

# Sustainable Infrastructure Design using High Strength Metallic Alloys

## Overview

Construction sector plays a very significant role in sustainability because of its economic, social and environmental contributions as it accounts for almost 40% of global energy consumption. With the ever-growing need for infrastructure, reduction of carbon footprint for the construction sector is considered as one of the major concerns for sustainability. High performance construction materials such as high strength steel and stainless steel offer numerous beneficial effects that could be effectively used in the construction industry; high strength-to-weight ratio, recyclability, reduced construction time and less maintenance requirements are some of the major advantages offered by high strength alloys. High strength steel and stainless steel alloys are now produced worldwide, and the manufacturers are making every effort to promote their use in construction. Whilst their advantages are obvious, the current design codes are not capable of exploiting their offered benefits using the traditional design concepts. Lighter construction also brings along new challenges to ensure overall structural stability, which will require an appropriate understanding of their structural responses when subjected to various types of loading.

This course will offer an insight into the current design principles, including AISC, EC3 and AS/NZS design Codes that deal with thin-walled metallic structural sections. Performance of hot-rolled and cold-formed steel sections will be compared based on various design codes to provide a clear understanding on the effects of cold-forming process on material characteristics. This discussion will gradually lead into the design challenges offered by high strength steel and stainless steel alloys, which are now, in many cases, regarded as a more sustainable and environmentally friendly alternative to ordinary carbon steel. However, high strength steel and stainless steel have a long way to go to be fully adopted in the current design codes. New design techniques such as the Continuous Strength Method could be used for appropriate utilisation of enhanced strength and strain hardening offered by these alloys.

The teaching technique will be interactive, partially flipped and research informed making sure that the participants are well aware of the recent trends and advancements in the field. Lectures will be supplemented by tutorials where a large number of examples and case studies will be covered to make clear sense of the design principles. Overall, the course is designed to make the participants familiar with the existing design rules, and to identify their limitations in tackling the challenges offered by high strength thin-walled metallic alloys in construction.

<b>Course Dates</b>	<b>12<sup>th</sup> December, 2016 to 17<sup>th</sup> December, 2016.</b> <b>Max. Number of participants is limited to 45</b>
<b>Host Institute</b>	<b>Department of Civil Engineering, Government college of Engineering, Salem – 636011, Tamilnadu</b>
<b>No. of Credits</b>	<b>1 (One)</b>
<b>-You Should Attend If...</b>	<ul style="list-style-type: none"> <li>▪ you are a structural engineer, who is keen to know the recent advancements in metallic structures</li> <li>▪ you are a faculty member or a student with keen interest in metallic structures</li> </ul>
<b>Course Fees</b>	<p>The participation fees for taking the course is as follows:</p> <p><b>Participants from abroad :US \$300</b>  <b>Industry/ Research Organizations :Rs. 5,000/-</b>  <b>Academic Institutions/Faculty :Rs. 4,000/-</b>  <b>Students :Rs. 1,000/-</b></p> <p>The above fee include all instructional materials, laboratory equipment usage charges.            Mode of payment : Demand draft in favour of <b>"THE PRINCIPAL GIAN CIVIL GCE SALEM"</b> payable at Omalur, Salem, Tamilnadu.            Transport and accommodation of course participants will be borne by the individual course participants themselves. On the request the participants, he/she will be provided with single bedded accommodation on payment basis in the hostel.</p>

# The Faculty



**Dr. Mahmud Ashrafis** is an academic in the Steel Structures section in the School of Engineering and Information Technology (SEIT) at the University of New South Wales (UNSW Canberra), Australia. He has over 10 years of teaching experience in different parts of the world including Imperial College London (UK), University of Queensland (Australia) and University of New South Wales (Australia). His research interests are primarily related to investigating the behaviour of thin-walled metallic structures in a variety of loading conditions including extreme cases such as fire, impact/blast and seismic loading. He has published over 80 technical papers in the areas of stainless steel, steel and aluminium structures, which exhibit a combination of analytical, experimental and numerical investigations. He received a number of awards and fellowships including Confucius Research Fellowship (China), William Mong Research Fellowship (Hong Kong), Commonwealth Fellowship at Imperial College London (UK). He was invited as a speaker in many parts of the world including the UK, Canada, Portugal, South Africa, China, Hong Kong and Malaysia. Dr Ashraf also served as a consultant for Imperial College Consultants (UK) and Uni Quest (Australia).



**Dr. D Shoba Rajkumar** is an Associate Professor in the Department of Civil Engineering at Government College of Engineering, Salem, Tamilnadu, India. She has an academic experience of more than 25 years. She has supervised 25 Masters thesis and over more than 40 undergraduate projects. She has published more than 25 papers in national and international journals/conferences. She is a Ph.D research guide at Anna University, Chennai. Her research interests include Ferro-cement structures, Special concretes and Steel Concrete Composite Structures. She has successfully organized many faculty development programs and workshops. Currently, she is the Controller of Examinations at Government College of Engineering, Salem. She is the member of many professional bodies such as Ferro cement Society, Indian Concrete Institute and Indian society for technical education. She is the reviewer for Journal of Institution of Engineers India-Civil Engineering and Journal GRADEVNIER (Journal of Croatian Association of Civil Engineers).



**Dr. M Anbarasu** is an Assistant Professor in the Department of Civil Engineering at Government College of Engineering, Salem, Tamilnadu, India. He has an academic experience of more than 13 years and 4 years of field experience. He has supervised 16 Masters thesis and guided more than 25 undergraduate projects. Presently he is supervising 2 research scholars. His research interest include experimental evaluation of steel structure, behaviour, Post-buckling behaviour of thin walled sections, Cold-formed steel structures, Structural stability of steel structures and Non-linear analysis of thin walled members. He has published 17 research papers in peer reviewed journals and 12 papers in national and international conferences. He is the reviewer of referred journals Engineering Structures (Elsevier), Steel and composite structuresjournal (Techno press) and Institution of Engineers India-Civil Engineering (Springer).

## Course

## Co-ordinators

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<http://www.gian.iitkgp.ac.in/GREGN>



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**12<sup>th</sup> Dec, 2016 to 17<sup>th</sup> Dec, 2016**

**Department of Civil Engineering, Government College of Engineering, Salem – 636 011**

**REGISTRATION FORM**

Name (Block Letters) : .....

Age and Date of Birth : .....

Gender : Male Female Transgender

Educational qualification : .....

Designation : .....

Experience : .....

Institution : .....

Address : .....

.....

Mobile : .....

E-mail : .....

GIAN Application ID : .....

(Application Id Generated during One time registration at GIAN portal of IIT Kharagpur)

Course Fee	:	<input type="checkbox"/>	Participants from abroad	:	US \$300
	:	<input type="checkbox"/>	Industry/ Research Organizations	:	Rs. 5,000/-
	:	<input type="checkbox"/>	Academic Institutions - Faculty	:	Rs. 4,000/-
	:	<input type="checkbox"/>	Students	:	Rs. 1,000/-

**Payment should be made through:**

Demand Draft, in favour of "THE PRINCIPAL GIAN CIVIL GCE SALEM" payable at Omalur, Salem, Tamilnadu.

DD no: ....., Date: .....

Amount: ....., Bank : .....

Date: .....

Signature of Candidate

**APPROVAL FROM INSTITUTION**

Date: .....

Seal and Signature of the Principal/  
Head of the Department/Division

**Send through post to the course coordinator:** Dr.D. Shoba Rajkumar, Associate Professor of Civil Engineering, Government College of Engineering, Salem – 636 011, Tamilnadu, India.

Please visit [www.gian.iitkgp.ac.in](http://www.gian.iitkgp.ac.in) and [www.gcesalem.edu.in](http://www.gcesalem.edu.in) for more details .