Sample Extract

Mastering 3D Plant Engineering, Digitalisation & Automation

By S. B. Sengupta & Soumen Roy

About the Book

Mastering 3D Plant Engineering, Digitalisation & Automation explores the transformation of industrial design and execution practices from traditional 2D drawings into intelligent, data-driven 3D environments. The book explains how digital models, enriched with databases, improve visualization, enable collaboration across geographies, reduce rework, and accelerate project delivery.

It provides practical insights into workflows, interoperability, modeling approaches, customization, and lifecycle management. Alongside digitalisation technologies like photogrammetry, laser scanning, digital twins, and IoT integration, the book presents how Industry 4.0 and 5.0 innovations reshape engineering and operations.

Intended as both a **reference and learning companion**, this book is valuable for practicing engineers, students, EPC professionals, plant operators, and managers navigating the shift toward intelligent engineering systems.

About the Authors

S. B. Sengupta has decades of hands-on experience in engineering design, plant operations, and consulting across major capital projects. His career contributions span multiple industries where he has championed the adoption of modern tools in design and construction.

Soumen Roy brings over 27 years of expertise in manufacturing excellence, engineering automation, digital transformation, and SaaS data analytics. He has worked with leading organizations such as Tata Steel (India), Gunung Raja Paksi (Indonesia), and OpenLM (Israel HQ). Soumen has pioneered the use of BIM, digital twins, drone photogrammetry, and Industry 4.0 practices in large-scale engineering projects. Alongside his corporate career, he actively promotes digitalisation and has co-authored this book as a foundational guide for engineers adapting to the new era.

Full Table of Contents

Chapter-wise Summaries

Chapter 1 – Fundamentals

Introduces intelligent 3D plant models, replacing physical models, enabling real-time collaboration and accuracy across project life cycles.

Chapter 2 – Workflow & Interoperability

Explains the sequential 3D modeling workflow, methods of software interoperability (native, neutral, API), and importance of collaborative platforms.

Chapter 3 – Modeling & Intelligence

Covers steps of modeling, role of tag vs library data, clash detection, and the expansion into 4D (time), 5D (cost), 6D (sustainability), and 7D (operations).

Chapter 4 – Customization

Details customization of databases, commodity coding, isometric sheets, P&ID; symbols, and block models.

Chapter 5 – Lifecycle Applications

Focuses on project setup, LOD (Levels of Detail 100–500), query customization, equipment libraries, and template standardization.

Chapter 6 – Digitalisation Techniques

Discusses remote sensing, GIS, photogrammetry, laser scanning, holographic modeling, ground-penetrating radar, and digital twins.

Chapter 7 – Document Management

Reviews EDMS evolution, indexing/search, cloud-based collaboration, encryption, NLP, and intelligent document assembly.

Chapter 8 – Lifecycle Management (cPLM/BIM)

Explores PLM vs cPLM, integration with ERP and BIM, ISO standards, AI/ML applications, and corporate adoption challenges.

Chapter 9 – Automation & AI

Demonstrates BIM integration with ERP/MES/SCADA, IIoT connectivity, AI/ML, RPA, blockchain, AR/VR, robotics, and cyber-physical systems.