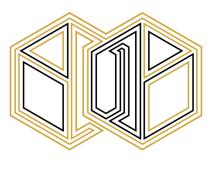# Advanced Troubleshooting Guide

Industrial Digitalization

DEMHA CONSULTANTS

The Professional Engineers

Content

Why a guide dedicated to industrial automation?

Industrial production is currently undergoing a fundamental transformation, leading towards a digitalised and interconnected industrial production, which is subsumed under the term Industrial Internet (of Things) or Industry 4.0.

Manufacturers – Industrial Digitalization

The fourth industrial revolution is here: the digitalisation of manufacturing. Often known as "Manufacturing 4.0," this profound change involves the integration of digital technologies, such as artificial intelligence (AI) and machine learning, with the wealth of data now available to manufacturers. If done right, digitalisation can become digital transformation, which will enable organisations to improve productivity, reduce costs, enhance workplace safety, and pave the way for the future of manufacturing.

What steps can lead to success in Industry 4.0?

In today's dynamic market landscape, embracing Industry 4.0 is no longer an option but a necessity to ensure competitiveness and resilience. However, for many organisations, the decision to take that first step toward industrial digitalisation may be the most difficult part of the journey. Most manufacturing companies have a lot of capital, and no small amount of blood, sweat and tears invested in legacy systems. Making the decision to move on from those legacy investments can be difficult. Here are a few simple processes to getting on the path to transformation:

1. Focus initially on your data, not the technology.
2. Look for ways to immediately benefit by increasing return on investment (ROI), enhancing productivity, or improving quality.
3. Build a customer-centric roadmap to guide your journey toward digitalisation.

In addition to these steps, it's essential to understand that making the move to digitalization isn't just about technology — it's also about your people. It's about involving everyone, including the guy who's been running the same machine every day for 30 years.

A reference study: Kilimanjaro Industrial Park (Beverage and Rigid)

Editor: Ahmed H. H. Mansoor – Founder, DEMHA Group

1. Introduction

Digitalization has emerged as a major driving force in the contemporary economy and society, being viewed as a core engine of the Fourth Industrial Revolution (Alcacer, 2016; Koh et al., 2019; Savastano et al., 2019). While its scope was initially restricted to the electronic version of a document or a sound, current digital technologies can be deployed in a wider set of application fields and have a much more extensive socio-economic impact by creating new sources of values and changing the way we produce, work, communicate, and cooperate (Kuusisto, 2017; Wiener et al., 2020). The disruptive changes brought by digital technologies are also affecting far more than specific industries, spreading their effects across the entire economy and society, and being amplified by the rapid rate that these technologies combine and generate innovations (Schwab, 2017).

Scholars have paid growing attention to this fast-moving environment. Over the last decade, digitalization has attracted substantial interest from both practitioners and academics (McQuivey, 2013). The terms "digitalization" and "digital transformation" have thus become buzzwords identifying the disruptive effects of digital technologies on the reorganization and transformation of production processes, the functioning of markets and evolutionary patterns of economics (e.g., Brynjolfsson & McAfee, 2012; Curran, 2018; Kenney et al., 2015).

When applied to manufacturing industries, digitalization is sometimes thought of as a synonym of "Industry 4.0" (Negri et al., 2017), the "Industrial Internet", and the "Industrial Internet of Things" (IoT). All these terms encompass technologies that allow real-time monitoring, remote control of devices, and production machinery through networked infrastructure, and eventually realizing a more direct integration and synchronization between the physical and the industrial world (Kritzinger et al., 2018). However, compared to these, digitalization has a different scope. Basically, it refers to a broader set of technologies, not necessarily complex, but that require some form of integration between them. Indeed, digitalization puts a higher emphasis on the potential linkages between manufacturing and tertiary industries (BCG, 2015) and is associated with new economic models such as the "platform economy" (OECD, 2017; Schwab, 2017). Conversely, the other terms require the presence of a subset or a different bundle of technologies (Frank, Dalenogare, & Ayala, 2019) while focusing on their interconnection within industrial production processes (Kagermann et al., 2013). "Industry 4.0", in particular, refers to manufacturing automation (Oesterreich & Teuteberg, 2016), is partly policy-driven, and being associated with the ultimate aim of increasing the productivity and efficiency of national industries (Lu et al., 2018; Liao et al., 2017). Digitalization, on the contrary, deals with all socio-economic transformations engendered by the combination of information, computing, communication, and connectivity technologies in an increasingly data-rich environment (Brunetti et al., 2020; Vial, 2019). Consequently, the scope of digitalization exceeds Industry 4.0, even when focusing on the manufacturing industry. Moreover, digitalization does not adopt an explicit policy perspective (Rindfleisch et al., 2017); differently from Industry 4.0, it does not carry implications in terms of industrial policies to be implemented to favor the diffusion of new technologies in national innovation systems.

To date, systematic literature reviews in the manufacturing field have essentially focused on Industry 4.0 (e.g., Awan et al., 2021; Culot et al., 2020; Liao et al., 2017; Mittal et al., 2018; Pagliosa et al., 2021; Piccarozzi et al., 2018; Zheng et al., 2021), the Industrial Internet (Li et al., 2017), and distributed manufacturing (Srai et al., 2016), or on specific technologies, such as cloud computing (Delavari et al., 2020; Farsi et al., 2020; Novais et al., 2019; Senyo et al., 2018), wireless networks (Li et al., 2015), big data (Gölzer & Fritzsche, 2017; Mikalef et al., 2018; Talwar et al., 2021), and the IoT (Ben-Daya et al., 2019; Lu et al., 2018; Malik et al., 2021; Palmaccio et al., 2021).

2. Health and Safety eLearning

Health and Safety E-Learning is an online training program designed to educate employees and managers on workplace safety, health hazards, and safety protocols. It is an interactive and engaging platform that offers customized content for each organization, ensuring that the employees understand the safety protocols, safety regulations, and procedures specific to their workplace.

Benefits
1. Flexibility: E-Learning is flexible and allows employees to learn at their own pace and convenience. They can access the training program from any location with an internet connection.
2. Cost-effective: Health and Safety E-Learning eliminates the need for hiring trainers or arranging on-site training, making it a cost-effective solution for organizations.
3. Customization: The content can be customized according to the organization's safety protocols and specific requirements.
4. Consistency: Health and Safety E-Learning E-Learning ensures that all employees receive the same level of training and information, maintaining consistency throughout the organization.
5. Tracking and Reporting: The online platform allows for tracking and reporting employee progress and completion, ensuring that all employees complete the required safety training.

Methodology
1. Analysis of the client's safety requirements
2. Identifying potential hazards
3. Designing customized content to address these hazards.
4. Training program to meet all regulatory compliance requirements.

Deliverables
1. Customized content tailored to the organization's specific safety requirements.
2. Interactive and engaging training modules accessible online.
3. Tracking and reporting capabilities to monitor employee progress and completion.
4. Compliance with all regulatory requirements.

Health and Safety E-Learning is a flexible, cost-effective, and customizable solution for organizations to ensure that their employees are trained on workplace safety protocols and regulations.

Fig. 1. Hazard Analysis and Critical Control Point – HACCP

3. Safety Animation

Safety Animation are animated videos or motion graphics that aim to promote safety and increase awareness about potential hazards in various industries. The videos are designed to educate employees, contractors, and other stakeholders on safe practices and protocols in the workplace.

Health & Safety Animation
A video-based training tool that uses animation technology to communicate safety information to employees. The use of animation in safety training has become increasingly popular because it is engaging, easy to understand, and can effectively demonstrate safety procedures and best practices.

Benefits
1. Improved employee engagement and retention of safety information: Animation videos are designed to be visually engaging and memorable, which can help employees retain safety information better.
2. Reduced workplace accidents and injuries: By providing clear and easy-to-understand safety training, Health & Safety Animation services can help reduce workplace accidents and injuries.
3. Regulatory compliance: Health & Safety Animation are designed to help organizations meet regulatory compliance requirements by providing up-to-date safety training.
4. Improved workplace safety culture: Health & Safety Animation can help organizations improve their overall safety culture by demonstrating a commitment to employee safety and providing effective safety training.

Deliverables
1. Customized animation videos
2. Professional quality
3. Easy to use

Industrial Safety Animation
A video-based training tool that uses animation technology to communicate safety information to employees in the industrial sector. The use of animation in safety training has become increasingly popular because it is visually engaging, easy to understand, and can effectively demonstrate safety procedures and best practices.

Benefits
1. Improved employee engagement and retention of Industrial safety information: Industrial Safety Animation videos are designed to be visually engaging and memorable, which can help employees retain safety information better.
2. Reduced workplace accidents and injuries: By providing clear and easy-to-understand safety training, Industrial Safety Animation can help reduce workplace accidents and injuries.
3. Regulatory compliance: Industrial Safety Animation are designed to help organizations meet regulatory compliance requirements by providing up-to-date safety training.
4. Improved workplace safety culture: Industrial Safety Animation can help organizations improve their overall safety culture by demonstrating a commitment to employee safety and providing effective safety training.

Methodologies
1. Customized solutions
2. Industry-specific expertise
3. Attention to detail
4. Ongoing support

Deliverables
1. Customized animation videos
2. Professional quality
3. Easy to use
4. High-quality Graphics, 2D, 3D Modeling, and Animation Software

Key benefits of Safety Animation
1. Improved Safety Culture
2. Reduced Risk of Accidents
3. Compliance with RegulationsOur Safety
4. Increased Efficiency

Safety Animation services are a valuable for businesses looking to enhance their safety programs and protect their employees from harm.

Fig. 2. The hipster engineer shows the virtual animation of the objects in construction site

Fig. 3. Accelerating digitalization in manufacturing sector

4. Industrial Animation

Industrial Animation is aimed at delivering compelling and visually-engaging animation solutions to help industrial organizations with training and communication. It can be used to simulate the operation of industrial equipment, demonstrate the functionality of products, train employees on safe work practices, and showcase the features and benefits of industrial products and services.

Industrial Process Animation

An interactive tool designed to communicate complex industrial processes visually. It is an effective tool for training employees, suppliers, and customers on industrial processes, procedures, and best practices.

Benefits
1. Improved Understanding: Industrial process animation provides workers, suppliers, and customers with a better understanding of complex industrial processes, which can lead to improved decision making and better outcomes.
2. Increased Efficiency: Employees who understand the industrial processes they are working on can work more efficiently and effectively, leading to improved productivity and lower costs.
3. Enhanced Safety: Industrial process animation can help workers understand the potential hazards associated with the processes they are working on, leading to a safer work environment.

Methodology
1. A collaborative approach with our clients.
2. Conduct a thorough assessment of industrial processes and identify any areas where there may be gaps or opportunities for improvement.
3. Design a customized animation that effectively communicates the complexities of your industrial processes in a clear and engaging manner.
4. Use of the latest animation software to create high-quality, professional-grade content that is informative and easy to understand.

Deliverables
1. Customized Animation
2. High-Quality Content
3. Comprehensive Training

Investing in industrial process animation is a smart decision that can help improve understanding, increase efficiency, and enhance safety in your workplace.

Corporate Training Animation

An essential component of any organization's growth and success. However, traditional training methods can be time-consuming and costly. Corporate training animation is a powerful tool that can help organizations provide engaging and effective training to their employees. Corporate training animation is a process of using animated videos and simulations to train employees on various topics, such as safety procedures, product knowledge, and customer service skills. This technique is highly effective in engaging employees, improving knowledge retention, and providing an interactive learning experience.

Benefits
1. Engaging and Interactive Learning: Animated videos and simulations are more engaging and interactive than traditional training methods, which can lead to better knowledge retention and understanding.
2. Cost Savings: By using corporate training animation, organizations can save money on travel, equipment, and other costs associated with traditional training methods.
3. Consistency: Corporate training animation ensures that all employees receive the same training, which can help maintain consistency in the quality of work across different departments and locations.

Methodology
1. A collaborative approach with our clients.
2. Designs a customized animation that effectively communicates the training content in an engaging and interactive way.
3. Use of the latest animation software and instructional design techniques to ensure that the training is effective and informative.

Deliverable
1. Customized Animation
2. Interactive Elements
3. Performance Metrics

Corporate training animation is a highly effective tool for organizations looking to provide engaging, interactive, and cost-effective training to their employees.

Engineering Process Animation
Engineering processes are complex and often difficult to explain. Engineering process animation is a powerful tool that can help organizations communicate these processes in a clear and engaging way. Engineering process animation is the use of animated videos and simulations to explain complex engineering processes, such as manufacturing, construction, or design. This technique is highly effective in communicating engineering concepts.

Benefits
1. Improved Communication: Animated videos and simulations are more engaging and easier to understand than technical documents or presentations, which can lead to better communication and understanding of complex engineering processes.
2. Cost Savings: By using engineering process animation, organizations can save money on equipment, materials, and other costs associated with physical prototyping or testing.
3. Enhanced Collaboration: Engineering process animation can help stakeholders, clients, and team members collaborate more effectively, as it provides a shared understanding of complex processes.

Methodolog
1. A collaborative approach with our clients.
2. Designs a customized animation that effectively communicates the engineering process in a clear and engaging way.
3. Use the latest animation software and engineering design techniques to ensure that the animation is accurate and informative.

Deliverable

1. Customized Animation: We will design a customized animation that effectively communicates your engineering process and meets your organization's unique needs.
2. Interactive Elements: Our animations are designed to be interactive, which can help stakeholders, clients, and team members engage more effectively with the engineering process.
3. Technical Accuracy: We ensure that our engineering process animations are technically accurate and provide a realistic representation of the process.

Engineering process animation is a highly effective tool for organizations looking to communicate complex engineering processes in a clear and engaging way.

Machinery Animation

An essential tool in the modern manufacturing industry to simulate and visualize the operation of machines and equipment. It provides a comprehensive understanding of how machines and equipment function and interact with each other, allowing manufacturers to optimize their processes and make informed decisions.

Benefits
1. Improved Efficiency: Machinery animation provides a comprehensive understanding of how machines and equipment function, allowing manufacturers to optimize their processes and improve efficiency.
2. Reduced Downtime: By simulating the operation of machines and equipment, manufacturers can identify potential issues and address them before they cause downtime, reducing costs and improving productivity.
3. Enhanced Safety: Machinery animation can also help manufacturers identify potential safety hazards and develop strategies to prevent accidents, protecting workers and minimizing the risk of injury.

Methodology
1. A collaborative approach with our clients.
2. Conduct a thorough assessment of your machinery and equipment and identify any areas where there may be gaps or opportunities for improvement.
3. Designs a customized animation that effectively communicates the operation of your machinery and equipment in a clear and engaging manner.
4. Use of the latest animation software to create high-quality, professional-grade content that is informative and easy to understand.

Deliverables
1. Customized Animation
2. High-Quality Content
3. Comprehensive Training

Investing in machinery animation is a smart decision that can help improve efficiency, reduce downtime, and enhance safety in your manufacturing process.

Accident Recreation Animation

Accidents can happen in any workplace, and they can be costly in terms of human life, injuries, and property damage. Accident recreation animation is a process of simulating and visualizing accidents that have occurred in the workplace. It is a powerful tool that helps organizations to recreate accidents, understand their root causes, and develop effective prevention strategies.

Benefits
1. Improved Workplace Safety: By understanding how accidents happen and identifying their root causes, organizations can develop effective prevention strategies to reduce the risk of accidents.
2. Enhanced Training: Accident recreation animation can be used as a training tool to educate employees on workplace safety procedures and best practices.
3. Cost Savings: By preventing accidents, organizations can save money on property damage, workers' compensation claims, and other costs associated with workplace accidents.

Methodology
1. A collaborative approach with our clients.
2. Conducts a thorough investigation of the accident site, interviews witnesses, and collects data to ensure that our recreation is accurate and comprehensive.
3. Use the latest animation software to create high-quality, professional-grade content that is informative and easy to understand.

Deliverables
1. Customized Animation
2. Detailed Analysis
3. Recommendations

Accident recreation animation is an essential tool for organizations looking to improve workplace safety, enhance training, and reduce the risk of accidents.

Structural Animation
A visualization tool designed to communicate complex structural designs visually. It provides a comprehensive understanding of the structural design, its various components, and how they interact with each other. It is an effective tool to visualize the design and construction of a building or structure.

Benefits
1. Improved Design: Structural animation helps architects and engineers to design better structures by providing a clear visualization of the structure's components and how they fit together.
2. Enhanced Communication: Structural animation provides a clear and easy-to-understand visualization of the structure, making it easier for stakeholders to communicate and understand the design.
3. Increased Efficiency: By providing a clear visualization of the structure, structural animation can help contractors to work more efficiently, reducing the time and cost of construction.

Methodology
1. A collaborative approach with our clients.
2. Conduct a thorough assessment of your structural design and identify any areas where there may be gaps or opportunities for improvement.
3. Designs a customized animation that effectively communicates the complexities of your structural design in a clear and engaging manner.

4. Use of the latest animation software to create high-quality, professional-grade content that is informative and easy to understand.

Deliverables
1. Customized Animation
2. High-Quality Content
3. Comprehensive Training

Investing in structural animation is a smart decision that can help improve design, communication, and efficiency in your construction project.

Industrial Animation services includes Concept development, storyboarding, 3D modeling, animation, and post-production.

Key benefits of Industrial Animation
1. Enhanced Communication: Industrial Animations help to convey complex industrial processes and concepts in a simple and engaging manner, making it easier for stakeholders to understand
2. Improved Training: Animations can be used to enhance the effectiveness of training programs by providing a visual representation of industrial processes, equipment, and machinery.
3. Cost-effective: By leveraging the expertise of professionals and utilizing advanced animation techniques, companies can improve their operations, increase efficiency, and reduce the risk of accidents and injuries.

Fig. 4. Smart industry control concept on blurred automation machine

Acknowledgement

I would like to express my deepest gratitude to the following esteemed members,

1. Dominik T. Matt – Faculty of Science and Technology, Free University of Bozeb-Bolzano, Piazza Universita 4, 39100, Bolzano, Italy
2. Giulio Pedrini – Faculty of Economics and Law, Kore University of Enna, Cittadella Universitaria, 95100, Enna, Italy
3. Angelo Bonfanti – Department of Business Administration, University of Verona, Vis Cantarane, 24, 37129, Verona, Italy
4. Dr. Cherry Bhargava – PhD in VLSI Design, Research Analyst, India
5. Dr. Amit Kumar Singh – PhD in Electrical Engineering, Scotland, United Kingdom

Thank you.

Reference

[1] Agarwal and Brem, 2015
N. Agarwal, A. Brem
Strategic business transformation through technology convergence: Implications from general electric's industrial internet initiative
[2] Alcacer et al., 2016
J. Alcacer, J. Cantwell, L. Piscitello
Internationalization in the information age: A new era for places, firms, and international business networks?
[3] Alos-Simo et al., 2017
L. Alos-Simo, A.J. Verdu-Jover, J.Gomez-Gras
How transformational leadership facilitates e-business adoption
[4] Amit and Han, 2017
R. Amit, X. Han
Value creation through novel resource configurations in a digitally enabled world
[5] Andersson and Jonsson, 2018
J. Andersson, P. Jonsson
Big data in spare parts supply chains: The potential of using product-in-use data in aftermarket demand planning
[6] Annosi et al., 2020
M.C. Annosi, F. Brunetta, F. Capo, L.Heideveld
Digitalization in the agri-food industry: The relationship between technology and sustainable development
[7] Awan et al., 2021
U. Awan, R. Sroufe, M. Shahbaz
Industry 4.0 and the circular economy: A literature review and recommendations for future research
[8] Babkin et al., 2018
A.V. Babkin, D.D. Burkaltseva, A.V.Betskov, H.S. Kilyaskhanov, S. Tyulin, I.V.Kurianova
Automation digitalization blockchain: Trends and implementation problems
[9] Bader and Kaiser, 2017
V. Bader, S. Kaiser
Autonomy and control? How heterogeneous sociomaterial assemblages explain paradoxical rationalities in the digital workplace
[10] Baines et al., 2009
T. Baines, H. Lightfoot, J. Peppard, M.Johnson, A. Tiwari, E. Shehab
Towards an operations strategy for product-centric servitization
[11] Bauer et al., 2015
W. Bauer, M. Hämmerle1, S. Schlund, C.Vocke
Transforming to a hyper-connected society and economy – towards an "Industry 4.0"
[12] BCG, 2015
BCG: How to jump-start a digital transformation
[13] Beier et al., 2018
G. Beier, S. Niehoff, B. Xue
More sustainability in industry through industrial internet of things
[14] Beier et al., 2017
G. Beier, S. Niehoff, T. Ziems, B. Xue
Sustainability aspects of a digitalized industry – a comparative study from China and Germany

End Note