To Apply Sustainable Manufacturing System in FRP Cooling Tower Body Manufacturing Industry
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Abstract-- Fibre-reinforced polymer composites are engineered materials commonly used for many structural applications because of the high strength-to-weight ratios. The content in this report is completely focusing on recycling and reusing glass fibre waste by applying various methods of recycling glass fibre. The two main methods currently which are being used in the market are mechanical or size reduction and thermal (pyrolysis) recycling. An approach to chemical recycling of amine cured epoxy resin using nitric acid solution has been proposed. In this process resin is decomposed in nitric acid solution, and then the decomposed product is repolymerized with original resin.

Keywords-- Sustainable, recycle, reduce, glass fibre, reinforced plastic, pyrolysis.

I. INTRODUCTION

Composites are defined as a combination of two or more materials (matrix and reinforcement) to create a new engineered material. Fibre Reinforced Plastics (FRP) products are a class of composite building materials consisting of a fibrous reinforcement encased in a polymer matrix. The polymer matrix is applied as a liquid resin and chemically cured to a solid. The reinforcing materials are typically glass fibres, but they can also be materials such as aramid (kevlar) or carbon fibres. The fibre content of these composite materials can range from less than 5% to greater than 60% by weight.

Many manufacturing methods can be used to produce FRP products. These include hand lay-up, spray-up, closed-mould infusion, and compression moulding. A majority of FRP manufacturers in India uses hand lay-up, spray-up, or closed-mould infusion. Compression moulding is more commonly used in high volume manufacturing plants such as automobile factories.

Solid waste is generated by all of these manufacturing methods. The waste is typically in the form of overspray, trimmings, or non-compliant parts. Currently, this solid waste is landfilled.

II. WORKING PROCESS

HAMON SHRIRAM COTTRELL Pvt. Ltd. is a company situated in GIDC Umbergoan. It manufactures cooling towers, PVC fans and fan stacks.

During the visit we studied the whole process of manufacturing of cooling tower. One of the main processes include the body manufacturing of the cooling tower. GFRP as being the most lightweight, highstrength and easy manufacturing is used for making the cooling tower body. They use GFRP to make dies for the cooling tower body and then fabricate the FRP body by moulding the mixture of Resin+ fibre glass+ additives with a hand lay-up technique.

The other different process like welding, pressing is also conducted in the company as for the manufacturing of other components of cooling tower as ladder, impeller etc. Other parts are layed for manufacturing to the small neighbouring industry.

III. LITERATURE REVIEW

Recycling of fibre-reinforced composites and direct structural composite recycling concept

Author: - Eylem Asmatulu, Janet Twomey, Michael Overcash

In this article there is a complete view of each composite recycling technology, highlight the possible energy requirements, explanation of the product outputs of recycling, and discuss the quality (fibre strength) of recyclates and how each recyclate fibre could be used in the market for sustainable composite manufacturing. This article also includes the new concept of direct structural composite recycling and the use of these products in the same or different applications as low cost composite materials after small modification.

By examining the working process and process data of the company different modification which can be conducted in the company needed to be studied, which are mention below.
### IV. DISCUSSION

By studying the different research papers related to the ideas for modification in the industry process different methods which are invented and recently being practiced by the developing industries in GFRP manufacturing and recycling techniques were being looked on.

So, on the basis of the working process and process data of the industry one the key factor of the industry loss which is FRP waste a non degradable material which if not recycled may harm environment was being focused.

So as a topic for making the process sustainable a detailed study for the implementation of reduction and recycling of waste needed to be analyzed.

As per the above discussion the FRP waste is major problem of our concern industry which needs to be eliminated.

### V. OBJECTIVE

- To implement best suitable and economical method of reducing and recycling of GFRP waste by applying sustainable manufacturing process.

### VI. METHODOLOGY

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<tr>
<th>Sr. No.</th>
<th>Research topic</th>
<th>Author</th>
<th>Gap related to our company</th>
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<tbody>
<tr>
<td>03</td>
<td>Chemical recycling of GFRP epoxy resin cured with amine using nitric acid.</td>
<td>WeirongDang, Masatoshi Kudoshi, Hideki Sendokuya, Ken Tsuda[4].</td>
<td>Chemical recycling if GFRP waste material.</td>
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1) Waste Identification
   - Types of waste obtained

2) Classification of waste
   - Resin
   - Resin + Fibre
   - Finished Waste

3) Composition Study

4) Total amount of waste generated

5) Method Analysis

6) Comparative analysis of chemical composition
   - Waste material
   - Recycled material

7) Product development

8) Collection and segregation of waste as per requirement

9) Chemical composition and strength analysis

10) Market analysis
    - Cost
    - Quality

11) Purpose or Application

12) Result and Feedback
Acknowledgement

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REFERENCES


