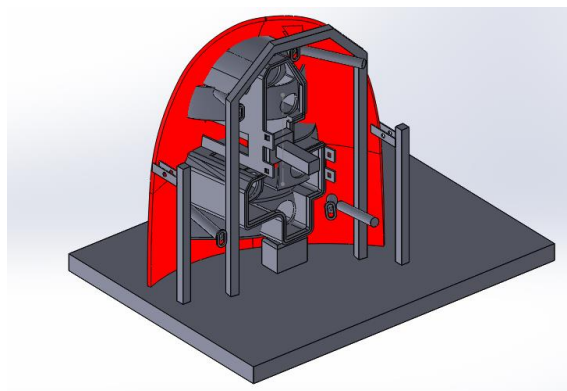
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- ◆ 1. Circles diameter: it is important measure lights perforations, in this point are considered five perforations.
- ◆ 2. Assembly perforations: in this point are considered four perforations where lights plate are assembled.
- ◆ 3. Assembly screws: in this point are considered four screw fittings.
- ◆ 4. Plate dimensions: horizontal and vertical dimensions in place where lights plate is assembly are important.

### 3. Measuring Device Draw

In the next picture is showed the measuring device model with Tail Light assembled:





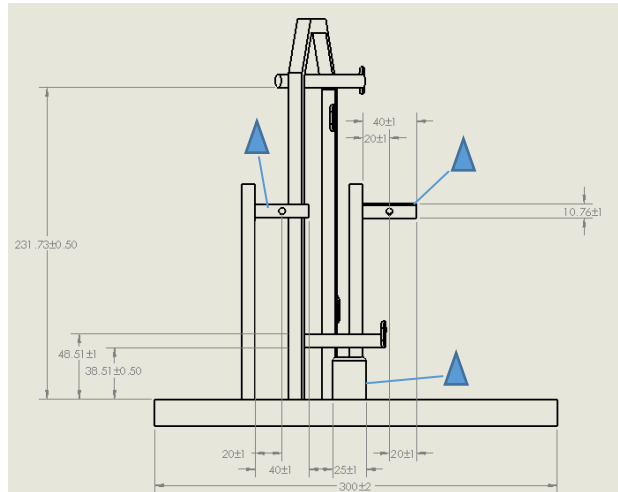
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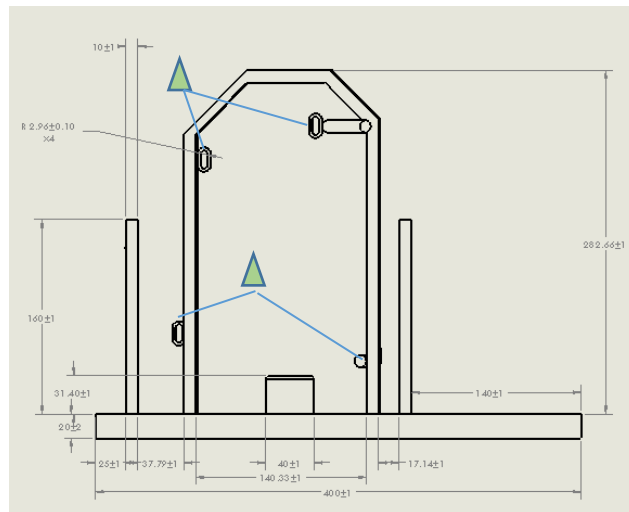
Measuring Device Draw:

Note: All measures were took in millimeters.

a) Base:



1. Blue triangles indicate fixture components, both triangles above indicate the fasteners and the one on the bottom indicate the tail light stop.



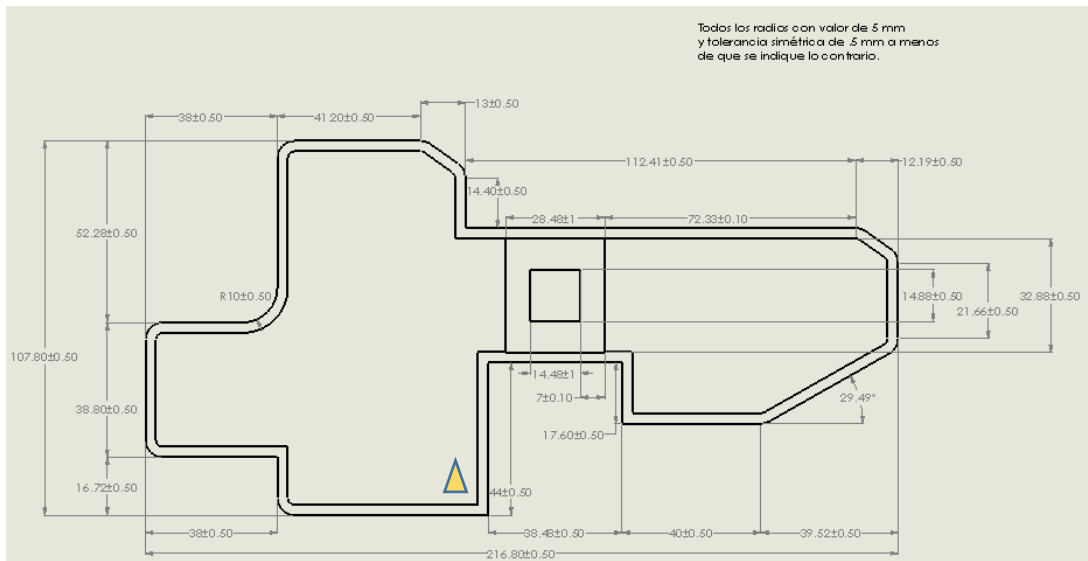
2. Green triangles indicate position measuring for assembly screws.



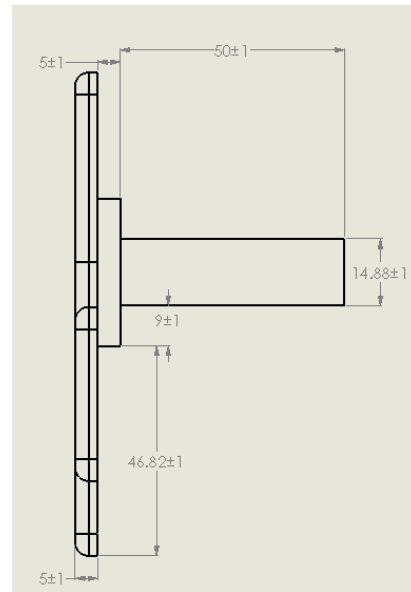
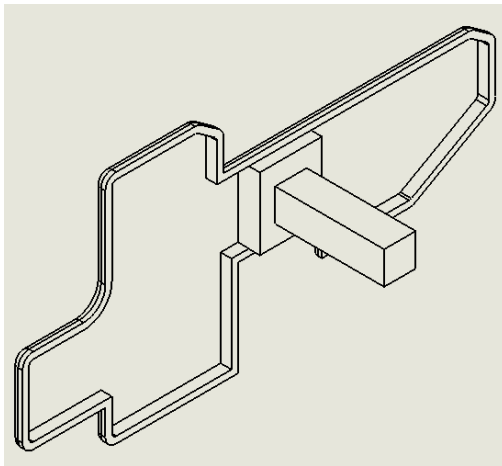
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b) Plate:



3. Picture before (yellow triangle) shows the 'plate', this part measure 'Plate Dimensions', place where plate for light is assembled. Next two pictures shows different views of Plate.



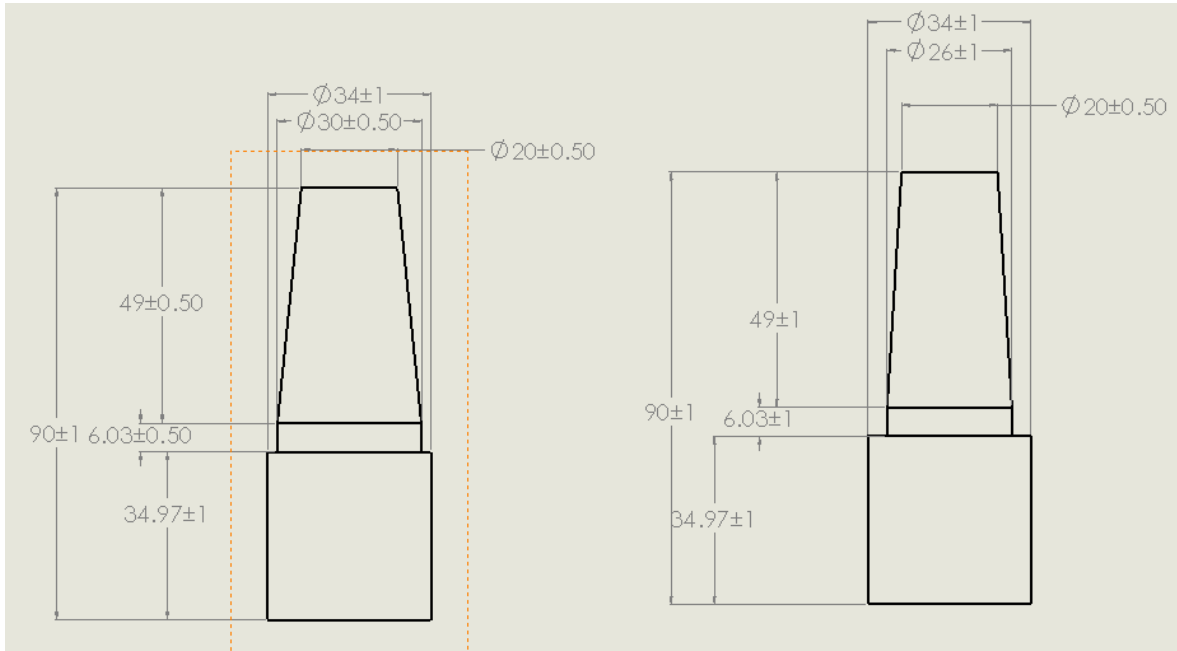


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c) Go/NoGo:

4. Following picture shows 'Go/NoGo' used to measure Circles Diameter, there are one for major circles (left) and other one for minor.



No	Measure Device	Resolution	Characteristic Number
1	Fasteners	-----	-----
2	Go/NoGo A	-----	3
3	Plate	-----	4
4	Go/NoGoS	Millimeters	1
5	Go/NoGoL	Millimeters	1



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4. Cost Analysis

Estimated Analysis Cost

MATERIALES:				
Description	Quantity	Description	Price	TOTAL
Selective Weld 101	4	Pzas	\$ 5.00	\$ 20.00
Protective Rubber	4	Pzas	\$ 2.00	\$ 8.00
Screws/Nuts	2	Pzas	\$ 3.00	\$ 6.00
Gas Can	1	pza	\$ 50.00	\$ 50.00
Steel	2.8	\$ 0.63	\$ 3,800.00	\$ 856.09
COSTOS VARIABLES				
Administrative Expenses:				
Description	Quantity	Description	Price	TOTAL
Electricity	20.89	2 Hrs	6.1	\$ 127.43
Human resource	1	1 Person 2 Days	160	\$ 160.00
<b>Total Estimated Cost</b>				<b>\$ 1,227.51</b>
<b>Estimated Sell Cost</b>				<b>\$ 1,718.52</b>
<b>Estimated Utility</b>				<b>\$ 491.01</b>





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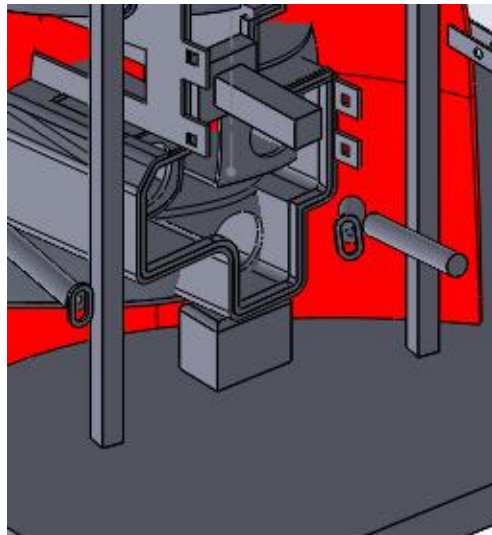
## Real Cost Analysis

Materials:				
Description	Quantity	Description	Price	TOTAL
Selective Weld 101	4	Pzas	\$ 5.00	\$ 20.00
Protective Rubber	4	Pzas	\$ 1.00	\$ 4.00
Screws/Nuts	2	Pzas	\$ 0.50	\$ 1.00
Gas Can	1	pza	\$ 36.00	\$ 36.00
Steel	2.8	\$ 0.44	\$ 3,870.00	\$ 603.72
Variable Cost				
Administrative Expenses:				
Description	CANTIDAD	DESCRIPCIÓN	PRECIO	TOTAL
Electricity	17.6	2 Hrs	4.772	\$ 83.99
Human Resource	1	1 Persona 2 Días	210.48	\$ 210.48
Total Real Cost				\$ 959.19
Real Sell Cost				\$ 1,342.86
Real Utility				\$ 383.67

## 5. Measuring Device Instructions

### Step 1

Put the tail light on the fixture, make sure that bottom part of tail light is correctly assembly to the stop in the fixture.



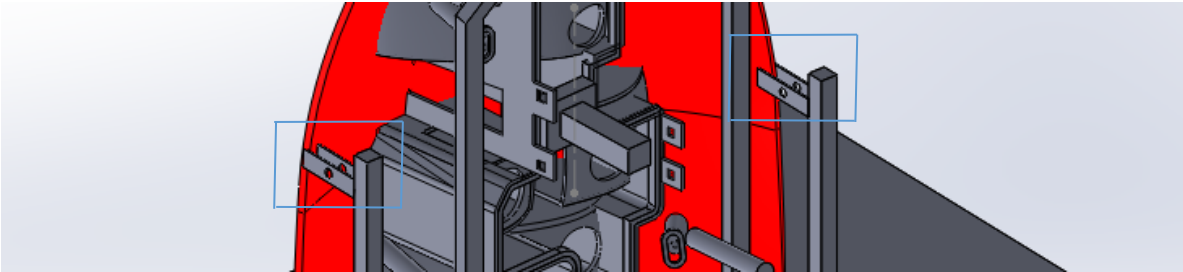


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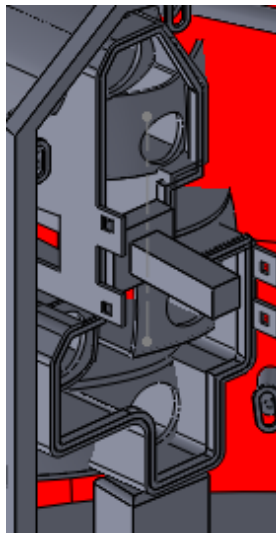
## Step 2

Assemble tail light edges to fasteners and press.



## Step 3

By take Plate piece and assemble it to plate part in the tail light, take in consideration correspondent tolerances.



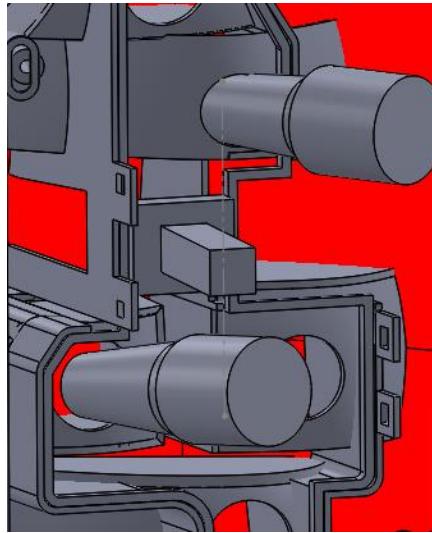
## Step 4

Use graduated go/no go 'S' and 'L' and assemble to light holes in the tail light, take care using go/no go 'S' or 'L' in the correct hole.



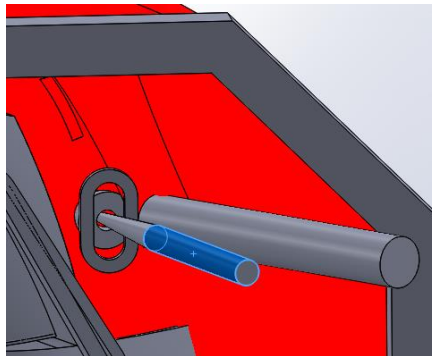
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## Step 5

Take go/no go 'A' and assemble it to assembly screws (one by one) to check correct positions.



## 6. Conclusions

About Project Development

Developing a Checking Fixture is a laborious work that needs multidisciplinary skills, is very important a correct communication between integrant in a team because a good organization depends of an effective communication.



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## About the Project

In a checking fixture design are important every measure detail because the minimum bad measure can be a totally wrong project, every tolerance is important. Operator comfort is a very important aspect to, is not so useful a wonderful device if it doesn't give ergonomic conditions to the operator, in fact it can bring worst consequences.

## About Students Formation:

This kind of projects are good to include students to automotive industry because it make them enter to automotive field, starting to consider important factors in this sector like time, space and human resources.

## 7. Learned Lessons

- Team Working.
- Self Study.
- Communication Skills.
- Manufacturing Skills.
- Time Administration.
- Attitude Skills.
- Perseverance.