



ChemE Chronicles

VOL.II No.11

August 2026

DEPARTMENTAL NEWSLETTER

FROM HOD's DESK

PROF. ADITYA KUMAR



It is a great pleasure to present the August 2026 edition of *ChemE Chronicles*, the official newsletter of the Department of Chemical Engineering at IIT (ISM) Dhanbad. Through every edition, the newsletter strives to strengthen communication and promote greater interaction among students, alumni, faculty members, and all members of the department. I sincerely appreciate and thank all the contributors for their valuable contributions, commitment, and efforts in making this edition possible.

This edition highlights a wide variety of academic, research, and student-oriented activities carried out by the department. The Alumni ChEnect section brings an insightful interaction with one of our undergraduate alumni, providing valuable perspectives on the diverse career pathways available to students with a strong background in chemical engineering. Such experiences serve as an important source of guidance and motivation for students as they progress through their academic journey and prepare for their future careers.

The ChemE Trivia section delves into Water Expansion and the different techniques used in its production, emphasizing the vital role played by chemical engineers in healthcare infrastructure and other essential sectors. The Feature Article of this edition focuses on process control and predictive control strategies, highlighting their significance in enhancing the performance of complex industrial systems while maintaining safety, reliability, and efficiency. The article illustrates how the fundamental concepts of chemical engineering continue to progress alongside developments in computational technologies and modern control approaches.

This edition also highlights recently granted and filed patents, showcasing the department's growing focus on innovation, industry-driven research, and intellectual property development. Additionally, we extend a warm welcome to the newly admitted undergraduate students and wish them a fulfilling and successful academic journey in the department.

I encourage all readers to go through this issue and share their valuable feedback, opinions, and suggestions. Let us continue working together to promote excellence in education, research, and innovation within the field of chemical engineering.

What's Inside

- Alumni ChEnect.
- ChemE Trivia
- Feature Article
- UG Batch 2026 Orientation Programme

Chemical Engineering News

L&T Technology launches AgenticIQ to scale Agentic AI across engineering and manufacturing

L&T Technology Services (LTTS) has launched AgenticIQ, an end-to-end Agentic AI platform designed to help engineering and manufacturing organizations move autonomous AI from pilots into production. The platform is built to orchestrate autonomous, multi-agent workflows across engineering, product development, manufacturing.

[Read More...](#)



Record fertilizer sales lift GSFC Q1 FY27 profit by 15%

Gujarat State Fertilizers & Chemicals Ltd. (GSFC) delivered a strong start to FY 2026-27, posting its highest-ever Q1 sales of Rs. 3,581 Cr. as fertilizer demand and a sharp rebound in industrial products drove growth. The fertilizer business was the biggest growth engine. Sales jumped 82% year-on-year to Rs. 2,947 Cr., from Rs. 1,619 Cr. a year earlier. Volumes rose 17% to 5.26 LMT, compared with 4.51 LMT in Q1 FY26. [Read More...](#)



GUJARAT STATE FERTILIZERS & CHEMICALS LIMITED

*Please send your suggestions to: che@iitism.ac.in

Alumni ChEnect

Suryansh Tripathi

M.TECH [2024-2026]



1 Welcome to the “Alumni ChEnect” interview series! Please tell us in detail about your current job.

I am currently working as a Post Graduate Engineering Trainee (PGET) in the Process Engineering department at L&T Energy Hydrocarbon – Onshore. I joined the organisation in July and have been here for about two months. At present, I am undergoing a structured training programme, which is giving me an opportunity to understand not only the practical aspects of Process Engineering but also how large-scale engineering projects are executed in an industry environment. A major part of my work at this stage involves studying and interpreting P&IDs (Piping and Instrumentation Diagrams) of various projects undertaken by the company. This has helped me develop a better understanding of how a process is translated into engineering drawings and how different equipment, piping, instruments, control loops and safety provisions come together to represent an operating plant. Since L&T Energy Hydrocarbon operates in the **EPC (Engineering, Procurement and Construction)** domain, understanding the broader EPC business is also an important part of our training. We are getting an overview of how a project progresses from its initial **concept and engineering stages through procurement and construction, ultimately taking the design on paper to an actual operating plant.** As part of the training, we are being introduced to different engineering disciplines, including **Process, Piping, Mechanical (Static and Rotating), Instrumentation, Civil and Structural, Metallurgy, and Electrical.** One of the valuable aspects of this experience has been understanding how these disciplines interface with one another and how the Process Engineering department provides the process basis for much of the subsequent engineering.

2. Please tell us about your academic journey, starting from school days.

I completed my schooling at Sheiling House School, Kanpur, the ICSE Board. School was an important part of my development beyond academics as well. I actively participated in quizzing and sports, particularly cricket, and was part of my school's inter-school cricket team. I also participated in sports meets and had the opportunity to win events such as the 100-metre sprint, 400-metre race and long jump. Academically, I was a fairly consistent student. After school, I joined Harcourt Butler Technical University (HBTU), Kanpur, for my B.Tech in Plastic Technology, where I got my first exposure to engineering education. My undergraduate experience developed my interest in engineering and encouraged me to pursue higher studies. I subsequently joined IIT (ISM) Dhanbad for my M.Tech, which marked the next important step in my academic and professional journey.

3 Why did you choose chemical engineering? Was it out of passion, or driven by circumstances? Please walk us through your thoughts as a Class 12

After Class 12, I knew that I enjoyed Mathematics and Physics, so engineering felt like a natural direction for me. I joined HBTU Kanpur in Plastic Technology, which was a good opportunity to study engineering while also staying in my hometown. During my B.Tech, I was exposed to several subjects that are closely related to Chemical Engineering, such as Thermodynamics, Fluid Mechanics and Heat Transfer. I found myself enjoying these subjects, particularly because of their mathematical and problem-solving aspects. This made me curious to learn more about the broader field of Chemical Engineering. So, honestly, choosing Chemical Engineering was not something I had planned from the beginning. My interest developed gradually during my undergraduate years as I explored different areas of engineering. That curiosity eventually encouraged me to pursue my M.Tech at IIT (ISM) Dhanbad. Looking back, it was really a combination of interest, exposure and simply being open to exploring something new.

4. How has IIT (ISM) Dhanbad helped you in this journey?

IIT (ISM) Dhanbad has played a very important role in my journey, both academically and personally in a holistic way.

During the first year of my M.Tech, the coursework gave me a strong foundation in Chemical Engineering. Subjects such as Thermodynamics, Computational Techniques, Fluidization Engineering, Mass Transfer and Advanced Process Control, among others, helped strengthen my understanding of the field. The interaction with knowledgeable professors also gave me greater exposure to the subject and helped me develop a better sense of professionalism. The second year, which was dedicated to research, was a completely different learning experience. Under the guidance of my research supervisor, I got an opportunity to understand how research is actually carried out—from studying existing literature and identifying a problem to developing models, generating results and understanding how scientific work is communicated through research publications. My work in modelling and simulation gave me a glimpse into the process of going from simply learning established concepts to trying to generate new knowledge. IIT (ISM) also provided me with many opportunities. One such memorable experience was getting the opportunity to attend a summer school programme at St. Petersburg Mining University, Russia. It gave me the chance to experience a different academic environment, interact with people from different backgrounds and broaden my perspective beyond the classroom. The campus environment itself has also been a major part of my growth. Being surrounded by ambitious and hardworking people motivated me to push myself and become more disciplined in my own work. Looking back, I feel immensely grateful to IIT (ISM) for the many opportunities, experiences and people that have been a part of my journey.

5. What is your typical work-day like?

My typical workday currently revolves around understanding and interpreting P&IDs and gradually developing a deeper understanding of the processes behind them. Significant part of the day is spent studying the diagrams, following the process flow, and understanding the various instruments and control philosophies associated with different plant equipment, such as a high-pressure separator. I also regularly interact with my IS and colleagues, where we discuss what we have understood and share our inputs with each other. I am particularly grateful that the seniors here are very approachable and willing to share their experience and insights, which has made the learning process much easier and more meaningful.

6. What are the pros and cons of the profession in your honest opinion?

Since I am still at the beginning of my career, I am discovering the profession every day. What I particularly enjoy about Process Engineering is the opportunity to apply academic concepts to real engineering projects and see how a process designed on paper eventually contributes to an actual plant. I also like the interdisciplinary nature of EPC work, where Process Engineering interacts with several other disciplines. As for the cons, I feel it is too early for me to comment on them definitively. I am still learning and getting familiar with the EPC environment. For now, the challenges of understanding technical details, maintaining accuracy and developing practical expertise feel more like opportunities to learn and grow.

7. How has your career evolved since you graduated, and what advice would you give to current chemical engineering students aspiring to follow a similar path?

My professional journey has only just begun, and joining L&T after my M.Tech has been an important first step in understanding how Chemical Engineering is applied in the EPC industry. My advice to students would be to build strong fundamentals, stay curious and remain open to learning. Make the most of the opportunity to interact with experienced people around you—whether they are professors, research guides, seniors or industry professionals—as their experience can teach you things that go beyond textbooks. Along with technical knowledge, work on your communication and problem-solving skills. Most importantly, be consistent, keep learning and give yourself time to discover where your interests take you.

Feature Article

When does a smooth flow become unstable?

Imagine water flowing smoothly through a pipe. Every fluid particle appears to follow an orderly path, and the flow seems completely predictable. But what happens if we introduce a tiny disturbance - a small vibration, a slight pressure fluctuation, or an imperfection in the flow? The disturbance may disappear almost immediately. If so, the flow is stable. But under certain conditions, the disturbance can grow instead. A tiny fluctuation may develop into waves, vortices, and eventually turbulence. The study of this fascinating process is called hydrodynamic stability. To understand it, we begin with a known flow, called the base flow, and imagine a small disturbance superimposed on it. The actual flow can therefore be thought of as the base flow plus a small disturbance. The central question is remarkably simple: Does the disturbance decay or grow with time? This question leads us to one of the most important ideas in fluid mechanics: the competition between viscous forces and inertial forces. Viscosity tends to smooth out disturbances, while inertia can transport and amplify them. Their relative importance is characterized by the Reynolds number, which depends on the fluid's velocity, characteristic length, and viscosity.

At sufficiently low Reynolds numbers, disturbances are generally damped. As the Reynolds number increases, certain disturbances may begin to grow. This can mark the beginning of the transition from smooth, laminar flow to turbulent flow. Interestingly, instability is not always undesirable. Engineers can deliberately exploit instabilities to enhance mixing, heat transfer, and mass transfer. Thus, hydrodynamic stability is much more than a mathematical exercise. It asks a fundamental question: How can an apparently orderly flow suddenly lose its order? Obtaining an answer to the aforementioned question provides one of the first steps toward understanding the remarkable phenomenon of turbulence, which has a large number of applications spanning across different domains of chemical engineering.



Prof. Sourav Sengupta

ChemE Trivia

Damköhler Number (Da)

The Damköhler Number (Da) is a dimensionless number used in chemical engineering to compare the rate of a chemical reaction with the rate of mass transport or flow in a system. It helps determine whether a process is mainly controlled by chemical reaction or by the movement of reactants. A high Damköhler number indicates that the reaction occurs rapidly compared with transport, while a low value suggests that transport is faster than the reaction. This concept is widely used in reactor design, combustion, catalysis, mass transfer, and reaction engineering to understand and predict the behavior of reacting systems.

The Damköhler Number (Da) has an important role in understanding the interplay between reaction kinetics and transport phenomena in chemical engineering systems. It can be defined differently depending on the process, but in a simple flow reactor it is often expressed as the ratio of the characteristic flow or residence time to the characteristic reaction time. When $Da \ll 1$, the reaction is relatively slow and significant reactant may leave the reactor before reacting. When $Da \gg 1$, the reaction is very fast and reactants can be consumed rapidly within the reactor. A $Da \approx 1$ represents a crossover regime where reaction and transport have comparable timescales. This makes the Damköhler Number particularly useful for scale-up, reactor optimization, combustion systems, catalytic processes, and identifying the rate-limiting step in complex chemical processes.

The Damköhler Number (Da) is also useful for comparing the characteristic timescales of reaction, diffusion, and convection in a reacting system. It helps engineers identify whether a process is reaction-limited or transport-limited and predict how changes in temperature, concentration, flow rate, or reactor size may affect performance. In systems such as porous catalysts, combustion chambers, microreactors, and environmental reactors, the Damköhler Number can indicate where reactions are likely to occur most intensely.

UG Batch 2026 Orientation Programme

The Department of Chemical Engineering, IIT (ISM) Dhanbad, organized an Orientation Programme for the newly admitted Undergraduate Batch of 2026 on 6 August 2026. The programme marked an important milestone in welcoming the new students and introducing them to the academic and research culture of the department. The orientation provided students with an overview of the department's academic programmes, research activities, laboratories, infrastructure, and the diverse areas of specialization pursued by faculty members. The programme also offered an interactive platform for the newly joined students to connect with faculty members, senior students, and their peers. Through these interactions, students gained valuable insights into undergraduate coursework, research opportunities, project work, seminars, and other academic activities. The importance of developing strong technical knowledge, analytical thinking, communication skills, and professional competence was also emphasized as essential components of undergraduate education. The orientation further helped students understand the various opportunities available within the department for pursuing innovative research and interdisciplinary collaboration. Students were encouraged to actively participate in departmental events, workshops, conferences, technical activities, and research initiatives, thereby making full use of the resources and expertise available at IIT (ISM) Dhanbad. The event concluded with an enthusiastic and positive spirit, setting the stage for a productive academic journey for the UG Batch of 2026. The department extends its warmest wishes to all the newly admitted students and looks forward to their active participation and valuable contributions to the academic, research, and innovation ecosystem of the Department of Chemical Engineering.



Editorial Board

Chief Editor: Prof. Aditya Kumar (Head, Department of Chemical Engineering)

Editors: Prof. Khantesh Agrawal & Prof. Sourav Sengupta

Student Editor: Roshan Tiwari

Send your feedback to: che@iitism.ac.in

Follow official LinkedIn page: <https://chemical.iitism.ac.in> <https://www.linkedin.com/company/department-of-chemical-engineering-iit-ism-dhanbad>