

ANJUMAN ENGINEERING COLLEGE

(Recognized by AICTE, New Delhi, Affiliated to VTU, Belgaum)

ANJUMANABAD, BHATKAL-581320

KARNATAKA



Project Report On

**“DEVELOPMENT OF PROTOTYPE MACHINE TO
PRODUCE CARBON FIBER PREFORM”**

By

WASEEM AHMED

2AB03ME058

MOHAN KUMAR P

2AB06ME029

MD. MEHROOF M.C

2AB04ME026

SAYED RAMEEZ

2AB04ME047

Under the guidance of

Prof. PADMAYYA NAIK

(Asst. Prof. Dept of Mechanical Engineering)

DR A. O. SURENDRANATHAN

(HOD & Prof. Dept of metallurgy and material science, NITK, Suratkal)

DEPARTMENT OF MECHANICAL ENGINEERING

(2009-2010)

Abstract

Carbon/Carbon (C/C) composites are composed of carbon or graphite fiber reinforcements in carbon or graphite matrices. They maintain high strength and low co-efficient of thermal expansion at temperatures above 2000 °C (3600 °F), and exhibit excellent thermal shock resistance. They also have superior toughness, excellent thermal and electrical conductivity, and resistance to corrosion and abrasion. In spite of this outstanding combination of properties, high cost has limited their applications primarily to aerospace and defense. However, new processing method involving performed yarns has been developed by the Across Company, Japan, which is said to considerably reduce both cost and manufacturing time. Conventional production methods of manufacturing C/C composites include CVD (Chemical Vapor Deposition) and a technology in which a thermosetting resin binder is carbonized. In the CVD method, a preform of carbon fibers having a specified shape is heated in a furnace to a high temperature, while a hydro-carbon gas is fed to the furnace. The gas is thermally cracked to form carbon, which then deposits uniformly on the fiber surfaces. In the other process, yarns or woven/nonwoven fabrics of carbon fibers are shaped into various structural shapes, with the use of a thermosetting binder such as phenol or epoxy resin. The structure is subsequently heated in an inert gas atmosphere to carbonize the resin. These conventional techniques have reportedly encountered problems because the resulting C/C composites lack uniformity in properties such as bending strength and density. The processes are also complicated and time consuming. The patented preformed yarn method involves producing yarn consisting of a bundle of carbon fibers in a matrix precursor of coke and pitch binder powders. The yarn is encased in a flexible thermoplastic sleeve to contain the powders during handling and subsequent processing. This simplified manufacturing process ensures better penetration of the binder into the carbon fiber bundle, there by resulting in higher strength than conventional C/C composites. Furthermore, the matrix powders are often derived from the residue of petroleum processing, which can have beneficial environmental effects. The preformed yarn may be woven into sheet or chopped to fill a mold, and is then hot pressed to form the composite product. Since the reinforcing fibers are homogeneously dispersed in the matrix, properties of the resulting composite are quite uniform. The preformed yarns have excellent workability and processability.

