PLEX®

6TH ANNUAL
STATE OF SMART MANUFACTURING REPORT

Opportunities & Challenges for Today's Automotive Manufacturers →

Participants in a recent global survey of nearly 300 manufacturers, including 80 automotive manufacturers, recognized the importance of smart manufacturing for agile decision making, process automation, and greater efficiency.

This study from Plex Systems, in collaboration with Hanover Research, explores how automotive manufacturers can use technology to address today's challenges and take advantage of long-term opportunities.

The data reveals a clear need for smart manufacturing technology in order to address current challenges, especially those created or heightened by the COVID-19 pandemic.

- Most automotive manufacturers are currently using at least some components of smart manufacturing to achieve their business goals.

- Technology investments for auto manufacturers are determined predominantly by tangible ROI. The data shows a need for emerging technologies, but auto manufacturers must clearly understand the value cases in order to drive adoption.

- Automotive manufacturers are pragmatic and tend to favor smart manufacturing technologies that complement their existing operations while enabling them to scale and expand over time as new challenges arise.

SMART MANUFACTURING:

The intelligent, real-time orchestration and optimization of business, physical, and digital processes within factories and across the entire value chain. Resources and processes are automated, integrated, monitored, and continuously evaluated based on all available information as close to real time as possible.

MESA International

RESPONDENT DEMOGRAPHICS

In which of the following areas does your organization operate?

18%   20%

29%

67%

- Parts & supplies
- Passenger safety systems
- Electronics
- Coating & painting
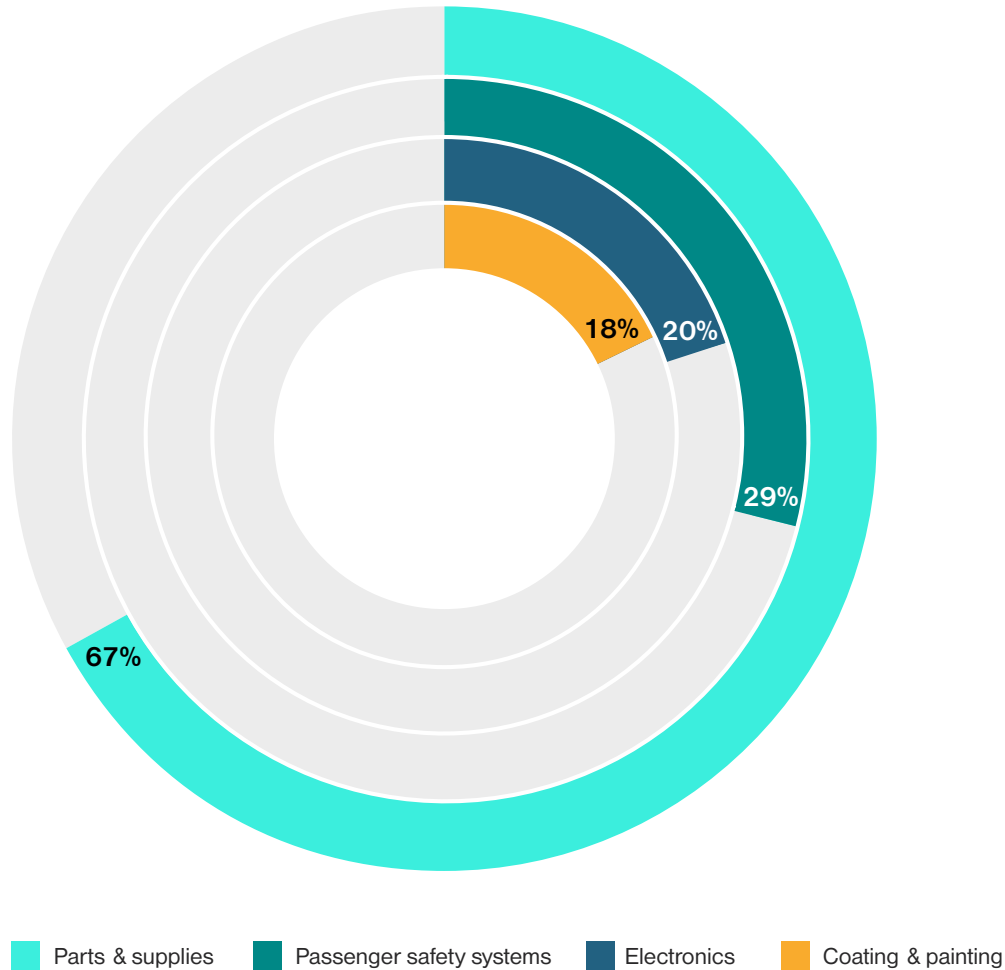
KEY SOLUTIONS

Enterprise Resource Planning (ERP): Automates front- and back-office processes, including financial management, revenue management, human capital, order management, billing, and inventory

Manufacturing Execution Suite (MES): Tracks and documents the transformation of raw materials into finished goods, providing real-time production management to drive enterprise-wide compliance, quality, and efficiency

Quality Management System (QMS): Standardizes and automates quality documentation, processes, and measurements

Supply Chain Planning (SCP): Combines data from multiple departments across the business to sync demand and supply forecasting to improve inventory accuracy and production management

Industrial IoT (IIoT): Combines process, operational, and machine-level data to improve business performance, automate production and business processes, and increase plant floor production efficiency

Manufacturing Analytics: Provides systematic analysis of data to discover deeper insights, make predictions, or generate recommendations

SMART TECHNOLOGY IN AUTOMOTIVE MANUFACTURING TODAY

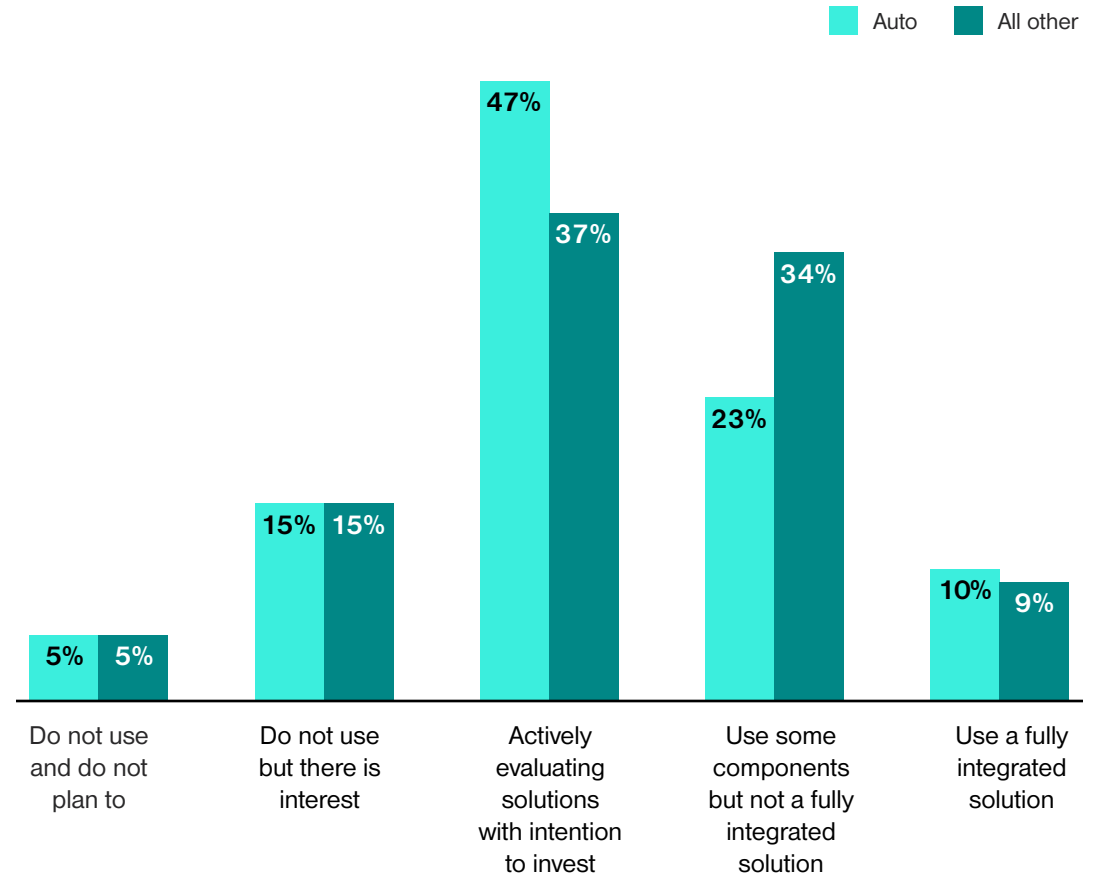**To what extent is your organization using smart manufacturing?**

THE VALUE OF SMART MANUFACTURING

78%

of automotive industry professionals feel smart manufacturing is very important to their future success.

Though many manufacturers are actively using smart manufacturing technologies, automotive manufacturers are slightly behind other sectors in adoption.

Despite this lag, many auto manufacturers say they are actively evaluating smart manufacturing solutions, and very few have no plans to adopt.

Legend: ■ Auto ■ All other

Category	Auto	All other
Do not use and do not plan to	5%	5%
Do not use but there is interest	15%	15%
Actively evaluating solutions with intention to invest	47%	37%
Use some components but not a fully integrated solution	23%	34%
Use a fully integrated solution	10%	9%

Cloud adoption among manufacturers is at an all-time high, laying the foundation for future smart manufacturing initiatives.

Nearly two-thirds of automotive manufacturers are running the majority of their enterprise software solutions, such as ERP and CRM, in the cloud, slightly outpacing the rest of the manufacturing industry.

How much of your enterprise software is in the cloud vs. on-premise?

Auto | All other

	Auto	All other
All in the cloud	10%	14%
Mostly in the cloud	54%	48%
Equally in the cloud and on-premise	30%	28%
Mostly on-premise	4%	7%
All on-premise	1%	3%
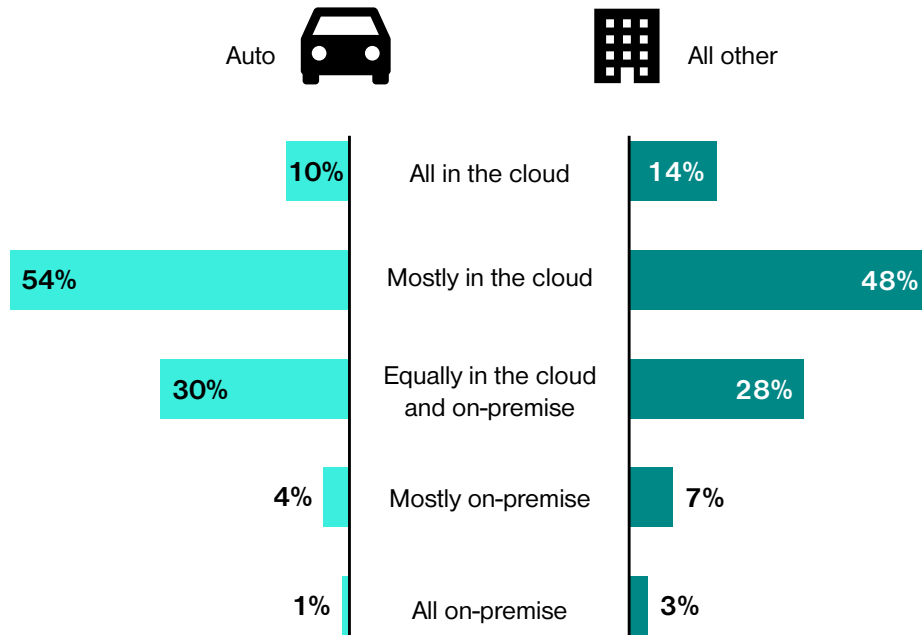
PROOF POINT: HORIZON TECHNOLOGY

"The only work involved in rolling Plex out to employees was to set up a new computer with an internet connection. We quickly gained the ability to use an integrated system with no manual recordkeeping and easy access to data for everyone."

Cathy Cuneo
*Quality Manager at **Horizon Technology***

View as very or extremely valuable:

Auto manufacturers generally place **higher value** on smart manufacturing components that are **closer to the plant floor** and considered **core to manufacturing operations**.

Auto manufacturers place slightly **lower value** on smart manufacturing components they view as having **less clearly defined value cases**, suggesting a need to better understand the potential ROI of these technologies and their **ability to solve business challenges**.

89% — Manufacturing execution systems (MES)

81% — Quality management systems (QMS)

76% — Manufacturing Analytics

66% — Industrial IoT (IIoT)
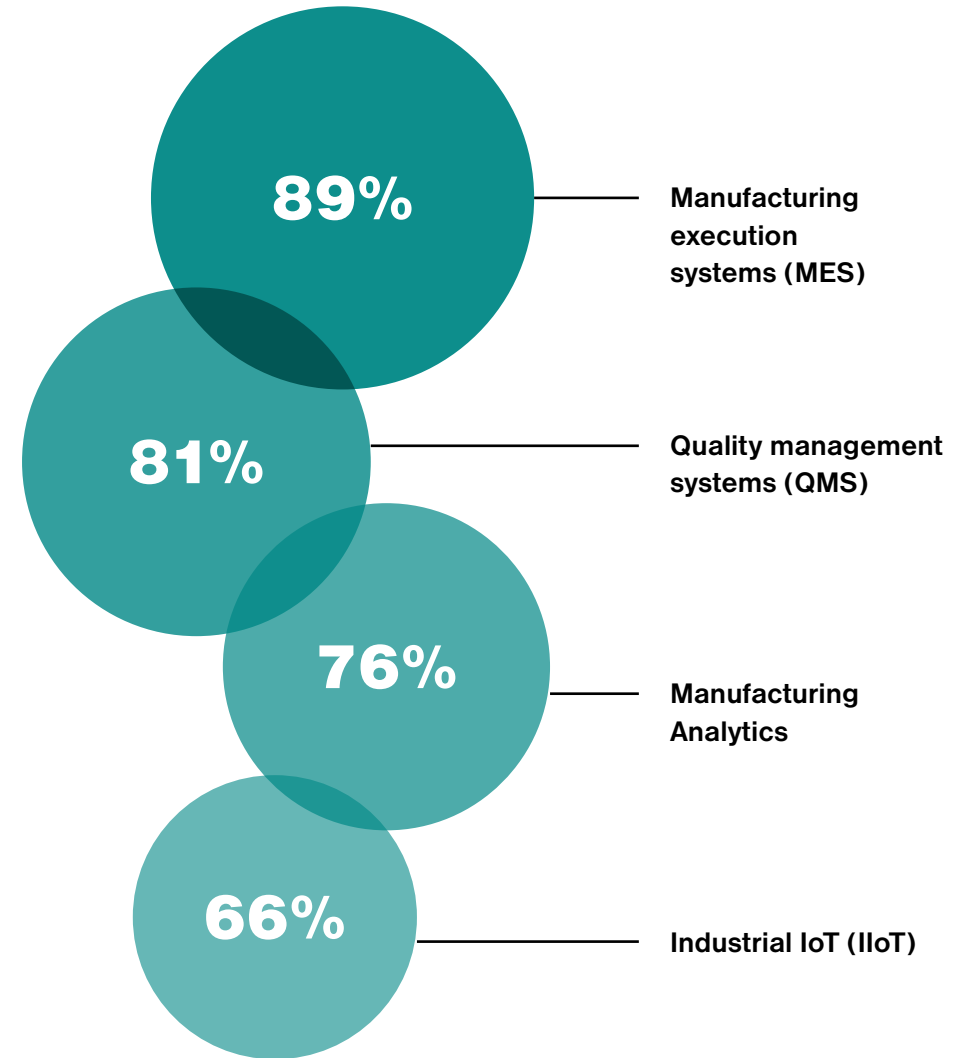
OVERCOMING BARRIERS TO CLOSE THE ADOPTION GAP

Companies are looking to adopt smart manufacturing solutions but face some roadblocks. Cost and lack of clarity around value are among the top barriers to adoption—when the value is not understood, the cost is perceived as high.

- Concerns around cost and employee adoption are notably higher in the automotive sector. This is likely due to auto manufacturers' **pragmatic approach to investing in technology** that aligns with clearly defined business value and addresses widespread workforce challenges.

- Focusing short-term on their core production business while **failing to innovate** could hurt auto manufacturers long-term.

What are the barriers to adopting smart manufacturing?

Barrier	Auto	All other
Cost/Expense	51%	39%
Lack of skill set to take advantage of smart manufacturing technology	46%	32%
Employee resistance to technology adoption and change	37%	26%
Lack of clear definition of smart manufacturing value	33%	32%
Lack of skill set to manage smart manufacturing implementation	33%	27%

Legend: ■ Auto   ■ All other
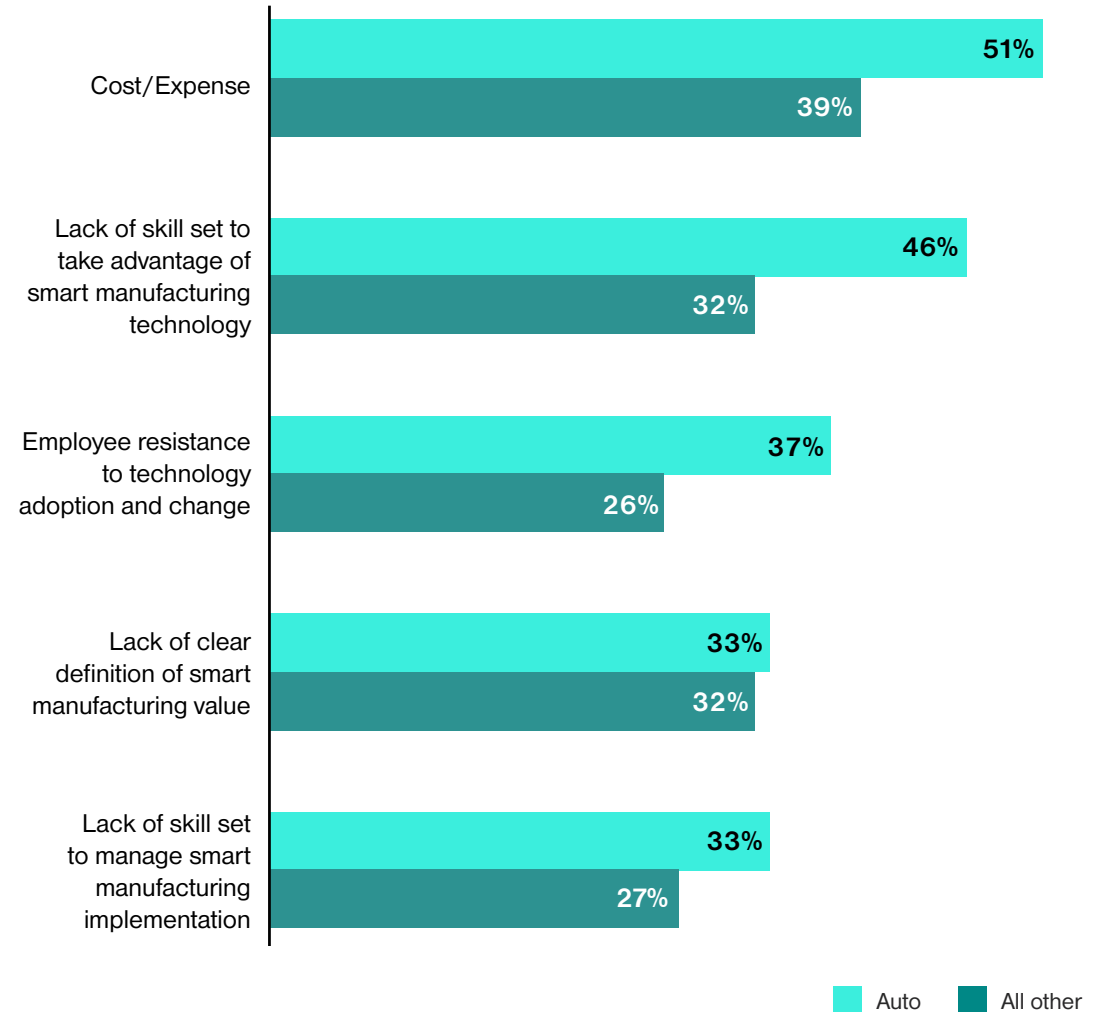
While automotive manufacturers favor smart technologies in core manufacturing operations, multiple points of entry to smart manufacturing are possible with a lower initial investment that scales over time, including quality management, machine integration, process automation, Industrial IoT, manufacturing analytics, and supply chain planning.

- These investments help manufacturers **decrease waste, improve resource efficiency, and enhance operational performance**—thereby improving customer satisfaction and market competitiveness.

- Early wins help **build the business case** for additional investment and scaled expectations.

PROOF POINT: MOTUS INTEGRATED TECHNOLOGIES

"When we launched Plex in our production facilities, it brought with it a foundation of change and visibility. We gained a better understanding and control of our inventory and increased our operational efficiencies. We've also reduced human errors, decreased our scrap rates, and increased the quality of our product by identifying production errors earlier in the process."

Garn Evans
*CIO at **Motus Integrated Technologies***

ADDRESSING CHALLENGES HEAD-ON

The automotive industry is experiencing major shifts. Consumer purchasing behavior is changing, and governments around the world are pushing the auto industry to reduce carbon emissions and adopt sustainable operational practices, causing auto manufacturers to assess both their financial operations and social responsibilities.

The past year has particularly tested auto manufacturers' preparedness to navigate major disruption that **heightened workforce challenges** and **increased competition in a volatile market.**

What are the biggest obstacles to your organization's growth?
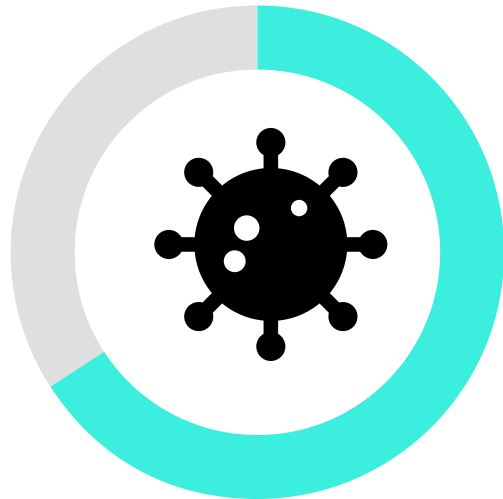
66%
Impact of COVID-19 pandemic
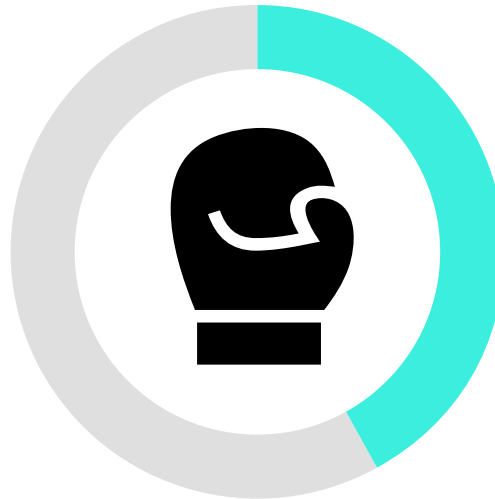
42%
Competition
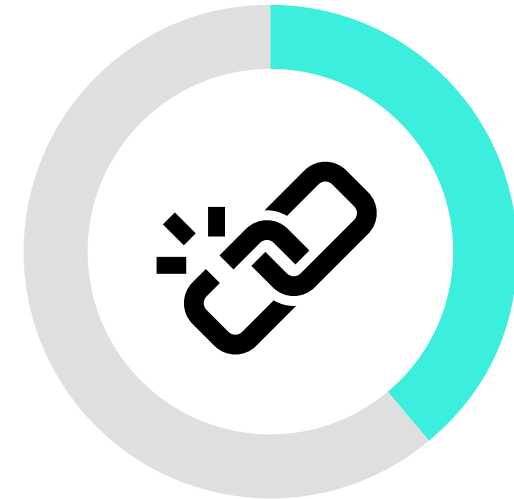
39%
Supply chain disruption

NAVIGATING SUPPLY CHAIN DISRUPTION

Unsurprisingly, automotive manufacturers have been impacted by supply chain challenges due to the COVID-19 pandemic. This disruption has emphasized the need to develop a **more agile supply chain** and **contingency plans for unforeseen shutdowns**. Forced closures in some regions and reduced staff per shift no doubt contributed to some supply chain fluctuation.

How has the COVID-19 pandemic affected your organization?

Increase efficiency with smaller workforce	80%
Greater interest in developing more agile supply chain	71%
Developed contingency plan for widespread disruption	67%
Restored confidence in ability to plan for business disruption	66%
Complied with COVID-19-specific regulations	66%
Reprioritize investments	65%
Unable to produce at capacity due to lack of qualified workers	62%
Organization has diversified (e.g., industry, product)	56%

While nearly three-fourths of automotive manufacturers feel supply chain planning is very or extremely valuable, they rely more heavily on error-prone manual or homegrown supply chain planning solutions than the industry as a whole.
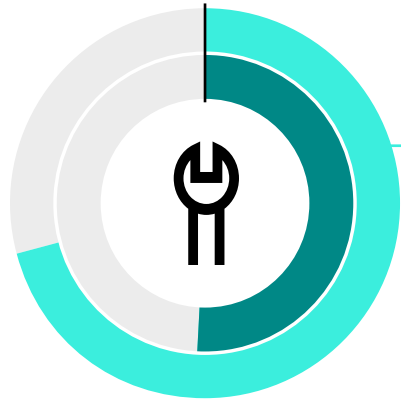
71% of auto manufacturers use manual or homegrown solutions compared to **51%** of manufacturers across all other sectors.
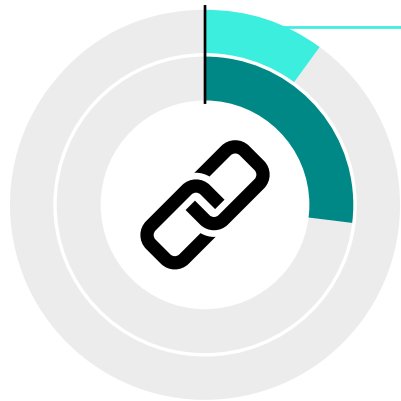
Only **10%** of auto manufacturers use connected supply chain planning solutions compared to **27%** of non-auto manufacturers.

Connected supply chain planning solutions that are cloud-based, scalable, and able to connect business and operational data enable manufacturers to:

Navigate supply chain disruption

Remain steady amidst a changing market

Use data to understand where and how to pivot their operations

ADDRESSING WORKFORCE CHALLENGES

Compared to the manufacturing industry overall, automotive manufacturers have felt a stronger negative impact on their organizations' internal operations due to the pandemic, such as production output and ability to meet market or customer demands.

91%

have experienced adverse impact compared with 74% of other manufacturers.
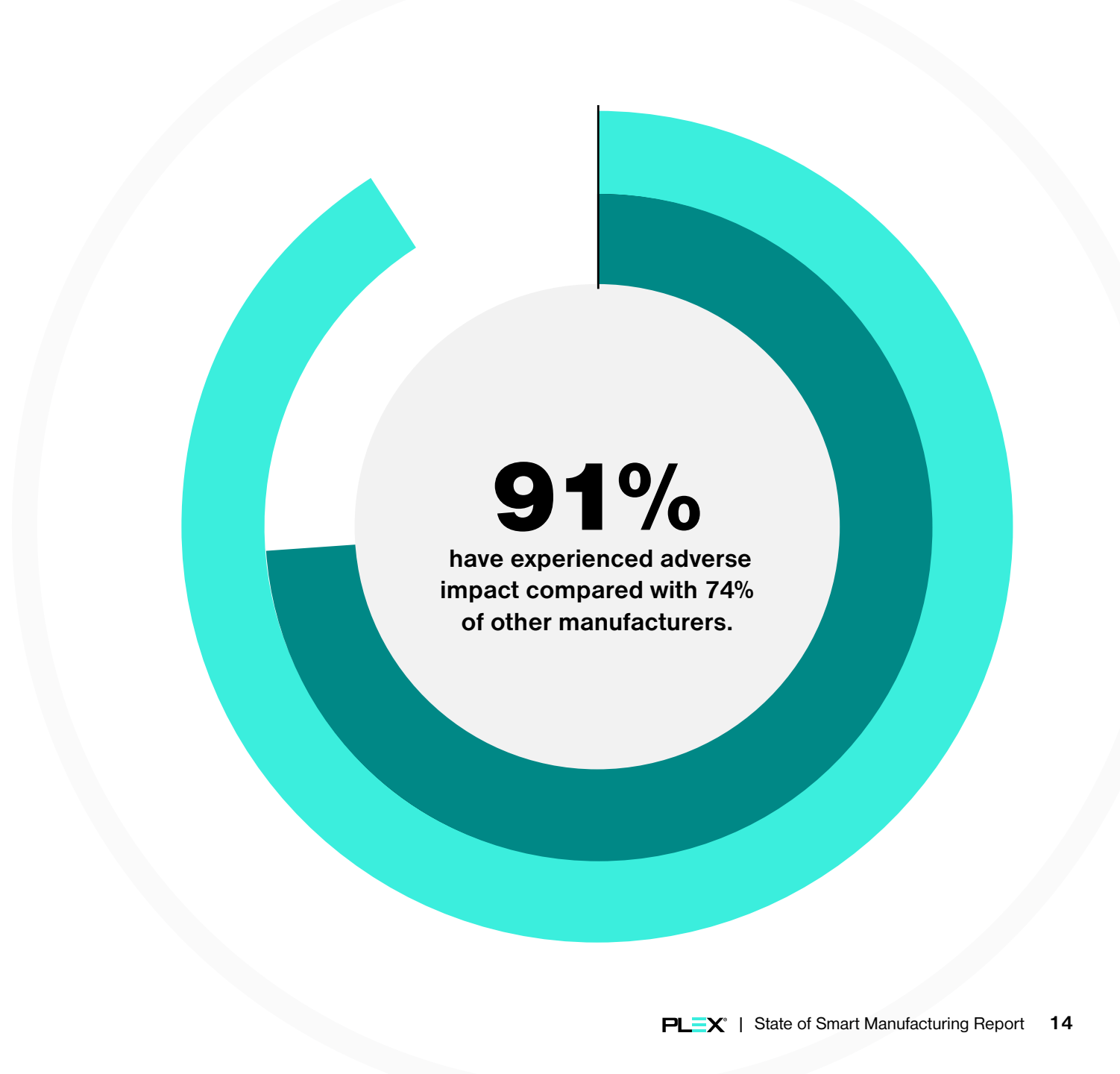
Key areas of automotive manufacturers' operations have been affected by the COVID-19 pandemic to a greater extent than the industry overall:

🚗 Auto	**80%**
🏢 All other	**69%**

80% of auto manufacturers see a need to increase their efficiency with a smaller workforce compared to **69%** of other manufacturers.

🚗 Auto	**62%**
🏢 All other	**53%**
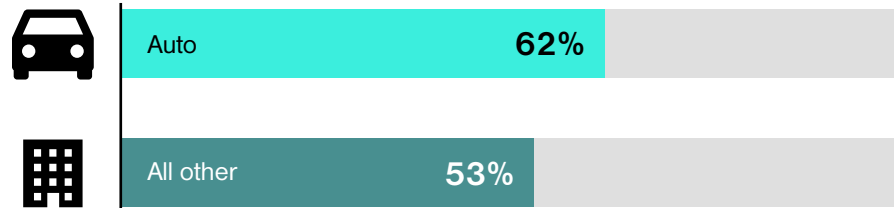
62% of auto manufacturers say they haven't been able to produce at capacity due to lack of qualified workers compared to **53%** of other manufacturers.

To address these needs, auto manufacturers are turning to automation.

- Auto manufacturers lead other sectors in automation, with nearly three-fourths using software and/or hardware to automate processes.

- Compared to the industry overall, auto manufacturers place slightly greater importance on technologies capable of automating business processes and automatic machine control.

- 43% of auto manufacturers plan to increase their future spend on automation.

Automation affects workers' skills in two ways depending on how and where it is implemented in an organization's operations:

While smart technologies can reduce the number of workers on the factory floor, they can provide career growth opportunities as employees learn critical new technical skills.
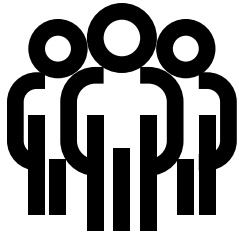
Automation can also reduce complexity, making it easier and faster to hire and onboard lower-skilled employees.

WORKFORCE INSIGHTS FROM PLEX

As manufacturing production recovered during the latter half of 2020, the number of unique users logging into Plex increased by 8% while the production rate increased by 18%.

Despite a lower workforce volume, Plex customers are able to meet high levels of production through investments in automation tools and smart technologies in addition to traditional measures such as additional shifts.

COMPETING IN A VOLATILE MARKET

The COVID-19 pandemic has increased competition and elevated the need for manufacturers to address gaps hindering their success. Compared to other sectors, auto manufacturers see a greater need for technology and access to/ability to use data effectively in order to gain a competitive edge.

Given the self-identified need for both technology and access to data in order to compete, it's not surprising that automotive manufacturers are significantly behind in leveraging technology for use cases that require the collection, connection, and analysis of data from throughout the organization.

Which of the following does your organization lack that would help outpace the competition?

Technology
- 35% Auto
- 22% All other

Skilled workforce
- 32% Auto
- 31% All other

Access to data
- 25% Auto
- 14% All other

Auto | All other

Which operational activities are you currently supporting with software and/or hardware?

Automating processes
- 72% Auto
- 69% All other

Tracking corporate data (e.g., financials, human capital management)
- 65% Auto
- 72% All other

Connecting people, systems, machines, and supply chains
- 58% Auto
- 75% All other

Leveraging analytics for insights into the business
- 52% Auto
- 70% All other

Tracking plant floor production data
- 51% Auto
- 61% All other

Auto | All other
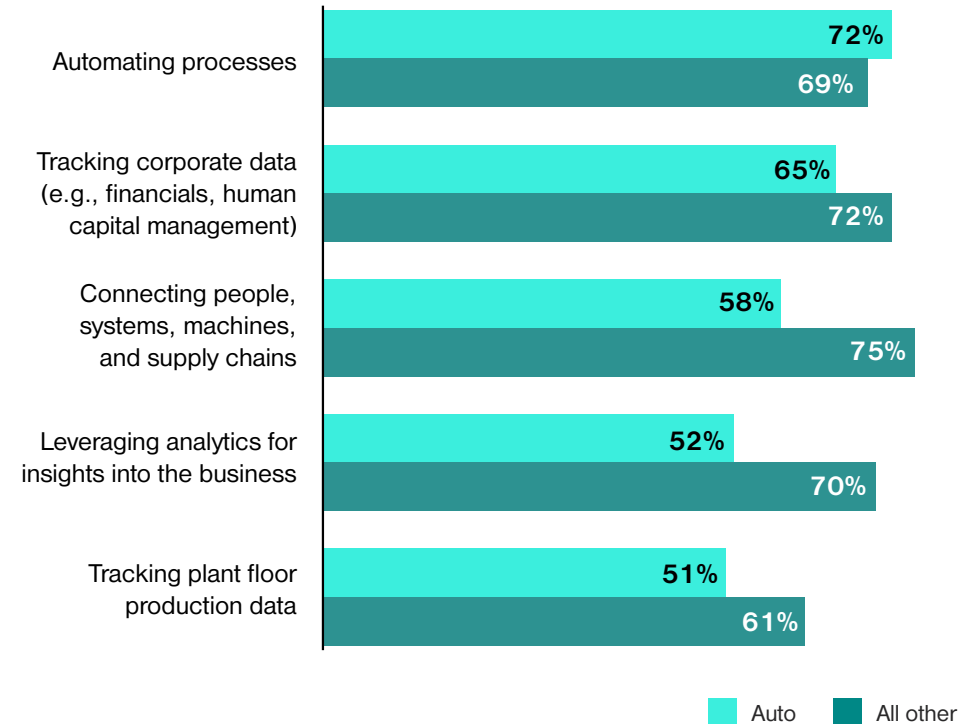
Though they ranked Industrial IoT and manufacturing analytics slightly lower in importance than the rest of the industry, auto manufacturers have a very real desire to capture and use data more effectively. To accomplish this, auto manufacturers have the opportunity to expand their use of connected devices, which harness valuable production data close to the source.

38% of auto manufacturers are using sensors in their operations compared to **48%** of other manufacturers.
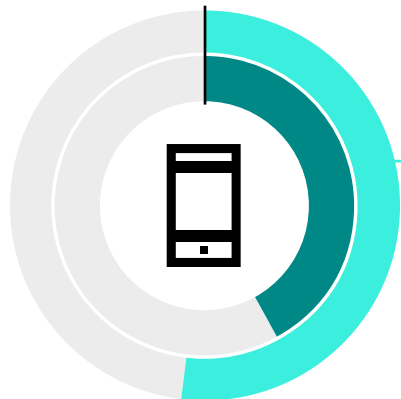
42% of auto manufacturers are using consumer devices like mobile phones compared to **52%** of other manufacturers.

PROOF POINT: COASTAL AUTOMOTIVE

"We had no trouble getting people excited about Plex because it means they're not tethered to individual work carts anymore. When you put a wireless smart scanner in their hands, they can be much more mobile and get jobs done more quickly as inventory moves through our facilities."

Jeff Bender
Materials Manager at Coastal Automotive

Using smart technology to capture and analyze valuable production data—especially on the plant floor—will increase manufacturers' visibility into their operations and support data-driven decision making to improve their organization.

Nearly half of auto manufacturers currently collect data to monitor specific operational areas such as sales performance and supply chain risk, but there is huge opportunity to adopt smart technologies that can connect and analyze enterprise-wide data to achieve greater visibility, efficiency, and agility.

How does your organization use data collected from the technology, processes, connected devices, etc. you currently have in place?

BETTER SERVE CUSTOMERS	AUTO	OTHERS	INCREASE OPERATIONAL EXCELLENCE	AUTO	OTHERS	IMPROVE HEALTH OF SUPPLY CHAIN	AUTO	OTHERS	MITIGATE RISK	AUTO	OTHERS
Sales analytics	48%	41%	Process optimization	42%	46%	Monitoring or managing supply chain risk	46%	40%	Evaluating critical suppliers	51%	45%
Sales and operations planning	41%	45%	Management dashboards	42%	33%	Supplier performance	29%	38%	Backing up data	44%	46%
Improve/monitor product quality	29%	42%	Artificial Intelligence/ Machine learning	34%	41%	Supply and/or demand planning	25%	41%	Ensuring data accuracy for reporting and informed decision making	37%	42%
Inventory forecasting	20%	42%	Production planning/ scheduling	33%	48%				Isolating supply chain problems	30%	41%
			Predictive maintenance	28%	35%						

LOOKING AHEAD TO FUTURE OPPORTUNITIES

Given the level of disruption caused by the pandemic, it's no surprise that COVID-19 has shed light on the need for smart manufacturing processes and technologies across industries.
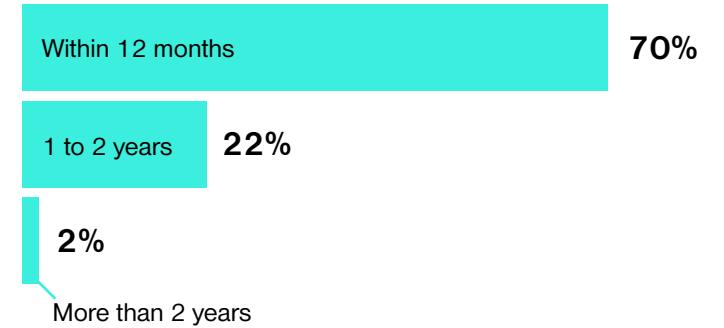
Although 2020 posed several challenges for the automotive industry, it also accelerated digitization across several operational areas.

87% of auto manufacturers agree that the COVID-19 pandemic has **increased the need for smart manufacturing processes and technologies.**

71% of auto manufacturers say the COVID-19 pandemic has **made investing in smart manufacturing technology a higher priority.**
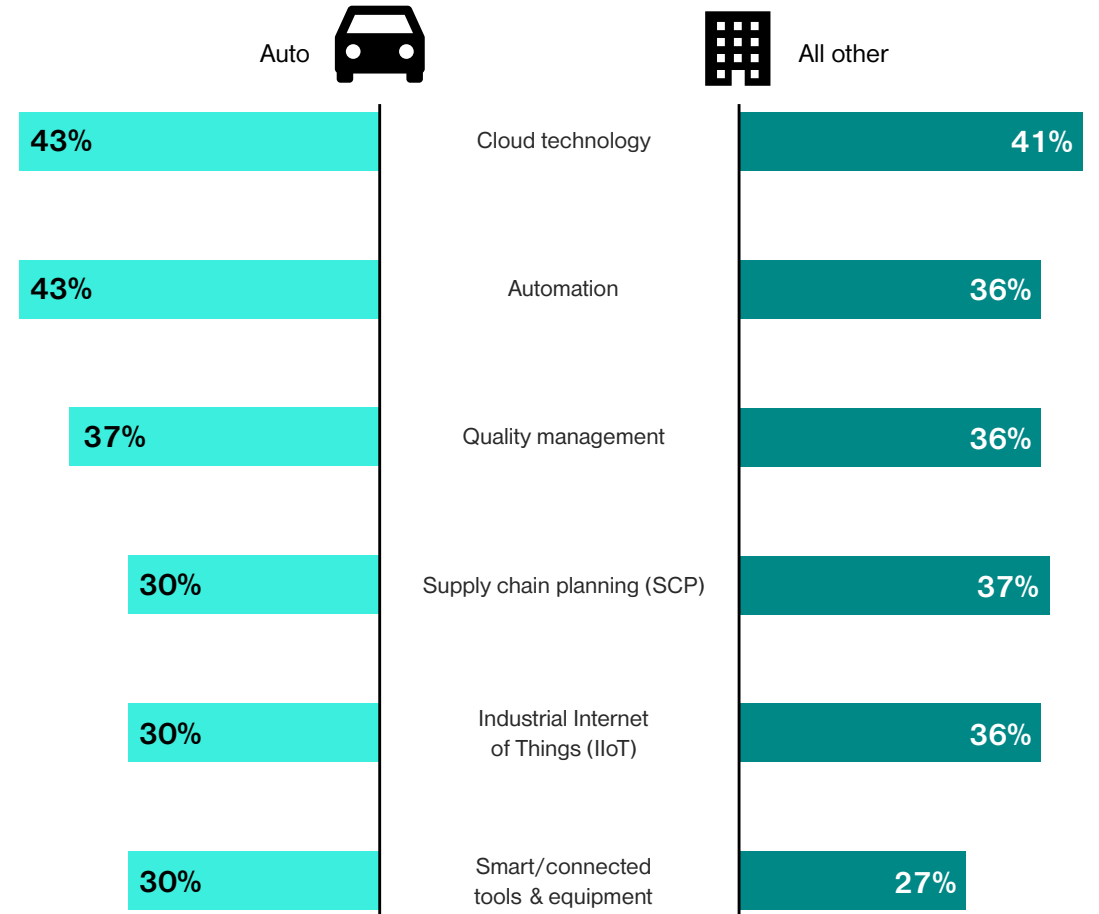
70% of auto manufacturers with plans to adopt smart manufacturing will **do so within the next 12 months, outpacing the industry overall.**

When does your organization plan to adopt smart manufacturing?

Within 12 months — **70%**
1 to 2 years — **22%**
2% More than 2 years

Within 12 months — **57%**
1 to 2 years — **30%**
6% More than 2 years

Where do you plan to increase tech spend in the future?

Auto manufacturers are especially ready to invest in cloud technology and automation, which help make for better, higher-quality products while supporting productivity improvements.

Auto | | All other

	Auto		All other
Cloud technology	43%		41%
Automation	43%		36%
Quality management	37%		36%
Supply chain planning (SCP)	30%		37%
Industrial Internet of Things (IIoT)	30%		36%
Smart/connected tools & equipment	30%		27%

Auto manufacturers have perhaps the greatest opportunity of any sector to capitalize on Industrial IoT in the coming year as a pragmatic solution to business challenges. The impact of these initiatives can extend beyond the plant floor to include both cultural and strategic business transformation. Companies that reimagine their operations and build a culture of continuous improvement stand to gain a significant competitive edge.

There's reason for auto manufacturers to be optimistic. Adopting smart manufacturing technology can address business challenges by **connecting systems, tracking data, enabling remote access**, and **creating process efficiencies**.

PROOF POINT: MPI CORPORATION

"Industrial IoT presents an opportunity to look at the business and say, 'How can we change? What can we do better? What can we impact in a positive way?' At MPI, we targeted reducing gap time on heat treat furnaces. We've seen up to a 10% increase in revenue during our busiest times simply by increased productivity of our assets."

Robert Bierwagen
*VP of Digital Strategy at **MPI Corporation***

The Value of Industrial IoT

CONNECTING
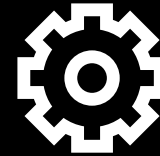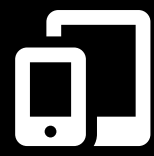
Systems   Networks   Devices
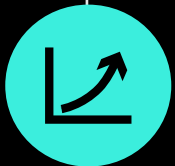
IN ORDER TO

Analyze data   Identify gaps   Improve business processes   Create value efficiently

TAKING ACTION

Smart manufacturing adoption is driven by business challenges, including competitive threats, fluctuating demand, and workforce availability. Manufacturers need to pragmatically invest in technology and build towards a culture of data-driven operations in order to boost ROI and adapt to ever-changing conditions.

"The digital world has enabled a new reality. It will be the companies with the right mix of talent and software tools that will be best able to recover and thrive in these changing conditions."

IDC MarketScape: Worldwide SaaS and Cloud-Enabled Medium-Sized/Midmarket Business ERP Applications 2020 Vendor Assessment (doc #45972120, July 2020)

IDC | ANALYZE THE FUTURE

THE WAY TO MANUFACTURING SUCCESS

Smart manufacturing is essential for future success. Manufacturers will be able to adapt in a changing market and unlock long-term opportunities by connecting and automating their business.

- Incremental adoption of smart technologies can help manufacturers gain value over time.

- Many possible entry points to smart manufacturing exist, and manufacturers should weigh their options and prioritize improvements that will yield the greatest value.

STARTING YOUR SMART MANUFACTURING JOURNEY

What are the operational challenges you're trying to solve?
Identify challenges with the greatest financial and productivity impacts, then prioritize those that are highest in value and attainable through technology.

Where are your information gaps?
Identify the essential information you need to solve your operational challenges and develop key use cases to collect and analyze that information.
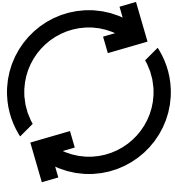
Which use cases offer the right balance of value creation and time-to-value?
Invest in the smart manufacturing solutions that deliver results for your highest-priority use case.

MAKING THE BUSINESS CASE FOR
SMART MANUFACTURING

Smart manufacturing provides the following key benefits:

Efficiency
- Production efficiencies through process automation
- Human resource efficiencies from a single source of accurate, trustworthy data
- Continuous operational improvements driven by real-time, data-backed insights

Achievable ROI
- A pragmatic, stepwise approach lowers adoption risk while providing returns to fund future smart manufacturing initiatives

Risk Mitigation
- Reduced exposure to IT vulnerabilities including system downtime, security breaches (cyber attacks), and application currency

Making a business case for smart manufacturing can help communicate the benefits, gain approval, and accelerate adoption and time-to-value. Plex can help.

ABOUT PLEX

Plex is the leader in cloud-delivered smart manufacturing solutions and has been helping manufacturers improve their businesses for decades. Plex has resources and deep industry expertise in defining business value from technology, and we're ready to assist manufacturers in adopting smart manufacturing technology and processes to achieve their business goals.

Learn how to achieve your business goals using smart manufacturing at Plex.com

PLEX MAKE IT SMART™

www.plex.com