



Who can attend?

- Students pursuing B.Tech./M.Tech./MS/M.Sc./Ph.D. degrees in any discipline or members of Faculty of any department from academic and technical institutions.
- Researchers in Sciences and Engineering disciplines working in advanced manufacturing processes.
- Executives working with manufacturing, service or any other organization, including research laboratories.

How to Register?

- Register online at: <https://gian.iitkgp.ac.in/GREGN/index>

- The registration fee can be paid through a Demand Draft drawn in favour of “PDPM IIITDM JABALPUR” payable at JABALPUR OR through NEFT/RTGS:

Account Name : PDPM IIITDM JABALPUR
Account No.: 50210022387
Bank MICR Code: 482019014
Bank IFS Code: IDIB000M694
Bank Name: Indian Bank
Branch Name: Mehgawan, IIITDM Campus Branch, Jabalpur. 482005

- Please email transaction details and registration copy (from GIAN) to:
Email: hybridforming.gian@iiitdmj.ac.in

Course Overview

Strength and ductility are the two most important mechanical properties of metals for structural applications in a wide variety of industries. The problem of obtaining sheets of these metals with higher strength characteristics limits the possibilities of their application in the creation of innovative technology for the automotive and other industries. Recent global research shows that graded materials containing both ultrafine-grained and coarse-grained domains have the best combination of strength and ductility. Studies also show that pure metals and alloys designed with a gradient distribution of their internal microstructure (grain size, twin plate thickness, lamella structure thickness, dislocation density, texture, phase composition) have the best combination of strength and ductility due to the action of the mechanism hetero-deformation hardening.

The scientific novelty and significance of the proposed approach lie in the possibility of obtaining a gradient structure in the sheets of various metals and in the development of new technologies for asymmetric rolling to obtain thin sheets (0.5 ... 2.0 mm) with a gradient distribution. The distribution of gradient structure over the thickness of the internal microstructure (size grains, lamellar structure thickness, dislocation density, texture) would help increase their strength while maintaining plasticity.

The course would provide a description of the results of the study of the effect of the strengthening mechanism of the gradient structure on the mechanical properties of metals. These lectures are directed towards developing new and efficient theory and technology for the formation of a thermally stable gradient structure of metals during asymmetric rolling and subsequent incremental sheet forming.

This course of lectures will be delivered by Prof. Alexander Pesin, a Professor of Nosov Magnitogorsk State Technical University (Russian Federation) who has developed and taught this course for his university. In the area of metal forming, a number of research dissertations are written and successfully defended under his supervision. His lecturing and consulting would be complemented by the laboratory practice and hands-on exercises and tasks that will be carried out by the staff and students of the host university.

About IIITDM Jabalpur

PDPM IIITDM Jabalpur was established by the Ministry of Education (Formerly MHRD), the Government of India in 2005 with a focus on education and research in IT enabled Design and Manufacturing. Since its inception, IIITDM Jabalpur has been playing a vital role in producing quality human resources to contribute to India's mission of inclusive and sustainable growth. The Institute offers undergraduate, postgraduate and Ph.D. programs in Computer Science and Engineering, Electronics and Communication Engineering, Mechanical Engineering, Smart Manufacturing, and Design, along with Ph.D. in Mathematics, Physics and English. Under the IIIT act, the Institute has been declared an Institute of National Importance.

Registration Fee

Industry/Research Organizations:	INR 2500
Academic Institutions (Faculty):	INR 1000
Research Scholars/Students:	INR 500
Students from SAARC Countries:	INR 1000
Participants from abroad:	USD 100

The registration fee includes instructional materials, tutorials and assignments. For accommodation in institute hostels, candidate has to pay charges as per institute norms available in the Institute's website (www.iiitdmj.ac.in).

The Course Instructor



Prof. Alexander Pesin

D.Sc.

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Nosov Magnitogorsk State Technical University,
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Prof. Alexander Pesin is a full Professor at Nosov Magnitogorsk State Technical University, Magnitogorsk, Russia. At present, he is also the Director of Magnitogorsk Scientific, Data and Engineering Center LLC and the Director of Chermet InformSystems LLC, enterprises established under the auspices of Nosov Magnitogorsk State Technical University. He is an expert of Moscow Institute of Logistics and Supply Chain Management as well as Russian Science Foundation. His primary research interests include Development of Theory and Technology of Cold and Hot Rolling, Combined and Hybrid Processes, Asymmetric Rolling, Logistics and Theory of Constraints, the Application of Scientific Knowledge for Practical Purposes, especially in industry. Prof. Pesin has published more than 350 scientific works, including 12 monographs and study guides, received 110 copyright certificates and patents of invention. He has been the editor of various journals, and was awarded a gold medal and Rospatent Diploma of the 1st Degree for the best invention at VI Moscow International Exhibition of Innovations and Investments.

Important Dates

Last Date of online Registration: October 20, 2023

Course Dates: November 20 - 25, 2023

Course Coordinators



Prof. Puneet Tandon

Mechanical Engineering & Design

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Prof. Puneet Tandon is a joint Professor of Mechanical Engineering and Design at PDPM Indian Institute of Information Technology, Design and Manufacturing, Jabalpur, MP, India. His primary research interests include Advanced Manufacturing Technologies, including Hybrid, Dieless, Additive, and Smart Manufacturing and CAX technologies, including CAD/CAM/CAE, BioCAD, and Human Factors in CAD. He has been awarded the 2020 DUO-India Fellowship Award with Padova University, Italy. He has also been awarded First Prize in IMTEX Forming 2016 on Dieless Manufacturing, and Second Prize in IMTEX 2018. He has more than 325 publications, besides being the author of 2 books and more than 23 patents to his credit. He has been editor/guest editor of a few journals.



Dr. Harpreet Singh

Mechanical Engineering

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Dr. Harpreet Singh is presently an Assistant Professor of Mechanical Engineering at NIT Jalandhar, India. He received his Ph.D. degree from the Indian Institute of Technology, Roorkee in the field of nano finishing of functional surfaces. He has over 12 years of research and teaching experience at UG and PG levels. He has published more than 70 research papers in International peer-reviewed journals of repute, National and International conferences in India and abroad. He is currently dealing with two sponsored research projects as PI supported by the Department of Science and Technology (DST), India and IIITDM Jabalpur. His research interests are broadly related to advancement of precision machining processes, nano finishing science and technology, green manufacturing methods, microwave processing of metals and composites (MMCs and CMCs), polymer processing and PMCs, powder mixed EDM, and CMMRAF. He has been a resource person and delivered invited lectures in several National and International Conferences, STTPs and QIP programs.



Ministry of Education (MoE) scheme on
Global Initiative of Academic Networks (GIAN)

Development of Theory and Technologies for Hybrid Metal Forming Processes

To be conducted in **OFFLINE** mode
at IIITDM Jabalpur

Mechanical Engineering Discipline

PDPM Indian Institute of Information Technology,
Design and Manufacturing, Jabalpur (MP), India. 482005

November 20 - 25, 2023

Course Content

Total lecture Hours - 12

Total Tutorial Hours - 06

- Lecture 01: Introduction
- Lecture 02: Metal sheets with high strength and ductility
- Lecture 03: Manufacturing issues
- Lecture 04: Methods of strength enhancement
- Tutorial 01: Asymmetric rolling - 1
- Tutorial 02: Asymmetric rolling - 2
- Lecture 05: Severe plastic deformation - 1
- Lecture 06: Severe plastic deformation - 2
- Tutorial 03: Asymmetric rolling - 3
- Tutorial 04: Asymmetric rolling - 4
- Lecture 07: Industrial applications
- Lecture 08: Problems in industrial applications
- Tutorial 05: Bending during asymmetric rolling - 1
- Tutorial 06: Bending during asymmetric rolling - 2
- Lecture 09: Difference between asymmetric and conventional rolling - 1
- Lecture 10: Difference between asymmetric and conventional rolling - 2
- Lecture 11: Algorithms
- Lecture 12: Shear-compression testing
- Tutorial 07: Parametric effect - 1
- Tutorial 08: Parametric effect - 2
- Lecture 13: Shear-compression specimen
- Lecture 14: Shear-compression testing - Simulation
- Lecture 15: Incremental Sheet Forming - 1
- Lecture 16: Incremental Sheet Forming - 2
- Tutorial 09: ISF - 1
- Tutorial 10: ISF - 2
- Lecture 17: Combined AR and ISF - 1
- Lecture 18: Combined AR and ISF - 2
- Tutorial 11: Computer Modeling
- Tutorial 12: Process Mechanics
- Lecture 19: Combined AR and ISF - 3
- Lecture 20: Combined AR and ISF - 4
- Lecture 21: Issues
- Lecture 22: Novel Techniques - 1
- Lecture 23: Novel Techniques - 2
- Lecture 24: Computer Simulation

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