Department of Chemical Engineering, IIT Hyderabad
CH5036-Industry Lecture Series
Jan-May 2025

Date: 26-03-2025
Time: 04:00 PM (IST)
Speaker: Dr. Venkat Runkana
Affiliation: Tata Consultancy Services
Title: **Digital Twins of Physical Systems**

Abstract

Manufacturing industries face challenges in meeting targets linked to plant productivity and availability, product quality, asset maintenance, emissions, safety, energy consumption, resource utilization, etc. Secondly, availability of skilled and knowledgeable workforce is also becoming scarce. As industrial operations are influenced by global events and supply chain disruptions happen relatively frequently, new technologies such as digitalization, Internet of Things, hyper-scaler platforms, and artificial intelligence are being employed to address the above challenges as well as to monitor, diagnose, optimize and control the manufacturing operations remotely. Several industries are embarking on digital transformation of their operations. Digital twin, an autonomous cyber-physical system that can work in tandem with a physical entity taking real-time data and providing real-time decisions, is one of the key components of this transformation. Digital Twin technology has matured to a level that it is being gainfully deployed in several operating plants globally. It can be used for a variety of applications in operating plants in real-time, both for optimization of plant performance as well as for an efficient and cost-effective maintenance of plant assets. The utility and power of digital twins is demonstrated in this presentation with the help of a few examples from our work. The transformative potential of integrated digital platforms such as TCS INTWIN® will also be briefly discussed.

Biography

Dr. Venkat Runkana is currently the Chief Scientist and Head of Research and Innovation for Manufacturing and Engineering in TCS. Venkat is a chemical engineer by education and holds a Ph.D. in Environmental Engineering from

Columbia University, New York. He has more than 33 years of experience in process modeling, simulation and optimization, advanced data analytics and digital twins, process development, scale-up and design, nanomaterials, and drug delivery systems. Venkat was an AICTE-INAE Distinguished Visiting Professor at IIT Kanpur during 2013-2018. Venkat received the TCS Distinguished Scientist Award in 2014 and his team received the Tata Group level innovation award, Tata Innovista for Implemented Innovations and Piloted Technologies, Aegis Graham Bell Award for Innovations in Manufacturing, and the IT Innovation Award from Express IT Awards for their work on digital twin technology. He is a co-inventor of 60+ granted and 100+ filed unique patents. He has also co-authored 12 chapters in edited volumes and 125+ papers in journals/conference proceedings. Venkat's team has developed the software platform TCS INTWIN® for development and deployment of industrial digital twins and several other software assets, and contributed to the development of TCS IP2™ (TCS Intelligent Power Plant) that uses artificial intelligence, IoT, and digital twin technologies to optimize the performance of power plants.