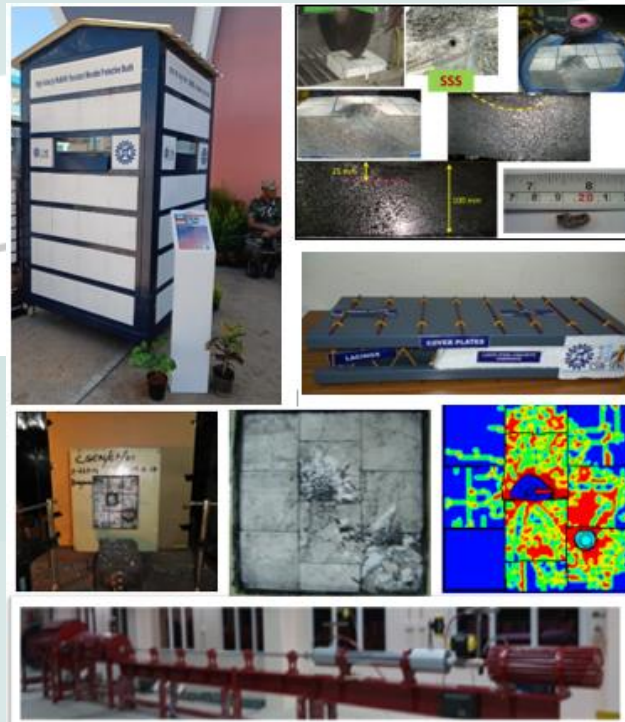


A Short Term Advanced Course on Fortified Futures: Next-Gen Hardened Protective Structures September 21-25, 2026



Organized by
CSIR-Structural Engineering Research Centre
(An ISO 9001:2015 Certified Organization)
CSIR Campus, Taramani, Chennai-600113, India



About the Organization

CSIR-Structural Engineering Research Centre, Chennai, is one of the national laboratories under the Council of Scientific & Industrial Research (CSIR), India. CSIR-SERC has built-up excellent facilities and expertise for the analysis, design and testing of structures and structural components. Services of CSIR-SERC are being extensively used by the Central and State governments and public and private sector undertakings. Scientists of CSIR-SERC serve on many national and international committees and, this Centre has recognition nationally and internationally as a leading research institution in the field of structural engineering.

Background

Protective structures face unprecedented challenges in today's world, where extreme loadings such as impact, blast, explosions, and vehicle crashes continue to evolve with advances in technology and research. These events, though rare, often prove catastrophic—causing severe injuries, fatalities, economic losses, and social disruption. Designing resilient structures capable of withstanding multiple or coupled extreme events is therefore one of the most demanding tasks for practicing structural engineers.

Traditional simplified approaches, including single-degree-of-freedom models and closed-form solutions, have long been used to predict structural responses under such conditions. However, modern advancements in computational and experimental mechanics now enable more reliable analysis and design. Techniques such as Smoothed Particle Hydrodynamics (SPH) and Peridynamics (PD) allow engineers to simulate complex responses under blast and impact loadings, while laboratory and field testing validate these models and provide deeper insights into real structural behavior.

The use of innovative materials and bio-inspired designs has further opened pathways to lightweight, shock-resistant, and structurally optimized protective systems. Coupled with advanced experimental facilities and instrumentation, these developments are reshaping our understanding of how materials and structures perform under extreme shock environments.

In this context, CSIR-SERC is organizing a five-day advanced offline course on "Fortified Futures: Next-Gen Hardened Protective Structures." The program will equip participants with cutting-edge knowledge of computational and experimental techniques, innovative materials, and resilient design strategies to address the pressing challenges of modern protective engineering.

Objectives

The advanced course "Fortified Futures: Next-Gen Hardened Protective Structures" is designed to address the complex challenges in analyzing and designing protective systems against extreme loadings such as impact, blast, explosions, and crashes. It aims to provide students, consultants, practicing engineers, and professionals from both public and private sectors with a comprehensive overview of current trends and recent advancements in protective structural engineering. Participants will gain exposure to cutting-edge computational and experimental techniques, innovative material applications, and resilient design strategies, with emphasis on both numerical modelling and experimental validation. Through expert lectures, case studies, and demonstrations, the program will equip attendees with the knowledge and practical tools needed to critically evaluate protective structures and develop robust solutions that safeguard lives, assets, and infrastructure against modern extreme events.

Course Contents

- Introduction to protective structures
- Analysis of Protective structures under various loading conditions (Blast / Impact / Crash)

- Design philosophy & current practices for determination of impact, shock and blast loads
- Behavior of concrete/composite structures under high strain rate loadings
- Shock wave propagation in materials under impact/blast loading
- Numerical simulation of explosion and impact loading
- Innovative and bio-inspired materials for advanced protective structures with enhanced shock resistance
- Strengthening and mitigation measures for infrastructure protection
- Case-studies on protective structures
- Demonstration on instrumented impact machine and high velocity impact tests with gas gun facility at CSIR-SERC.

Faculty

Faculty for the course would comprise mainly scientists from CSIR-SERC and experts from reputed research/academic institutions /industry.

Prerequisites

The course registrants can ensure adequate knowledge on the background to course contents to fully exploit the benefits of attending the advanced course.

Venue & Duration

Training and Development Complex, CSIR-SERC, Chennai.
Timing: 10.00 a.m. to 5.00 p.m.

Registration and Fee

Registration fee is Rs. 5000/- per participant inclusive of GST for Indian delegates and US\$750/- for foreign delegates. Course material in pdf format and certificate of participation will be provided to all the registered participants. The above registration fee includes a kit, lunch and refreshments for five days. The course registration can be completed via online form in the URL below:
<https://serc.res.in/course>

Travel, Boarding and Lodging Arrangements

The participants or their sponsoring organizations must bear travel, boarding and lodging expenses. Limited accommodation in the Guest House/Trainee's Hostel at CSIR- SERC Campus may be arranged on a first-come-first-served basis at extra cost. Participants wishing to avail of this facility are advised to write to the course coordinator well in advance.

Course coordinators

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