

Digitalization in the Tire Industry - Where the Rubber Actually Meets the Road

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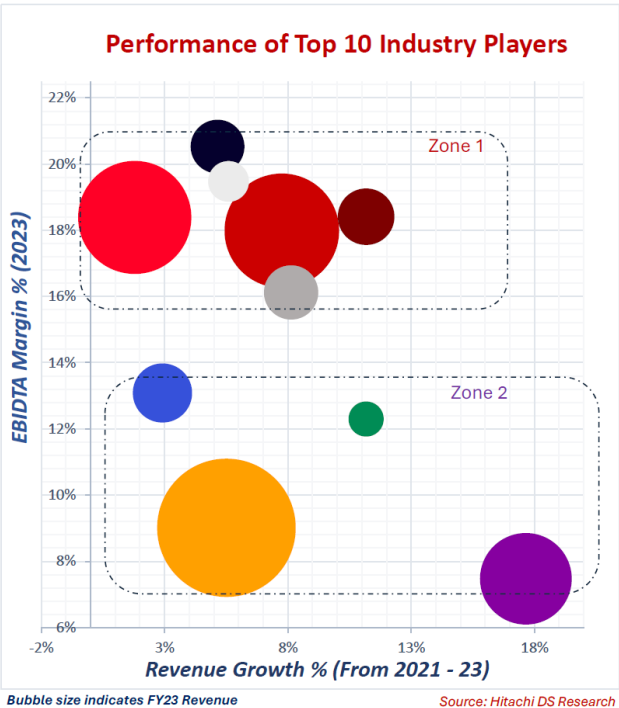
The tire industry, being a key supplier of automotive and an advanced adopter of lean practices and process excellence, is facing challenges due to weak growth projections. Healthy revenue growth seems to be a challenge for top players. Despite the accelerating positive trends in selective areas of manufacturing, the industry remains plagued with a serious set of challenges. The tire industry needs to move into high gear for rapid adoption of a comprehensive digital transformation initiative aligned with optimizing the entire manufacturing value chain.

Introduction

The global tire industry is witnessing steady growth, driven by increasing vehicle production, rising demand for electric vehicles, and advancements in tire technology. The market size of Global automotive Tire industry is expected to reach around \$425 billion in 2030 with a CAGR of 4.9%. With demand projections poised for consistent growth, leading tire companies would want to position themselves strategically to capitalize on expanding market opportunities.

Despite the growth prospects, the industry is under significant pressure to improve its EBITDA margins, as rising raw material costs and competitive pricing strategies impact profitability.

We clearly observe that the top players are operating within two distinct EBITDA zones: Zone 1, with margins ranging between 15-20%, and Zone 2, with margins between 7-12%. This disparity can be attributed to the differential adoption of technology and digital tools across the value chain. Companies that have embraced digital transformation and advanced operational technologies are reaping the benefits in terms of higher margins, while others lag behind.



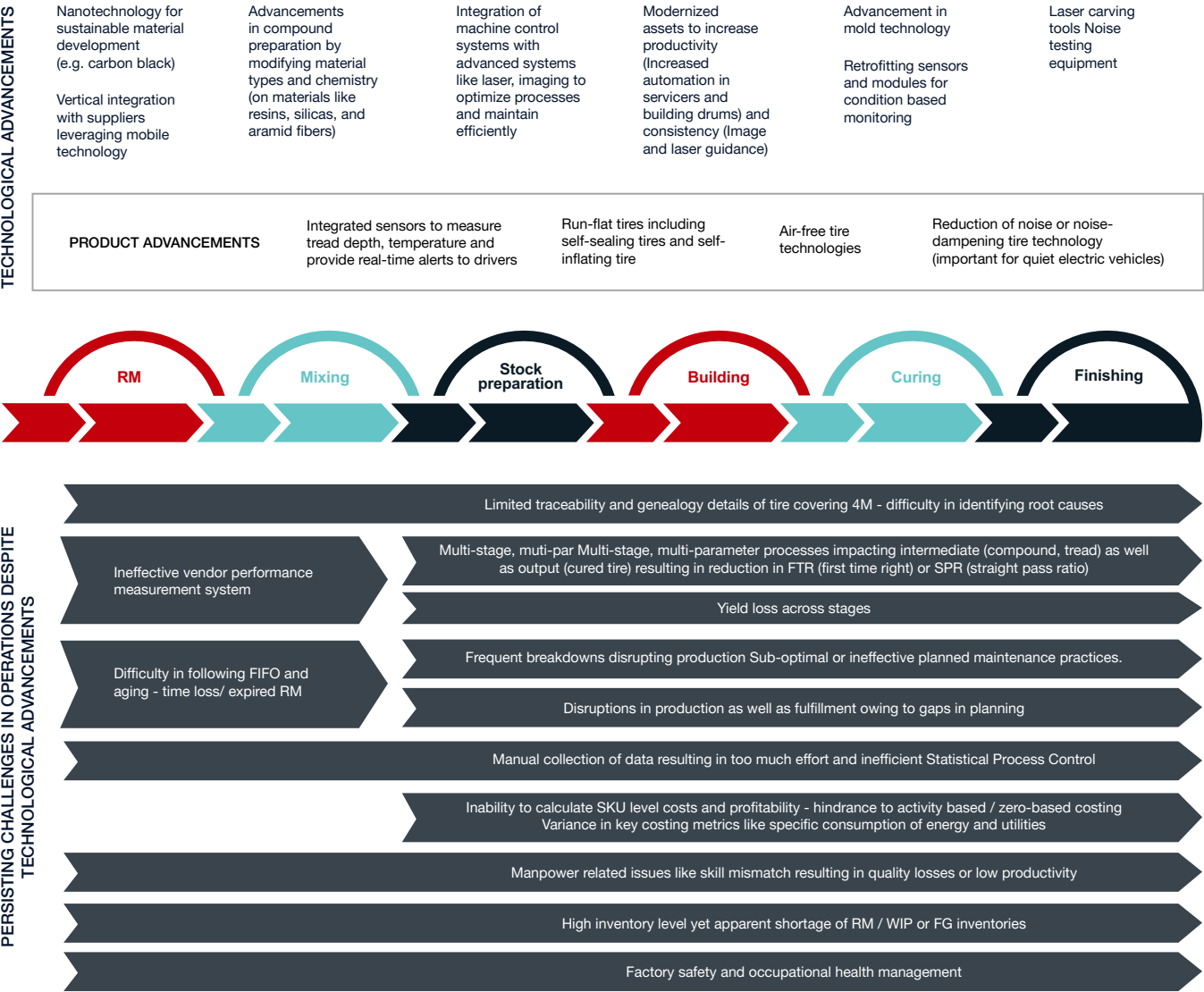
The industry must choose between stagnation and progressing into advanced digital transformation. Companies already using cutting-edge technologies must keep innovating, while those behind need to quickly adopt strategies to boost EBITDA margins and catch up with market leaders.



Current Technological Advancements and Challenges Highlight the Increased Importance of Digital

The need for product innovation enabling Smart Tires Vision, yield maximization, flexible production, defects reduction and increased on-time delivery have already set the stage for digital interventions, at scale. These trends have played a crucial role in driving automation, asset modernization, like modern tire building machines and product and process innovations.

As the industry faces stronger headwinds, we foresee a combination of upstream innovations focused on materials & composition, along with compound preparation for improving efficiency of tires, coupled with downstream innovations through automation of assets to enhance tire quality and manufacturing productivity ensuring industry competitiveness. The schematic below highlights key trends gathering traction across the tire industry value chain:



Despite the accelerating positive trends, the industry remains plagued and beset with a serious set of challenges. While there have been significant piecemeal advancements across individual areas, there is a lack of a unified digital thread across the value chain, which could help the organizations achieve the next level of operational excellence. A holistic perspective is the need of the hour to drive effective digital transformation, wide and deep, in the tire industry.

Digital Solutions for the Tire Industry

As we traverse the journey towards a comprehensive digital transformation in the tire industry, there have been quite a few early wins observed in the Hitachi client base. A leading off-road tire manufacturer was facing issues around shop-floor performance visibility and traceability coupled with a problem of over-weight tires leading to yield loss. The manufacturer's industrial engineering team collaborated with us to identify potential digital solutions for addressing these issues. The initiative prioritized the implementation of Connected Factory and traceability solutions, which helped the organization to connect shop-floor assets and processes as a baseline.

The data gathered also enabled better fact-based root-cause analysis and control of rubber consumption across the tire building value chain. The end-result was a 1% reduction in material consumption while being able to simultaneously enhance OEE.

Another tire manufacturing client was facing issues with the rubber mixing process. Hitachi employed Advanced Process Control (APC) to address the challenges of the process and develop a predictive quality model. The project's focal points encompassed the intricacies of raw material variability and the constraint of fixed process parameters. By deploying predictive models, we unlocked essential insights into the relationship between input variables and output quality. The solution also provides recommendations on optimal value ranges of control parameters to pre-emptively address potential quality deviations. The end goal was a targeted improvement of 5% in the current first pass rate with an associated saving in power consumption through reduced reworks.

Hitachi offers a comprehensive suite of digital solutions covering the entire manufacturing value chain of the tire industry. Each solution, and its constituent components, are geared towards addressing specific business levers and offer tangible potential impact across the value chain through the adoption of these solutions.

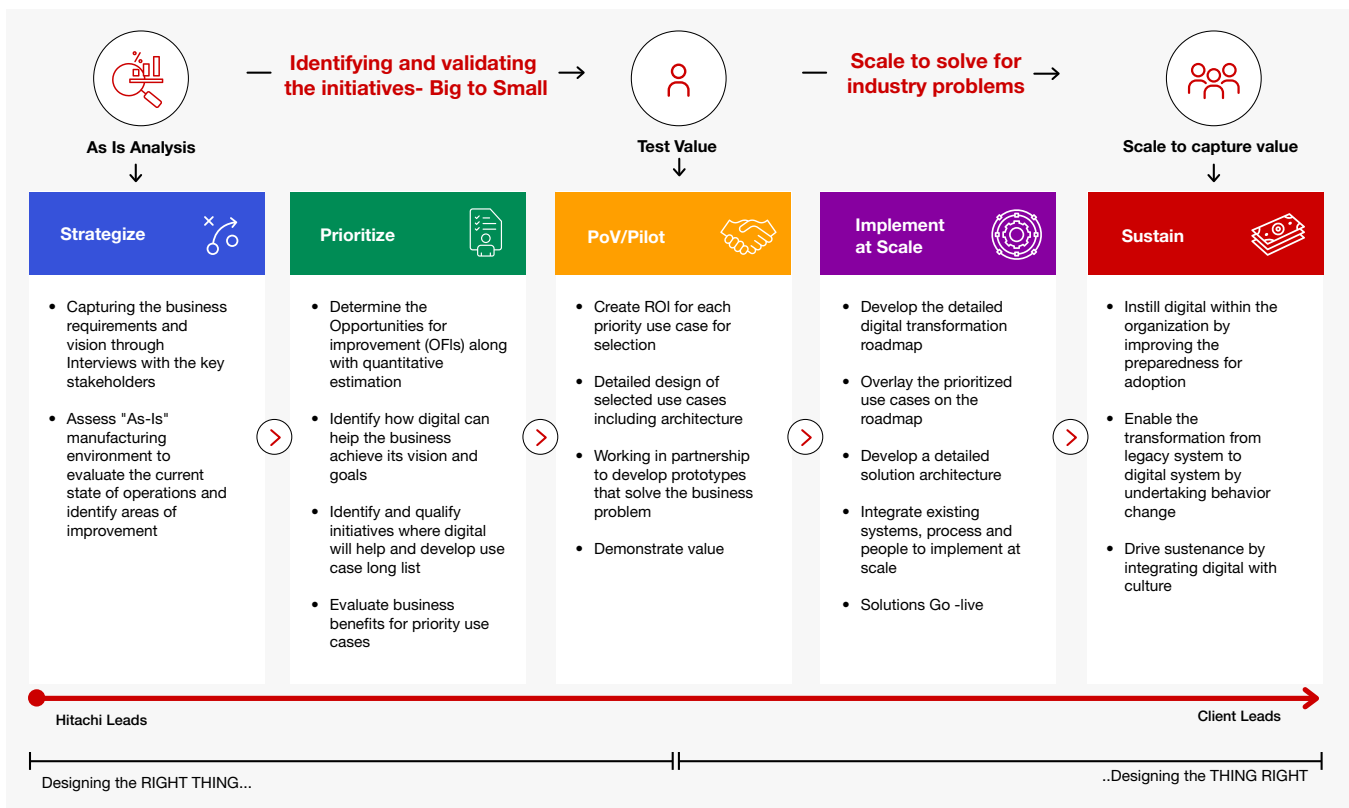


The Road Ahead

The Road ahead seems bumpy for the automotive sector, which will have knock-on effects for the Tire Industry. Piece-meal stakeholders addressing individual silos may generate some excitement but will not lead to sustainable results. The Tire industry needs to move into high gear for rapid adoption of a comprehensive digital transformation program aligned with optimizing the entire manufacturing

value chain. To help the Industry players step on the gas and plan an organization wide digital transformation program, Hitachi can help in defining a comprehensive value driven approach for even the most complex multi-year transformation programs.

The schematic below depicts our value-driven approach for Intelligent Manufacturing Journey, which has been adopted by manufacturers globally across a cross-section of industries.



An outcome driven business metrics focused approach, which considers not just the technology dimension, but the people and process dimensions will only help drive sustainable change. The tire industry needs to prove its mettle in these challenging times and prove that it has what it takes

when the Rubber really meets the Road. Hitachi's Digital Transformation Solutions specifically geared for the tire industry & our industry specific know-how can really help make your transformation journey a success.



Solution	Value chain applicability	Key components	Potential Impact
Digital Health & Safety	Across the Value Chain	- Digital data logging and reporting for all HSE related KPIs - Video analytics-based Worker & Site Safety (e.g. PPE violation detection, Perimeter protection, Intrusion detection etc.) - ID based access control for critical areas to ensure access to relevant stakeholders	LTIFR Reductions
Digital Quality	- Mixer - Calendering units - Extruders	- Advanced Process Controller detecting process anomalies - Ideal operating envelope for controllable parameters to achieve high throughput and quality - Real-time recommendations to avoid probable quality rejections	First pass ratio (5-10%)
Digital Maintenance	- Mixer - Extruders - Cutters - Tire building machines - Curing presses	Integrated reliability centered maintenance solution comprising of - Digital FMEA - Digital fault tree - Asset Remaining useful life & Failure Prediction of critical assets - Spares Management	Availability (5-10%) Maintenance and spares cost (5-15%)
Digital Production	Across the Value Chain	- Integrated system to capture machine parameters - Digital logbooks to capture manual inputs - IoT & Analytics platform for comprehensive insights and management reporting - Barcode enabled scanning of input and output material - System checks to ensure a streamlined process without errors - Bladder and mold management 4M traceability - Digital cost-based value stream map with inputs from connected factory	OEE (10-25%) Consumable cost (5-15%) SKU wise cost and margin visibility Profitability Analysis (2-5% uplift)
Digital Supply Chain	- Raw material procurement - Production - Dispatch	- Digital SI&OP that brings together forecasting, capacity planning, material resource planning - Inputs for actual production capacity, constraints are leveraged from the connected factory solution	Product Lifecycle Assessment Score
Digital Sustainability	Across the Value Chain	- Energy optimization & monitoring through digital tools - Digital Product life cycle management (PLM) tool - GHG Emission tracking dashboard	Product Lifecycle Assessment Score



Accelerate Your Intelligent Manufacturing Maturity Journey

Hitachi has 110+ years of OT experience and 60+ years of IT experience and has partnered with the manufacturing industry to deliver successfully on this approach. Hitachi's Industry Consulting Practice accelerates your digital industrial transformation by assessing your current position in the intelligent manufacturing journey, helping your organization discover transformative use cases that will scale your manufacturing excellence initiatives and recommend leadership approaches that will ensure best outcomes. Schedule time with our manufacturing subject-matter experts and ask for an Intelligent Manufacturing Maturity Assessment for your operations. Reach out to us at manufacturing@hitachids.com.

For more information or to discuss how Hitachi Digital Services can help in your digital transformation journey, you may visit <https://hitachids.com/industry/manufacturing/> or reach out to manufacturing@hitachids.com

About Hitachi Digital Services

Hitachi Digital Services, a wholly owned subsidiary of Hitachi Ltd., is an edge-to-core digital consultancy and technology services provider helping organizations realize the full potential of AI-driven digital transformation. Through a technology-unified operating model for cloud, data, and IoT, Hitachi Digital Services' end-to-end value creation for clients is established through innovation in digital engineering, implementation services, products, and solutions. Built on Hitachi Group's more than 110 years of innovation across industries, Hitachi Digital Services helps to improve people's lives today and build a sustainable world tomorrow. To learn more, visit hitachids.com.

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