

## Lightweight materials for automotive applications: Fundamentals, recent developments and challenges in manufacturing (09 – 13 January 2023)

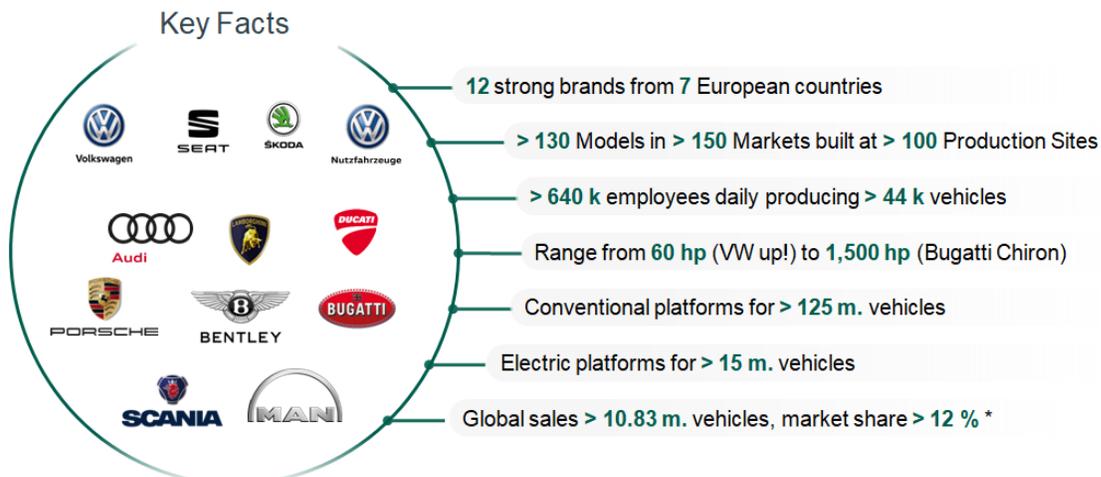
### Overview

A 10% reduction in vehicle weight can result in a 3 – 10 % improvement in vehicle performance and hence lightweight materials are becoming essential to improve the energy efficiency of modern automobiles (including battery-operated vehicles) while maintaining safety and performance. Therefore, the use of lightweight materials becomes one of the major future directions for the automotive industry globally. New innovations in sheet metal have been a pioneer in reducing the weight of body-in-white (BIW) and at the same time in fulfilling all crash requirements. Keeping in view the significant need for this domain, the main objective of this course is to understand innovations in lightweight materials for automobile applications in terms of materials characteristics and its manufacturing issues.

Joining and fabrication techniques for new, lighter, and stronger materials also play a crucial role in augmenting the present manufacturing for new generation vehicles. Furthermore, a multi-material lightweight design strategy in which both advanced high strength steel and low-density alloys are used is becoming a novel approach towards environmentally sustainable transport. The Need of metallurgical considerations and various challenges for joining of lightweight structures will also be discussed which may provide a new direction of the research.

### About Volkswagen

For value addition as well as to strengthen the course content, the foreign expert is from Volkswagen, Germany, a leading automobile manufacturing industry. Volkswagen was the world's largest automaker by sales, overtaking Toyota and keeping this title in 2017, 2018, and 2019. It ranked seventh in the 2018 Fortune Global 500 list of the world's largest companies. Some of the highlighted features about the Volkswagen Group are presented in graphical view to get its immediate attention:



Overall, efforts will be made to deliver the most recent industry-oriented knowledge with the participants in terms of the need for lightweight materials, ongoing developments and associated challenges with the manufacturing of automotive components. Additionally, an attempt will also be made to invite renowned experts from leading Indian automakers and allied industries to interact and enrich the knowledge of participants by discussing the present scenario and opportunities in manufacturing automobile structures using lightweight materials.

## Objectives:

The primary objectives of the course are:

1. Exposing participants to the fundamentals and requirements of lightweight structures for new generation automobiles.
2. Building in confidence and capability amongst the participants towards the application of lightweight materials, innovative forming, and joining technologies which will be the need for future manufacturing industries and researchers.
3. Providing exposure to design for manufacturing by presenting problems in the manufacturing of lightweight structures and their solutions through simulation tools.
4. Enhancing the capability of the participants to understand challenges in forming and joining of lightweight materials as well as dissimilar materials.
5. Providing exposure to practical problems and their solutions through case studies and tutorials/hands-on practice.

<b>Course information</b>	<b>Duration: 09 – 13 January 2023</b> <b>Total contact hours:</b> Minimum 20 (Including lectures and hands-on) <b>The number of participants for the course will be limited to 50.</b>
<b>Modules</b>	<ul style="list-style-type: none"><li>▪ Introduction to the new Era of E-Mobility and lightweight automobiles</li><li>▪ New trends in sheet metal forming/joining and innovations in materials and tooling to form lightweight structure.</li><li>▪ Innovations in non-ferrous materials to form a lightweight structures</li><li>▪ Optimum material mix for light and economical BIW</li><li>▪ Importance of design for manufacturing and fundamentals of joining technologies to fabricate a lightweight structure.</li><li>▪ Process planning to stamp high complex outer body part, clamping design, case studies for feasibility analysis and to narrate the use of simulation tools, etc.</li><li>▪ New innovations in welding and joining technologies to join lightweight structure, significance of testing of structures.</li><li>▪ Issues need to be considered during manufacture of BIW including the effectiveness of energy management.</li></ul>
<b>You should attend if...</b>	<ul style="list-style-type: none"><li>▪ You are designer, manager, executive, engineer, technician, researcher, scientist, etc. from manufacturing industries, government organizations including R&amp;D laboratories.</li><li>▪ You are faculty from reputed technical institutions.</li><li>▪ You are PG student, research scholar, etc.</li></ul>
<b>Course fee</b>	<ul style="list-style-type: none"><li>▪ <b>Industry/Govt./Research organizations:</b> Rs. 3,500/-</li><li>▪ <b>Faculty/staff from academic institutions:</b> Rs. 3,500/-</li><li>▪ <b>Research scholar/Student:</b> Rs. 2,500/-</li></ul> <p><b>Additional 18% GST as per Govt. of India norms is applicable on the course fee.</b> The course fee covers the course materials, access to all the sessions, tutorials, laboratory usage, and refreshments/working lunch between the course sessions. The interested participants can be provided single/shared accommodation in the Institute guest house/student hostel on self-payment basis, subjected to availability.</p>

## The Faculty



**Dr. Kartik** is having reach experience of more than 28 years in various world-renowned organizations out of which 14 years with Volkswagen AG in Germany. The Volkswagen group is a strong global player successfully transforming itself from IC Engine to E-Mobility era. Before he started with battery development 05 years back, he was involved with the development of body-in-white vehicles. He has handled many projects for VW Group in the area of stamping and welding of advanced grades of sheet metal parts. He was responsible for the beginning phase starting with a feasibility analysis of body-in-white till the last stage of production. In his role as product readiness manager, he had to work closely with the development team, tool makers from all over the world, design and purchase department to see that the right quality products are delivered in right time.

He completed his Ph.D. from the University of Stuttgart in Germany. During his Ph.D., he was involved deeply in improving manufacturing processes like a sheet and bulk metal forming and validating it with finite element method (FEM) based simulation. After his Ph.D., he worked with Autoform, which develops simulation software for the stamping process. Later he involved himself in areas like the design for manufacturing and tooling design. He did additional specialization in battery technology and lightweight structures. From the last 07 years he is giving regular lectures in the area of continuum mechanics, E-Mobility and battery production in various international forums including IIT Bombay.

In his present work, he is responsible for developing a new production process. He has developed 12 patents, which involve the production of batteries more effectively and economically. He is pleased to share his knowledge and expertise in the area of lightweight, innovations in manufacturing process (stamping and welding) and development of automobile body-in-white (with special emphasis to E-Car) to researchers, faculties, and industries.



**Dr. Vivek Kalyankar** is presently serving as Assistant Professor in the Department of Mechanical Engineering at S. V. National Institute of Technology (SVNIT), Surat, Gujarat, India, which is an Institution of National Importance of Govt. of India. He is having around 20 years of professional experience which involves the blend of academics, research, and industry experience. His research interest mainly includes the **weldability of advanced grades of materials**. He was instrumental in developing an advanced welding laboratory in the department which consists of state of the art research facilities highlighted with the availability of plasma transferred arc welding set up, Servo-electro mechanical creep testing machine set up, etc. At present he is **handling a project “Development of multi-material welding approach for ultrahigh-strength steel and 7xxx aluminium alloys to promote lightweighting and green mobility in the automobile sector”, which is very relevant to this course**. He developed good networks with surrounding **industries** of the field and involved in attempting various **industry-based projects** through research on their ongoing materials. He is a co-author of more than 35 International articles and acting as a reviewer to various reputed International Journals. He is a **recipient of the ‘Young Engineer Award in Mechanical Engineering Discipline’ in 2014-2015** given by Institution of Engineers (India).

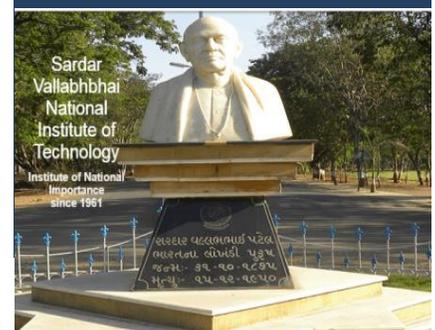


**Dr. Mukund H. Bade** started his teaching carrier in 2000 after completion of Master in Power Engineering. He worked in various Institute of University of Mumbai, including Sardar Patel College of Engineering, Mumbai for nearly 4 years. Since 2007, he is working as Assistant Professor in the Department of Mechanical Engineering, Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat. He completed his Ph.D. from Indian Institute of Technology Bombay, Mumbai, India in 2014. In addition to teaching, he is also involving himself in research activity and support institute in administrative works. His research interest is energy management of various systems, thermal and fluid engineering, and micro-hydro power plants. He also handles projects related to energy management along with the research group and has a good number of research publications in reputed international journals and conferences. In short, he loves to research and enjoys touching the heart of young minds and inspiring through teaching. He also makes himself busy in spiritual activity and having life membership of Scientists and Engineers Wing of Rajyoga Foundation.

## Course coordinators

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# Registration process

## Step 1: One Time Web (Portal) Registration

The candidates are advised to visit GIAN Website using the link: <https://gian.iitkgp.ac.in/GREGN/index> and create Login User ID and Password. Fill up the blank registration form and do web registration by paying Rs. 500 online through Net Banking/Debit/Credit Card. This provides the candidate with life-time registration of the GIAN portal to enroll in any number of the GIAN courses offered. **Those candidates, who have already enrolled at the GIAN portal, need not register again.**

## Step 2: Course Registration (Through GIAN Portal)

Log in to the GIAN portal with the user ID and Password created. Click on “Course Registration” option given at the top of the registration form. **Select the Course titled ‘Lightweight materials for automotive applications: Fundamentals, recent developments and challenges in manufacturing’** from the list and click on ‘Save’ option. Confirm your registration by Clicking on ‘Confirm Course’

## Step 3: Course fee payment

After registration on GIAN portal, the course fee is to be paid online in the account of SVNIT Surat, the details of which are given below:

### Course Fee

- Industry/Govt./Research organizations: Rs. 3,500 (+ 18% GST)
- Faculty/staff from academic institutions: Rs. 3,500 (+ 18% GST)
- Research scholars/Students: Rs. 2,500 (+ 18% GST)

### Account Details

Bank: State Bank of India  
Name: Director, SVNIT-CCE  
Account Number: 37030749143  
IFSC Code: SBIN0003320  
MCIR Code: 395002012

### Scan code:

MERCHANT NAME: DIRECTOR SVNIT CCE  
UPI ID: DIRECTORSVNITCCE@SBI

**SCAN & PAY**



The participants should pay registration fee through online mode (NEFT/IMPS/SCAN & PAY) and fill in the transaction ID/details in the Google Form using the link given in Step-4.

## Step-4:

After online payment of course fee, fill the google form Registration link given below: <https://forms.gle/9dzsuDk65qWWEse37>  
You will receive the final confirmation of participants from the course coordinator after few days of completion of all steps.