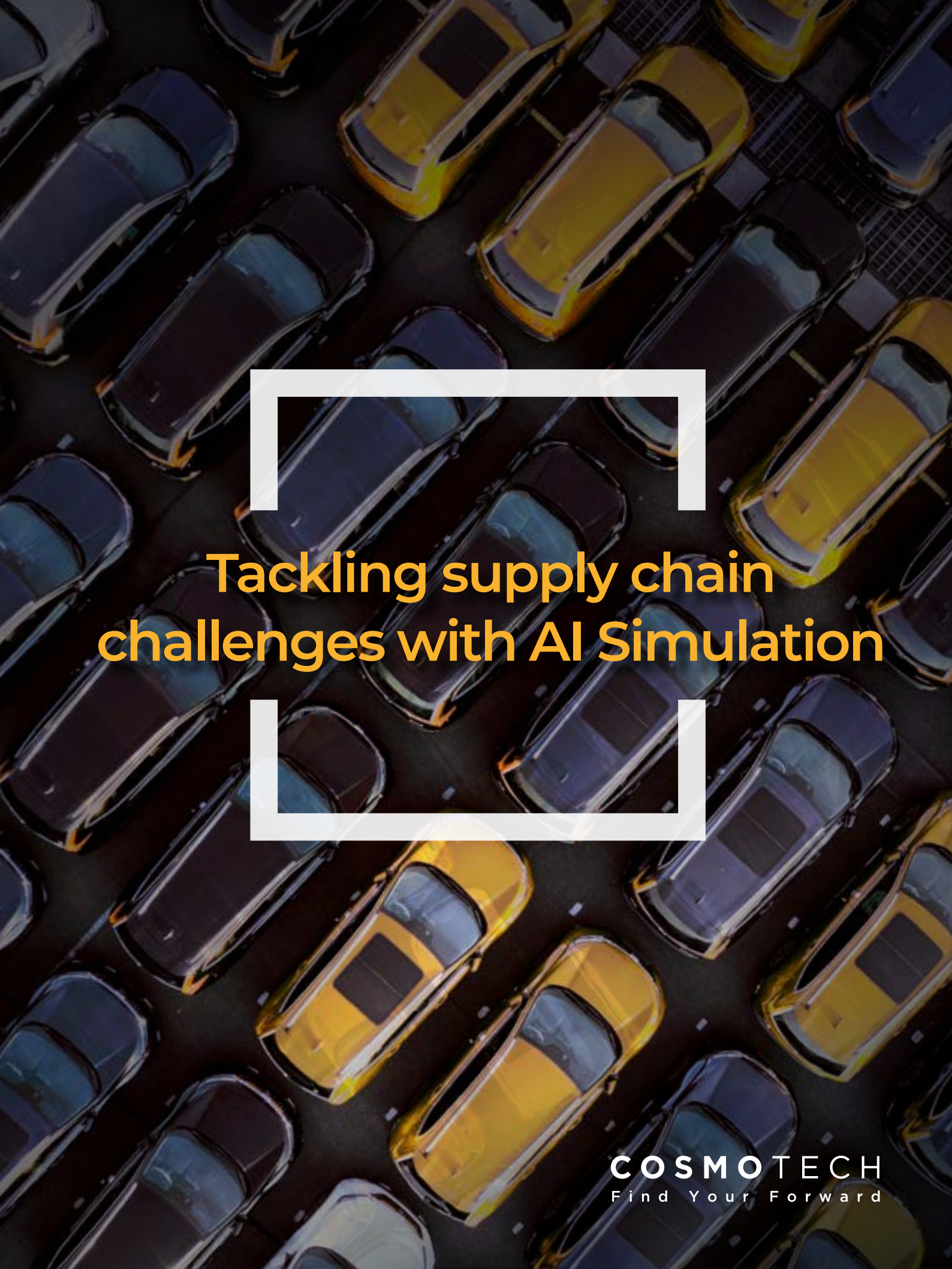

Tackling supply chain challenges with AI Simulation

COSMOTECH
Find Your Forward

Find Your Forward with simulation, planning new scenarios and developing robust, optimized action plans

Surmounting a supply chain crisis

The modern industrial world is constantly evolving, with economic trends and political decisions continually shaping and reshaping demand. For supply chain executives, this means not only confronting day-to-day challenges on a local scale, but also taking a long-term view of their global operations.

Recent global disruptions have highlighted ever more clearly the need for manufacturers to anticipate and prepare for business disruptions and fluctuations in demand. To weather this crisis and successfully restart operations, supply chain managers will need to quickly make and implement strategic decisions – about production, logistics, cost structure, hard savings, inventory and more – while generating free cash flow in a deeply uncertain environment.

To determine optimal action plans, manufacturers require both a complete understanding of inter- and intra-plant operational processes, and factual insight into changing business and social environments. Predicting how these various elements will interact is key to making quick and effective decisions, limiting costs in the short-term and defining a long-term recovery strategy.

Cosmo Tech's AI-Simulation technology creates a complete model of supply chain operations that accounts for ever-changing business environments. With Prescriptive Simulation Twins, manufacturing managers can simulate and optimize the effects of different operational strategies, identifying robust, resilient strategic plans and the actions required to implement them efficiently. Our technology identifies all possible points of optimization, providing manufacturers with short-term solutions for cost optimization and robust production planning, as well as long-term, resilient business recovery strategies.

While no one can determine the exact consequences of Covid-19, Cosmo Tech puts the power of prediction in our clients' hands. Our pre-packaged Simulation Twin solutions will play a key role in scenario planning, leading to optimized, robust and resilient value chains. For manufacturers worldwide, our advanced simulation tools provide factually-grounded, strategic plans that make a tangible impact on their business, steering them through uncertain times and towards successful outcomes.

Hugues de Bantel

Cosmo Tech Co-Founder and CEO.

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The digital-twin technology designing the future of manufacturing

50%
Industries using digital-twin technology by 2021

10%
Efficiency increase for companies using Enterprise Digital Twins[1]

20-30%
Cost reduction for industries deploying digital twins[2]

[1] Top 10 Strategic Technology Trends, Gartner, 2019.
[2] Howells, Richard. Thought-Leader Round Table: Three Experts Discuss Digital Twins, Forbes, 2019.

WHAT IS A DIGITAL TWIN?

For many people, the words "digital twin" conjure the image of a 3D model of a physical object. While traditional digital twins are replicas of individual machines, the newest class of digital twins can model entire organizations and complex systems based on the evolving dynamics of business' day-to-day operations.

How can an AI-Simulation Twin be used for supply chains?

AI-Simuation Twins replicate the dynamic functioning of an organization's complete operational system, including physical entities, financial assets, human resources, processes, workflows and constraints. For supply chain managers, AI-Simulation Twins offer the unique ability to replicate all activity and interactions throughout the production chain, regardless of the number and location of assets, manufacturing sites, suppliers, contractors and sub-contractors involved.

Using AI-Simulation technology, supply chain managers can create unlimited predictive "what-if" simulations that demonstrate the impact of different decisions on operational efficiency and KPIs. Supply Chain managers can evaluate the strength of their action plans, testing their robustness in the face of unexpected events and gaining valuable insight into how to implement their plans across manufacturing sites.

Advanced AI-Simulation Twins further provide prescriptive "how-to" optimizations that help manufacturing managers discover the course of action that best meets their needs. Users can choose among a range of KPIs (e.g. efficiency, cost, environmental needs), then use an Enterprise Digital Twin to discover the optimal action plan and implementation strategy for their business.

At a glance

Simulate the dynamic evolution of complete operational systems and sub-systems

Generate optimized and reliable plans for meeting KPIs using predictive and prescriptive functions

Provide step-by-step implementation instructions for short-, mid- and long-term action plans

Implement quickly and scale from a defined project to the complete industrial value chain

WHAT CAN YOU ACHIEVE WITH AI-SIMULATION?

AI-Simulation puts the entirety of an organization's operating model at a manufacturing manager's fingertips, helping them unlock hidden value throughout the value chain. With Cosmo Tech's Prescriptive Simulation Twins, users gain the unique ability to achieve full operational efficiency through simulation and optimization.

Virtually test strategic action plans with unlimited what-if simulations

Beyond providing a complete replica of an organization's operational model, the Cosmo Tech AI-Simulation Platform offers unlimited what-if scenarios, allowing users to simulate how their decisions will impact each aspect of their business. These predictive scenarios are highly accurate and can be customized by the user, providing a clear picture of the strengths and weaknesses of their operational plans over the short- and long-term.

Customize and modify what-if scenarios for any time scale, system, set of constraints or available resources

Evaluate the future impacts of business decisions across your organization

Design optimal operational plans and gain step-by-step guidance for implementation

Use comprehensive, end-to-end understanding of your operational system to align and meet stakeholder expectations

Improve business outcomes with how-to optimizations

The Cosmo Tech AI-Simulation platform offers prescriptive how-to optimization, identifying conflicts or obstacles in an organization's system, and providing optimal solutions to operational challenges.

Gain an optimal, actionable plan calculated specifically for your chosen KPIs

Receive accurate predictions for any time scale, from the next 10 minutes to the next 10 years

Ensure the robustness and reliability of operational plans in the face of unexpected events

How does this create value for your business?

By mastering **"cascading effects" –** the chain of events that emerges naturally, or in response to user decisions – Simulation Twins reveal operational inefficiencies and opportunities across an organization.

What-if simulations or **how-to optimizations** allow managers to optimize their action plans by using fact-based predictions and reviewing all possible drivers of optimization to achieve predetermined objectives. Users in the automotive, aerospace or other manufacturing industries can unlock hidden value with an Enterprise Simulation Twin, quickly achieving full operational efficiency and seeing measurable benefits within one quarter.

IN PRACTICE

MANAGING ASSET OBSOLESCENCE

Aging assets present numerous challenges for manufacturing plants: technologies becoming obsolete, the inability to source replacement parts, loss of expertise for managing older systems, etc. To gain the maximum value from their assets, manufacturing plant managers must develop plans for their complete lifecycle and eventual obsolescence.

Your challenges

Our client was an international car manufacturer with multiple interconnected manufacturing plants in several countries on different continents. The client needed to develop a robust CAPEX/OPEX investment plan and find the right asset management trade-offs between investment level and failure risk management.

- Managing assets at various stages of the lifecycle
- Managing multiple resources across different plants
- Maintaining production capacity for aged and aging assets
- Scarcity of spare parts
- Lack of maintenance skills for old technologies
- Lack of asset renewal strategies and programs for single assets and asset types
- Financial constraints

Our approach

Using Cosmo Tech's AI Simulation, we developed a dynamic model of our client's complete operational system, including assets of all ages across its numerous plants. Our technology allowed the client to:

- Simulate unlimited what-if scenarios that account for asset degradation, project renewals, maintenance policies, risk assessment and monetization
- Run how-to optimizations to determine the best investment for the short- and long-term
- Reduce maintenance costs
- Limit unscheduled asset downtime
- Improve overall asset ROI
- Facilitate cross-functional decision-making by implementing a proven asset obsolescence management strategy across teams
- Gain sensitivity analysis to ensure the robustness of asset management plans for production plants in case of unexpected events

Results

Using an Enterprise Simulation Twin, our client simulated a range of asset obsolescence management strategies, and found the optimal balance between their business goals and operational constraints. By optimizing their asset management strategy, the client was able to reduce CAPEX costs over a ten-year period, while maximizing the company's core KPIs for that same timeframe.

35%
TOTEX Savings

10 years
Duration of investment plan

8 factories
And 3 countries into account

HOW AI SIMULATION EMPOWERS MANUFACTURERS TO TAKE CONTROL

Manufacturers must be prepared for a range of eventualities, with managers needing ready answers to numerous what-if scenarios. What if obsolescent parts are unavailable? What if the supply chain is disrupted?

Taking a what-if approach is crucial for supply chain managers looking to handle complex production systems. To manage operations in a fast-evolving environment, manufacturers need to determine key contingency plans for shutdowns, maintenance and unexpected events, as well as for reinforcing production resilience.

The emerging and recurring issues raised by crises such as the Covid-19 pandemic are underscoring the critical need for contingency plans. To prepare for what-if scenarios, manufacturers must have the tools and technologies to create how-to management strategies.

Reviewing the past is not predicting the future

A key question for manufacturers is how to simulate the effects of potential changes on the future of their operations.

AI-only based technologies use past data to make predictions, determining the future state of a system by comparing its past and present states. Traditional digital twins rely exclusively on past data to make predictions, which do not account for ever-changing present and future scenarios. This leads to two problems:

1/ Traditional digital twins' cannot predict scenarios that have not already happened

2/ Predictions become less reliable the further a timeline is extended into the future

> In our ever-evolving and highly connected world, complexity is the new norm. We must have the ability to simulate this complexity, in order to anticipate what's coming and develop an optimal, actionable response in advance.

Hugues de Bantel, Cosmo Tech Co-Founder and CEO.

Predicting the future with simulation solutions

With the modeling of complex systems at its core, Cosmo Tech's technological approach is fundamentally unique among digital twin providers. Our Simulation Twin makes predictions and provides optimization scenarios based on a model of an industrial system's dynamic evolution. By identifying all of a system's critical variables, interactions and interdependent tasks, we can develop simulations for unlimited combinations of changes throughout a plant's operations.

Our AI-Simulation technology determines how each subsystem will affect others or be affected in any given scenario. By digitally testing a range of potential circumstances, the AI-Simulation technology can determine which disruptions to an operational system are most likely and most detrimental to production. Manufacturers can then optimize their responses, developing robust, effective action plans for numerous possible scenarios.

> Working with past data alone restricts one's ability to predict scenarios that have not already occurred. Without simulation, manufacturers cannot identify all possible options for optimization, or determine which plans to enact to achieve their stated goals.

Michel Morvan, Cosmo Tech Co-Founder and Chairman.

Why Cosmo Tech?

Cosmo Tech's solutions are based on a proprietary modeling language, the result of more than twenty years of academic research, as well as a unique methodology developed over more than a decade that identifies relevant variables and interactions. Our mastery of complex industrial systems allows us to use advanced simulation technology to predict the effects of changes with strong accuracy for the short-, medium- and long-term.

IN PRACTICE

OPTIMIZING OPERATIONAL AND SUPPLY CHAIN EFFICIENCY

The automotive market revolves around operational efficiency, a huge challenge for an industry dependent on complex supply chains. To maximize profitability and stay competitive, automotive players must master all stages of their value chains.

Your challenges

Our client, an international car manufacturer, needed to significantly boost production of one engine type to meet increased demand, without altering manufacturing capacity. To optimize production, the client required visibility on their end-to-end operations and the cascading effects of different decisions across the supply chain. Among the client's constraints were:

- Demand volatility
- Specific lead times
- Limited storage capacity
- Sharing resources between products with different cycle times
- Managing multiple resources manufacturing the same product

Our approach

Using a Cosmo Tech Supply Chain Simulation Twin, we developed a realistic and exhaustive Enterprise Digital Twin of the client's entire engine production system. The technology allowed our client to:

- Simulate a complete operational model, including multiple production sites and complex flows (e.g. factories, stocks, transports)
- Model real-world constraints (e.g. equipment capacity, labor shifts, lead-times)
- Include all necessary data (e.g. demand, contractors' agreements, production output, bill of materials, routings)
- Test what-if scenarios for pre-selected KPIs (e.g. productivity, efficiency)
- Run how-to optimizations and gain optimal action plans with step-by-step implementation guidance
- Perform sensitivity analyses to ensure an action plan's robustness
- Perform full cost calculations

Results

Our client first identified crucial points of operational efficiency – a bottleneck of two heat treatment machines running at maximum capacity – then determined and implemented the optimal action plan by negotiating with a specific contractor to increase production. By optimizing production line efficiency and output, our client was able to respond to market demand, maximizing production of specific engines without expending more resources.

+10%
Operational efficiency

Adapt and achieve resilience in the face of an evolving crisis:

- Manage cash flow and develop ramp-up scenarios
- Define contingency plans and mitigate risks
- Optimize production for unusual and uncertain demand
- Plan for optimal reopening and build a resilient supply chain

6 MYTHS ABOUT AI SIMULATION

When faced with a transformative technology like AI Simulation many business owners and operational efficiency experts find themselves in uncertain territory. Questions surrounding the price, complexity, implementation, data requirements and ROI associated with digital twins abound – but what is the truth about this innovative technology?

MYTH 1

AI Simulation is costly in the long and short-term

AI Simulation can be highly cost-effective for businesses, generating next-quarter value and quick return on investment (ROI). Because Enterprise Simulation Twins build on companies' existing data, they are relatively uncomplicated and inexpensive to implement. Ready-to-deploy digital twins, created to tackle specific industrial challenges, can be quickly and easily adopted. Given this, AI Simulation has spread rapidly across industries and investment in this transformational technology is expected to explode in the next 5 years.

MYTH 2

AI Simulation is only for large, fully-developed businesses

A core advantage of Simulation Twins is the ability to replicate specific areas of operations, securing quick wins for users before being scaled up. As companies evolve, the Simulation Twins can integrate new assets, processes, systems, technologies, locations, subsidiaries and more, covering the full value chain. The common platform underlying Cosmo Tech's digital twins makes it simple to scale vertically and horizontally, an approach that has consistently demonstrated quick ROI, paying for itself within a quarter.

MYTH 3

Like other AI technologies, AI Simulation requires mountains of data

Because AI Simulation technology relies on models, the real challenge is not the quantity of data available, but the quality. Most companies are data rich, and AI Simulation experts are experienced in identifying exactly what data is pertinent and usable, and collecting it. Unlike strictly AI-based technologies, Cosmo Tech AI Simulation does not rely exclusively on historical data, instead using an in-depth understanding of an organization's underlying systems to develop accurate how-to simulations.

MYTH 4

Only data scientists can work with an AI-Simulation Twin

Prescriptive Simulation Twins do not require clients to invest in data expertise; there is no need to hire data scientists or rearrange internal teams. Cosmo Tech Simulation Twins are designed to be user-friendly, providing an easy-to-configure platform, readable dashboards and a host of intuitive functions. Our Simulation Twins feature customizable, easy-to-program scenarios, step-by-step implementation instructions and clear explanations that make the technology usable for specialists and non-specialists alike.

MYTH 5

Implementing an Enterprise Simulation Twin is time-consuming

Organizations can completely implement an Enterprise Simulation Twin within a few months of signing a contract. AI Simulation experts work with in-house experts, analyzing all systems, processes and operations, then developing conceptual models both specific to the organization and based on existing templates. Once this is accomplished, experts can format client data and enter it into the AI Simulation platform, which can then be deployed.

Moreover, clients can choose a scale-up approach, making the process of implementing an Enterprise Simulation Twin even faster. Cosmo Tech Prescriptive Simulation Twins are fully industrialized solutions, providing users customized software solutions that can be quickly implemented.

MYTH 6

Interpreting AI Simulation results is complicated

AI Simulation shows how and why a model has reached its conclusions, allowing the user to isolate variables and view cascading effects one-by-one. The Cosmo Tech AI Simulation Platform takes this a step further, offering clear optimization tactics that are transparent and explainable. Managers can identify the necessary steps to integrate operational changes, ensuring Implementation across the organization.The complete transparency provided by an Simulation Twins makes it simple for users to justify strategic decisions to stakeholders.

IN PRACTICE

OPTIMIZING FACTORY PLANNING AND SCHEDULING

Manufacturing processes include many parts assembled by distinct processes, each with a specific manufacturing procedure and cycle. To maximize efficiency and output, and secure production in the face of constantly changing factory conditions, manufacturers need to optimize production sequencing and scheduling strategies.

Your challenges

Our client was the production manager responsible for supervising and directing a sheet metal production line. The client needed to optimize production sequencing and scheduling, accounting for costs and customer service needs, while respecting manufacturing rules and constraints.
Among the client's challenges were:

- Limited visibility on the number and location of parts required to achieve daily production targets
- Limited production capacity
- Bottlenecks throughout the production process
- Variable ability to deliver on time
- Limited ability to manage production hazards

Our approach

Cosmo Tech developed a realistic and exhaustive Simulation Twin of the client's complete plant and sheet metal production line. Using our technology, our client was able to:

- Simulate unlimited what-if scenarios to determine optimal production scheduling and anticipate bottlenecks
- Optimize task sequencing and maximize production capacity
- Limit parts shortages and minimize production stops
- Respect dynamic manufacturing constraints (e.g. storage space, resource capacity, demand priority rules)
- Reduce production lead times
- Improve delivery performance (On Time In Full)
- Determine the robustness of production plans by simulating various unexpected events

Results

Our client used the Asset Simulation Twin to model the exact connections between sub-assembly part processes throughout the plant and review the sequence of interactions among various assets. By determining when and where parts shortages occurred, the client was able to avoid bottlenecks and minimize production downtime, ensuring maximized production capacity and improving delivery performance.

100%
Production line system modeled

WHO ARE WE?

Cosmo Tech is an AI-Simulation Software company and an expert in prescriptive AI Simulation and Enterprise Digital Twins. We support both enterprise decision-making and business optimization by helping our customers navigate complexity and uncertainty.

Our Pre-packaged Simulation Twin solutions

The Simulation Twins provide a dynamic replica of an operational system, accounting for all its resources, constraints, processes and data. Decision makers can virtually test operational plans by running unlimited what-if scenarios and how-to optimizations, determining the robustness of their plans and defining the optimal strategies for achieving their goals.

Cosmo Tech's user-friendly, easy-to-implement pre-packaged Simulation Twin solutions show every step of an opera-tional strategy. Users gain complete transparency of their end-to-end operations, allowing them to unlock hidden value across the supply chain and achieve full operational efficiency. This results in immediate, measurable benefits for the organization, **and next-quarter value creation.**

2010
Cosmo Tech founded

105
Cosmo Tech employees

€24 million €
Series A and B venture

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