POLYMERUPDATE® ACADEMY

EDUCATIONEM RESPONSUM EST

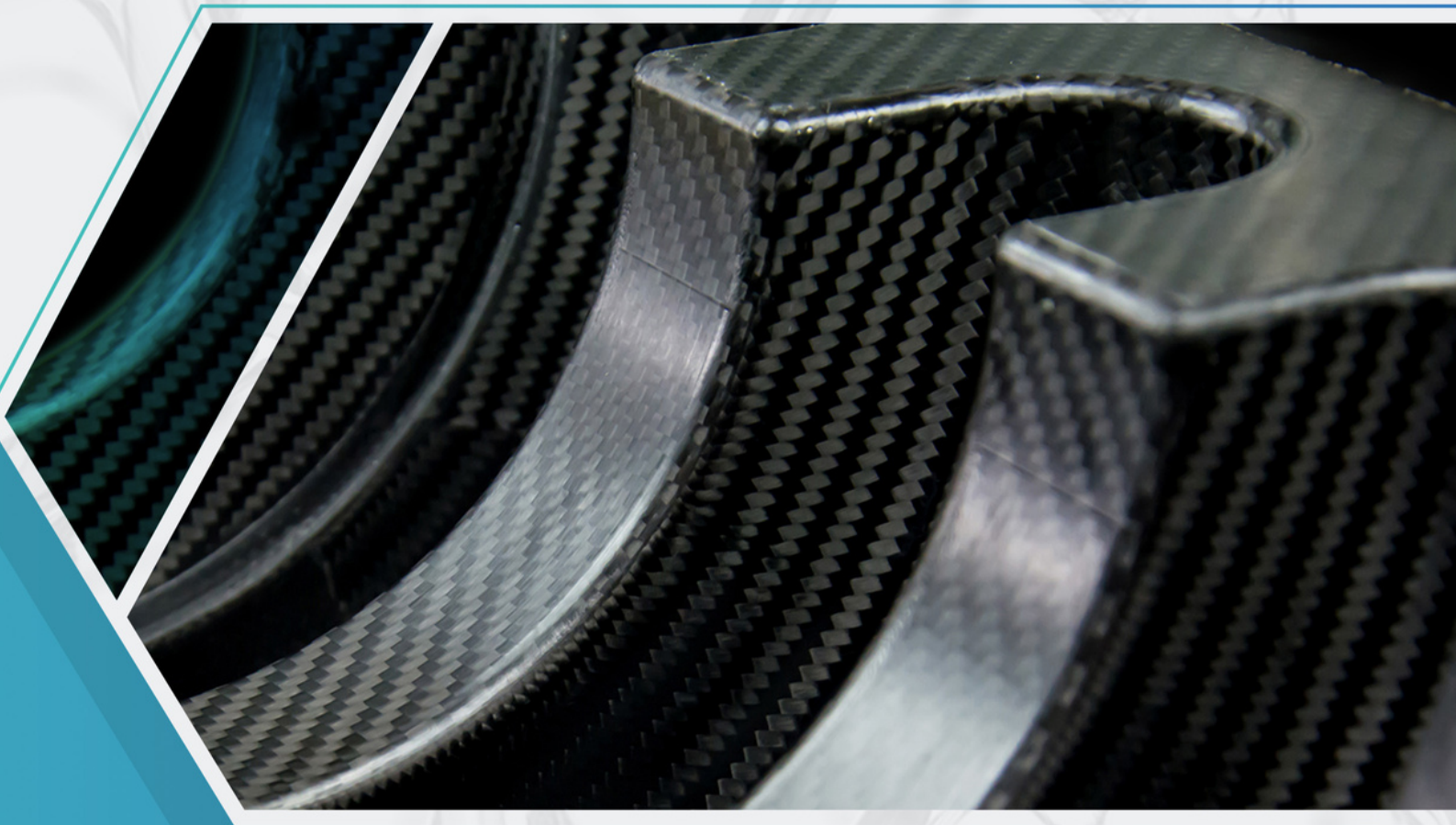
COMPOSITE MATERIALS IN POLYMER SCIENCE

Prepared & Conducted by

Prof Dr. DD Kale

B.Tech., M.Chem.Engg., Ph.D.

Honorary Chancellor - Polymerupdate Academy



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SUMMARY

This short course on composites is an overview of the composite industry. The course material is divided into two parts: (1) Raw material and (2) the processing techniques.

It briefly reviews the different type of fibers such as glass, carbon, aramid, boron, natural fibers and metal powders. Nano composites are also looked into. The role of wetting agent for composites is explained. The thermoplastic plastics like polyethylene, polypropylene, PVC, nylons are described in brief. The thermoset polymers such as epoxy, epoxy vinyl esters, unsaturated polyesters, polyurethanes and phenolic resins are presented briefly.

The processing techniques for composites are discussed in details. Bried description of extrusion, injection molding, compression molding, resin transfer molding, pultrusion, reaction injection molding is presented and sheet molding compounds as well as bulk molding compounds are covered. The manual processes of hand lay-up and chopped fiber spray process are explained. Illustrations of products made from composites and simple animations are used to explain the processes.

SUMMARY

The course is simple. It describes the composites for any person connected with plastic or chemical industry. It has avoided the complex equations in chemistry and mathematics. This is the foundation for a detailed course on composites being planned at a later date.

WHO THIS COURSE IS FOR??

- Undergraduate and PG students of any discipline, Mechanical & Production Engineering, Chemical Engineering, Polymer Science and Engineering
- Personnel associated with manufacturing and selling, use and application fiber reinforced Composite Industries, self employed in FRP field and allied industries
- Job seekers and students looking to widen their knowledge base and increase their employability chances, current employees and professionals in the FRP and Composite industry

WHAT WILL YOU LEARN??

- Details of Resins and their structure property relationship along with respective manufacturing processes
- Discussion on variety of reinforcements
- Explanation on various Fillers and Additives used in manufacturing of Polymeric composites
- Mechanical and electrical properties of composites
- Environmental aspects and recycling of polymeric composites

LECTURE 1: RAW MATERIALS: FIBERS, FILLERS AND ADDITIVES

It briefly reviews the different type of fibers such as glass, carbon, aramid, boron, natural fibers and metal powders. The different forms of fibers and terms associated with fibers such as monofilament, tow, denier, chopped strands or mats etc. are explained. Nano composites are also looked into. The role of wetting agent for composites is explained.

LECTURE 2: RAW MATERIALS: POLYMERS

The thermoplastic plastics like polyethylene, polypropylene, PVC, nylons are described in brief. The properties and structure of the polymers is described. In some cases, the manufacturing aspects of relevance are presented. The areas of application are illustrated

The thermoset polymers such as epoxy, epoxy vinyl esters, unsaturated polyesters, polyurethanes and phenolic resins are presented briefly. The properties based upon the monomers and their variation is discussed briefly. Typical products made from thermoset resins and the applications are covered with examples.

LECTURE 3: PROCESSING TECHNIQUES

The processing techniques for composites are discussed in details. Short description of extrusion, injection molding, compression molding, resin transfer molding, pultrusion, reaction injection molding is presented. The sheet molding compounds as well as bulk molding compounds are covered. The manual processes of hand lay-up and chopped fiber spray process are explained. Illustrations of products made from composites and simple animations are used to explain the processes.

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PROF DR. DD KALE

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Honorary Chancellor
Polymer update Academy

Born on November 16, 1945, Prof. (Dr.) D. D. Kale is a Chemical Engineer and has obtained his Ph. D. from University of Salford, UK.

With a teaching experience of over 40 years, Prof. (Dr.) D. D. Kale retired from University of Mumbai's Department of Chemical Technology, UDCT, Mumbai in 2005 as a Professor of Polymer Technology and as a Head of the Department of Polymer Engineering.

At present, he is a technical advisor to Giriraj Group, Mumbai and in the past has also been a consultant to several plastics industries.

He is a member of high power expert committee to Government of Maharashtra on various environmental issues and is on the expert panel for centers of excellence by DCPC. (Dr.) D. D. Kale is also a member of committee to define single use plastics set up by Ministry of Chemicals and fertilizers, New Delhi.

He has been a Visiting Professor in South Korea.

After superannuation in 2005, he has worked with Reliance Industries Ltd. for a tenure of three years.

His research interests include polymer processing, rheology, product design and recycling. He has guided 28 Ph. D. and 65 Masters Students. He has published more than 100 papers in peer reviewed journals and has one patent to his credit. He has presented papers in several International conferences such as IUPAC and has travelled widely.

He is associated with many professional bodies such as PLASTINDIA, All India Plastics Manufacturers Association, (AIPMA), IPI and SPE etc.

Prof. (Dr.) D. D. Kale has trained more than 5000 undergraduate and post graduate students in India and overseas. He has also trained more than 1000 industry personnel and has successfully authored two books. He was Honorary Editor of the journal, “Chemical Engineering Journal" published by I.I.Ch.E., India

WORK EXPERIENCE:

Jan 2018 till date - Technical Director, Euressia Polymers, Mumbai.
Feb 1, 2010 to - May 2012 - Director, Shroff S R Institute of Chemical Technology, Vataria, Taluka Valia, Bharuch, Gujarat, India
Aug 1, 2011 to Dec. 2012 - Visiting Professor, IIT Gandhinagar
Jan 1, 2006 to Dec 31, 2008 - Advisor, Reliance Industries Ltd.
Jan. 31, 1991 - Nov 30, 2005 - Professor of Polymer Technology, Head, Plastics and Paints Technology Division UICT, University of Mumbai.

AWARDS AND HONORS:

Elected as a Fellow of Maharastra Academy of Science (1998)
Received the Teaching Services Award (Best Teacher) of Mumbai University, 2003-2004
Received the Prof. K. S. Armugam National Award for Innovative Research in the Field of Engineering and Technology by the Indian Society for Technical Education (ISTE) New Delhi (2004)
Received 'Life Time Achievement Award' from Color Society, (2015)

OTHER INFORMATION:

- Editor 'Chemical Engineering Journal' published by I.I.Ch.E. (1992 – 94)
- Designed course work for
  Plastics for non-plastic personnel,
  Flexible packaging
  Coloration of plastics
  Chemical Engineering for plant personnel
- Headed the Knowledge Management group of I.P.I.
- Member of Board of Studies for Polymer Engg. Course of many Universities.

Has organized more than 10 Refresher Courses for Industry on behalf of Professional Bodies like IPI, SPE, Indian Institute of Chemical Engineers, Indian Small Scale Paint Association.

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THANK YOU

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