



## STUDY ON INVESTIGATION OF HYLAM BAKELITE SHEET PRODUCTION AND ESTIMATING ITS MECHANICAL CHARACTERISTIC

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**ABSTRACT** Hylam bakelite sheet has gain much industrial application in the different pharmaceutical and textile companies, due to variety of mouldable materials in today's market it has gain competitions to maintain its manufacturing cost with maintaining its properties. As hylam sheet has number of properties which is not possible in natural occurring material like wood, metal, plastic. For lowering cost of manufacturing the experiment is carried out. We have gone through number of changes in which the properties of material by just making minor changes in temperature and pressure we got some best results and change in its properties like mechanical strength, water absorption and electrical resistivity.

**KEYWORDS :** Pressure, Temperature, Catalyst, Cotton Fabric, Phenolic Formaldehyde, And Strength.

### INTRODUCTION

Generally, All the material has its unique property but its properties get changed while changing its temperature but in composite materials like phenolic fabric sheet it has very unique property by manufacturer the sheet we can change its property by just getting change in temperature and pressure highlander bricks it is generally available in 0.1 mm 20. 150 mm thickness and more but its industrial uses is not has a public aware and the usage of other polymer material like plastics and nylon is there in pharmaceuticals and textile industries the material uses very much known but another sector still its needs to be aware it is not able to replace wood and plastic do it has a unique property has come back to wood and plastic but still it need to be promoted in market like wood might get burn at high temperature and due to moisture absorption it might get layer but such circumstances won't affect the sheet, Hylam fabric sheet has properties like plastic but at some point plastic deshape if temperature increases, anytime get melted the material like cast metals are galvanised get affected by master and blessed and get rusted due to its heavy weight it increases the machine weight Helen publish it is unit material while it's good property of plastic foods and matter in it it has flexibility like plastic insulation more equal than wood and good strength has liked casting.

Composition-hylam sheet is a composition of phenolic formaldehyde resins and cotton fabric (250 GSM) with properties of casted metals, wood, and plastic it is very unique composite material has a ability to change its properties with changes in temperature and pressure usually we get changes in its strength and resistivity against electricity, the aggregate can be replaced by plastic sheet or wooden board. It also indicated that if the hylam sheet is given a pretreatment, the better and improved bonding may develop with the surrounding matrix, and that gives precised finishing in the material.

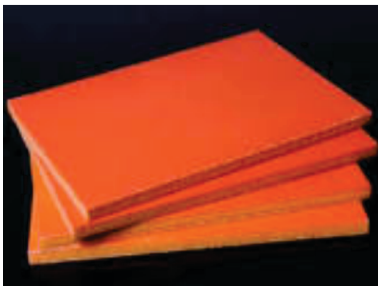


Figure 1: Hylam Bakelite Sheet

Sources: [www.googleimages.com/bakelite sheet](http://www.googleimages.com/bakelite%20sheet)

### INDUSTRIAL COMPOSITION OF HYLAM SHEET: GENERAL DETAILS

Table :01 General Composition of sheet

Composition of material	4 <sup>th</sup>
Formaldehyde	40%
Phenol	30%

HCL (Estimated 10% concentrate)	10-15% total batch
Powder acetic acid (catalyst)	Estimated amount
Methanol	20% approx
External heat	80-90 *C

Source: Industrial Value (Bestouch industries)

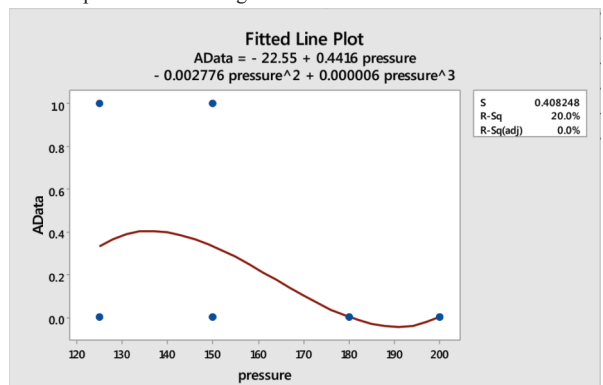
### CASE STUDY

Investigated. The variation in the material properties with the changes in pressure and temperature we get different out come as shown in the below table with its results from particular sheet (10mm-150 pound-160 C and 10mm-125 pound-180 C) is being selected for the test to be performed as per industrial requirement, As all the test carries for understand sheet strength and insulation properties).

Table:01 Different Material Analysis

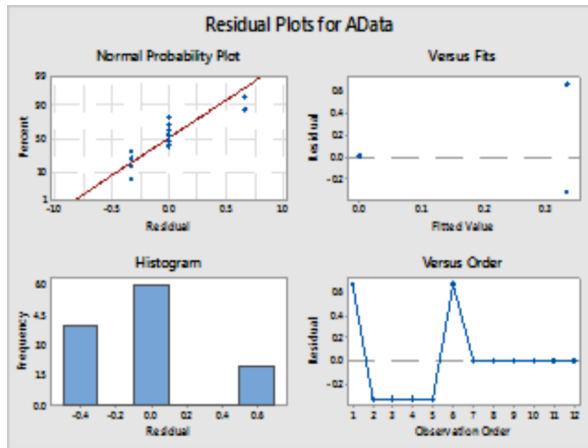
Thickness (mm)	Pressure (pound)	Temperature (degree c)	Results As per
10 mm	150	160	Pass
10 mm	150	170	Burn
10 mm	150	180	Burn
10 mm	125	160	burn
10 mm	125	170	burn
10 mm	125	180	pass
10 mm	180	160	stress
10 mm	180	170	binding error
10 mm	180	180	burned
10 mm	200	160	thickness
10 mm	200	170	brittleness
10 mm	200	180	prefortion

We have taken into consideration of 10mm thickness sheet which is manufactured at 125pound pressure and 160 degree temperature, On which industrial required test of Impact test, Tensile test, Density test, Electric resistivity test and Water absorption test is carried on it, As the result of performed test we get the observation as shown in the table:03



Graph:01 Temperature and Pressure graph

It's represented line plot graph suggest data streamlining the regression equation  $q+$  top shows possible combination of quadratic behaviour and its line. the value of R- square is the range here R-sq will adjust also is ZERO%.

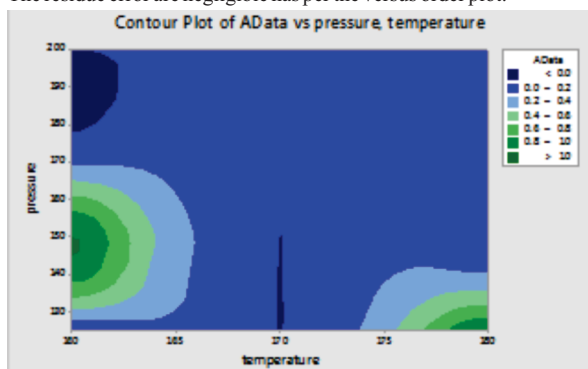


Graph: 02 Graphical waves

Residue plot for the editor space the normal probability plot shows distribution of data the data is eventually distributed for the experimental trial the data distribution is unique.

the normal distribution of frequency greater bell shape curve . Hear the cow may get skewed towards the left data is normally distributed the results are producing change of parameters.

The residue error are negligible has per the versus order plot.

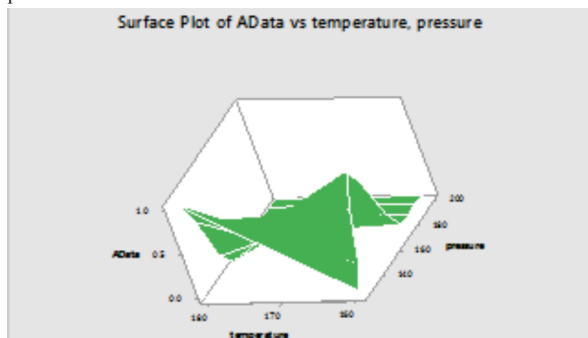


Graph:03 Anaysis view

the contour plot refers to the data investigation for its effect due to change in parameters.

The effective results are found in green zone as per the experimental investigation the blue zone present minimum changes in the characteristics of material for its mechanical consideration .

As per contour plot the mechanical properties are good for effective has the pressure 150 pound and the temperature is 160°C. the results are also considerable at 180 degree temperature and 130 pound pressure.



Graph:04 3D slope of pressure and temperature

figure shows surface lots of the experiment results. it show material characteristics in acceptable region for 140-150 mpa pressure on surface while manufacturing it and temperature 160°C, similarly quality for said thickness is found as 180 °C temperature and 120 mpa, pressure other set of experiment define degradation in quality of products manufactured.

- The quality less are found as follow.
- burn
- moisture observation
- Tearing
- Wearing of layers
- Loose packaging of layers
- under backing / backing of surface, etc.

**CONCLUSIONS**

- Due to increasing in high temperature it molecular structed get changes.
- Strength can be increased or decreased by maintaining temperature and pressure in the hydraulic press.
- Composition changes even cuases apperance and colour difference in material quality.
- Additions of salts in larger proposition like caustic soda reduces its hardness and causes defect.
- Water cantains in chemical can be reduced by heating at very low temperature and slowly.
- High pressure may causes defect formationhigh temeprature even causes defect formarion both to be balance.

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