

## AL COMPOSITE MATERIAL SHEET PANELS STRUCTURES BENDING DESIGN MODULATION AND ANALYSIS

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### Abstract

The automotive industry is being faced with a variety of planning challenges in a drive to increase mileage and superior with minimal to no work. For the best yield, there are several ways to achieve this in the plan division. Reduce the car's body weight is one of them. Hence, to plan the body construction, we are using composite material. We learned from several writing exercises that although the body weight is reduced when designed using composite materials that have sheet structures, the material eventually loses its quality. Maintaining an acceptable level of unity is also crucial. So, we want to use a comparable aluminum composite material but with different inward center structures for expanding quality and solidness.

Key words: Composite Material, sandwich Panel, Aluminum plate, examination

### INTRODUCTION

In flexible materials, most frequently sheet metal, twisting is an assembly process that produces a V-shape, U-shape, or channel form along a straight hub. Box container brakes, brake presses, and other specialized machine presses are examples of frequently used equipment. Boxes, for instance, electrical walled sections, and rectangular ventilation work are typical things created in this way.

#### Aluminum Composite Panel Bending:

Aluminum composite board might be one most prevalent materials in sign making, yet cutting it isn't in every case straight forward. The material itself is involved two layers of aluminum separated by non-aluminum substance, for example, meager layer of sap. Slicing through every one of the three without harming the closures can demonstrate to be troublesome errand.

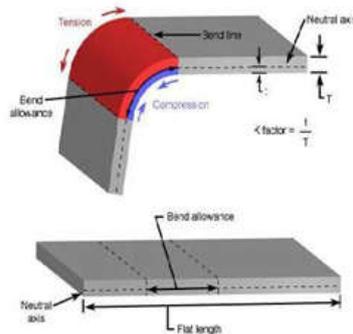


Fig.1. Flat plate bending

### Characteristics

The exceptional aluminum board composite offers expanded erosion opposition and points of interest in preparing

The super polyester finish ensures perfect printing properties, for screen just for advanced printing

## Procedure

### Sheet Metal Forming Basics

With the utilization mechanical assembling process, sheet metal is shaped by working metal into level and dainty pieces. Sheet metal is one helpful ways that is utilized in metal working it very well may be patched cut into different shapes and measurements. A wide scope of items are produced with utilization sheet metal making it fundamental part advanced world. Sheet metal shifts in thickness. Its thickness is evaluated by measure known its check. The metal will be slight if measure number is bigger. You can discover sheet metal as thwart too.

The structure where sheet metal found in market is either in looped strips in level pieces. The curls are made with nonstop running sheet metal into move slitter. Typically, curls utilized range from 7 to 20 checks. Sheet metal is utilized in different items like hardware, building rooftops, vehicle bodies, planes and significantly more.

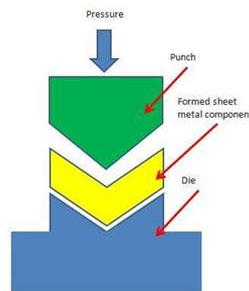


Fig.2. Punching of Sheet Metal

### Bending process

In press brake framing, work piece is situated over kick bucket square bite dust square presses sheet to frame shape. Generally twisting needs to defeat both ductile anxieties and compressive burdens. When bowing is done, leftover anxieties cause material to spring back towards its unique position, so sheet must be over-twisted to accomplish correct twist point. The measure of spring back is subject to material, sort of shaping. At the point when sheet metal is bowed, it extends long. The twist finding is sum sheet metal will extend when bowed as estimated from

outside edges twist. The curve range alludes to within span. The shaped curve span is needy upon kicks bucket utilized, material properties, and the material thickness.

### LITERATURE REVIEW

Dipak G. Vamja<sup>1</sup>, G. G. Tejani, al [2013], Test on Sandwich Panel Composite Material, Automotive industry is very nearly improvement more solaces are being joined in vehicle. On other hand clients have stringent interest of mileage, superior requiring little to no effort. So to have high efficiency auto-thought process makers are initiated to lessen weight. Creator has chosen composite material of Aluminum composite material (Aluminum skin, polyethylene center, sap fastener material). Rigidity, twisting quality has been completed on Universal Testing Machine (UTM) to advance mass composite material. One can utilize sandwich board composite material to upgrade mass cost of different car, marine, aviation and different structures.

Md. Jabihulla Shariff, Dr. R. Satya Meher, al. [2014], Design Modulation of Composite Material Sandwich Panels with Different Inner Polyethylene Core Structures, Now days Automobile business faces wide job inquiry in planning, so to expand efficiency and elite requiring little to no effort. There are bounty approaches to accomplish these in structure area for ideal yield. One among them is decrease the body weight car. So for that we are utilizing composite material to plan body structure. From the different writing examines we came to realize that planning body with composite material having hexagonal center structure, body weight is decreased yet in long run material misfortunes its quality. It is additionally important to keep up adequate measure solidarity. So we are intending to utilize similar Aluminum composite material (Aluminum skin, Polyethylene center, Epoxy gums) yet with various internal center structures for expanding quality and solidness. Elasticity, twisting quality has been completed on Universal Testing Machine (UTM) to upgrade of mass of composite material.

S. B. Akiwate V. D. Shinde, al [2017], Experimental Investigation of Bending conduct of Aluminum Alloy Honeycomb Sandwich Structure utilizing Four Point Bending Tests, The point of the present paper is to think about the twisting conduct of honeycomb sandwich structure made of aluminum combination centers, through the four point bowing tests. Impacts of the variety in honeycomb center stature and honeycomb sandwich board skin are examined. The honeycomb boards show an underlying straight versatile conduct which is trailed by nonlinear flexible plastic conduct. Additionally flexural conduct honeycomb sandwich structure was broke down by limited component examination. The honeycomb sandwich board disappointment modes are accounted for and examined.

**Priyanka Mohaney, Er. Gaurav Soni, al [2018]**, Aluminum Composite Panel as a Facade Material, The reason for investigation is to see each part aluminum composite boards regarding producing, life cycle, manageability, properties, its use in development structures. The examination additionally portrays analyses which are performed to comprehend utilization of aluminum composite boards with other structure material for example marble sheets.

**Priyanka Bhagat<sup>1</sup>, Kachare P.S<sup>2</sup>, al [2018]**, Advancement Of Aluminum Composite Beam And Study of Its Static And Dynamic Behavior, In request to moderate characteristic assets and conserve vitality, weight decrease has been principle focal point car producers in present situation. Weight decrease can be accomplished fundamentally by presentation of better material, plan improvement and better assembling procedures. The Sandwich boards are made of two high quality skins attached to either side light weight center and are utilized in applications where high firmness joined with low auxiliary weight is required. The motivation behind this work is to think about the mechanical reaction few sandwich boards whose center materials are having diverse thickness. Sandwich boards with two unique centers thickness; PU (Poly Urethane) skin material is Aluminum (Al). In wake assembling of sandwich plates UTM (Universal Testing Machine) testing will be directed on this sandwich board like tractable test and flexural test.

**Lorenzo Graziani, et.al [2015]**, motivation behind this work is to survey if generally utilized welded connectors for joining two skins of strengthened cement (RC) sandwich boards, utilized as basic dividers and flat auxiliary components, can be substituted with twisted ones. Along these lines, extent exertion is to lessen definitely the vitality required during assembling. Basic exhibitions were analyzed by testing full-scale sandwich boards under (hub and offbeat) pressure and flexural loads. Also, Finite Element (FE) study was created to explore and to streamline the component welded work quantity of connectors. The significant discoveries demonstrate that it is conceivable to substitute welded connectors with bowed ones without bargaining basic execution

tried RC sandwich boards, in this manner having progressively economical route for delivering these last ones.

## METHODOLOGY

### Aluminum composite Panel

Aluminum is flexible metal, contacts each part of our lives, from air ships to Automobiles, from control links to foils, aluminum can be molded into bunch shapes in an assortment of uses and recently structure business has gotten extravagant flexibility and Performance material.

Aluminum items are all more regularly utilized in development Buildings as composite boards in divider claddings, shade walling, and material. Aluminum is vitality concentrated material.

### Handling Techniques of Aluminum Composite Panel

#### Sawing and Cutting

Aluminum composite board can be sheared effectively by utilizing carbide tip saw. Additionally guillotine shears can be utilized. Be that may, shearing by utilizing guillotine shears may cause slight tilt at rough edge of  $1^\circ - 5^\circ$ , in shearing procedure at purpose of shear.

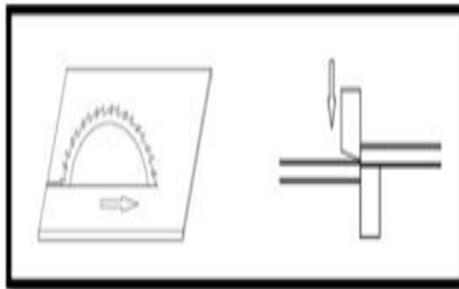


Fig 3: Shearing with saw and guillotine shears

#### Jointing

First the tip ought to be picked by collapsing kind of jointing holes to be opened by utilizing hardware. Polyethylene filling material ought to be left at thickness of 0.3 mm at purpose of jointing opened. 0.5 mm and thicker polyethylene can't be collapsed effectively. Then again 0.1mm and more slender polyethylene causes cracking of aluminum, and no polyethylene at jointing point makes aluminum break at principal sway

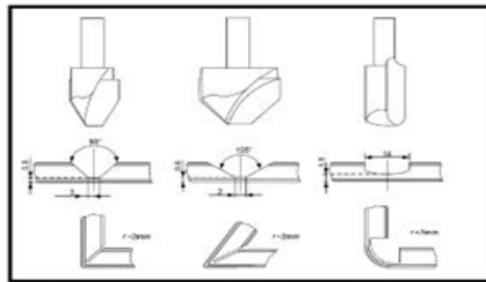


Fig 4: Jointing angles

**Bending Process under Pressure**

Aluminum Composite Panels can be effectively bowed and molded by single move press machine. Bowing point is dictated by form width, move sweep, stroke power and stroke separation. Front opening form must be smooth and in particular range. The two parts bargains must not be sharp cornered yet rather adjusted at particular sweep. Other than delicate support material can set to forestall squashing. The perfect shape width is determined utilizing recipe underneath. Bowing range is 40-55 mm with press and 200-300 mm with three roller machine.

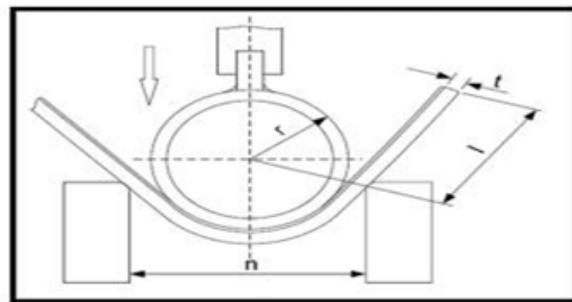
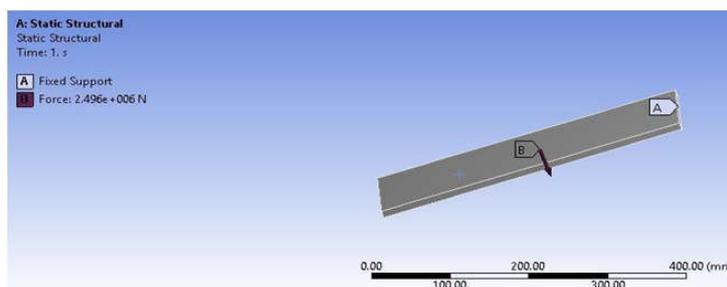
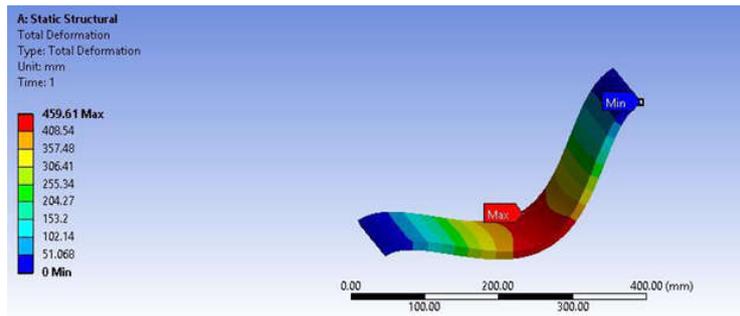


Fig 5: Press twisting under strain

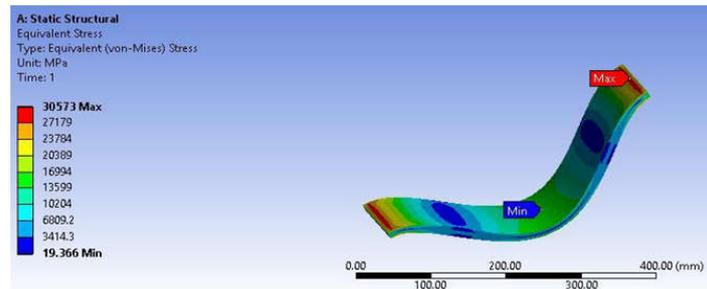
**Design and Analysis Static Structural**



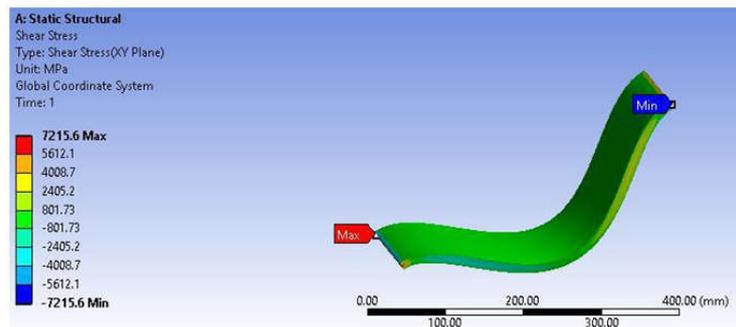
**Total Deformation**



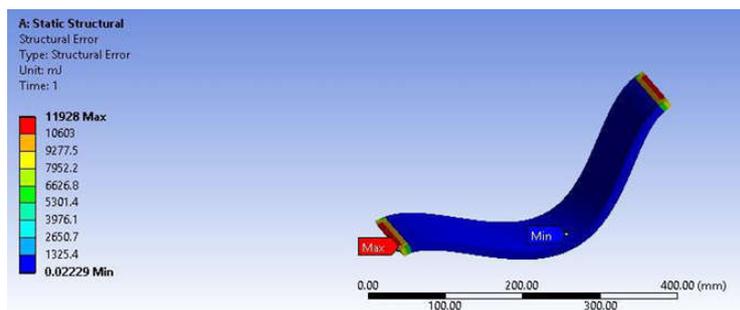
Equivalent Stress



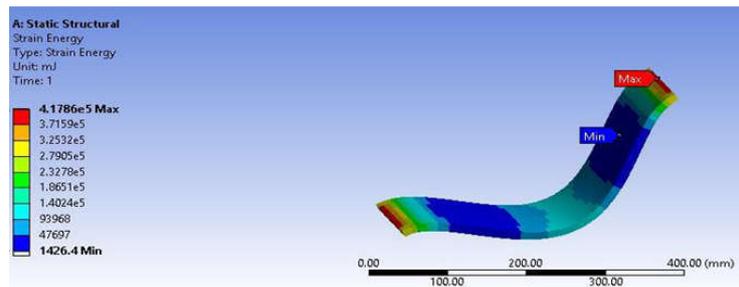
Shear Stress



Structural Error



Strain Energy



## Conclusion

The limited component investigation approaches have been utilized to discover avoidances of boards. The significant finishes of present research work are abridged underneath.

The flexural conduct of light weight honeycomb sandwich board appeared there is direct versatile nature at first pursued by non-straight versatile plastic. The board flopped because de-holding among centers and confronting skin. There are great understandings between limited component investigation results and The sheet board offer favorable circumstances, for example, incredible basic proficiency, structure flexibility, disposal of welding and predominant protecting characteristics which makes them reasonable for applications like satellites, rapid prepares and quick ships.

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