UHY

PRODUCED BY MetalForming Magazine

PMA PRECISION METALFORMING ASSOCIATION

AI in Manufacturing: Unlocking Efficiency and Innovation

July 16-17, 2025

Chicago, IL

Cory McNeley

Professional Experience

- Implemented over 40 different ERP systems to include Epicor, STS, JD Edwards, SAP, Microsoft Dynamics, Acumatica, Procentia, and others for fortune 100 and 500 organizations.
- Designed and developed customized ERP integrations for fortune 250 manufacturing organization.
- Designed and developed customized internal ERP system for fortune 100 retail organization
- Project managed digital transformation which included implementation of multiple ERP systems for large government municipality.
- Identified $74 million in cost savings opportunities by launching an enterprise technology system that uncovered vulnerabilities and highlighted employee accountability issues.
- Designed, developed and implemented a systemic data mining solution for a fortune 500 organization that identified 15 million dollars in waste.
- Developed various predictive models to identify anomalies in inventory and sales patterns, reducing shrink and unnecessary inventory growth by $28 million over three years.

Background

- Twenty-two (22) years of organizational development, process improvement, software development, and software implementation experience.

Education

- Michigan State University, Masters in Management, Strategy and Leadership
- Thunderbird School of Global Management, International Business
- Cal State Fullerton, Business Administration

Cory McNeley
Managing Director

Agenda

I. Background

II. Why AI is transforming manufacturing

III. Key technologies and use cases

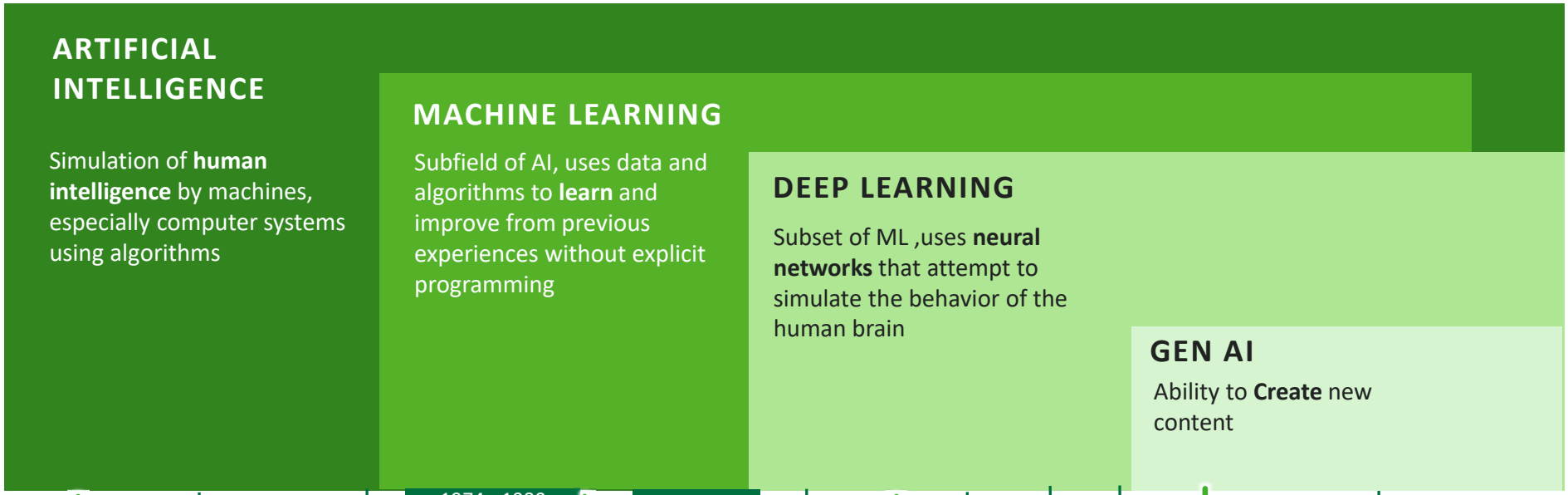
IV. Real-world case studies

V. Implementation strategies

VI. Measuring impact

VII. Where to start your journey

The Path of AI



1950s

1956: Birth of Artificial Intelligence as a field, advanced programming begins

1964: MIT launches 1st chatbot named Eliza

1974 - 1980 AI Winter I

1980s

1987 – 1993 AI Winter II

1997: IBM's Deep Blue defeats world chess champion

2010s

2011: Apple introduces Siri

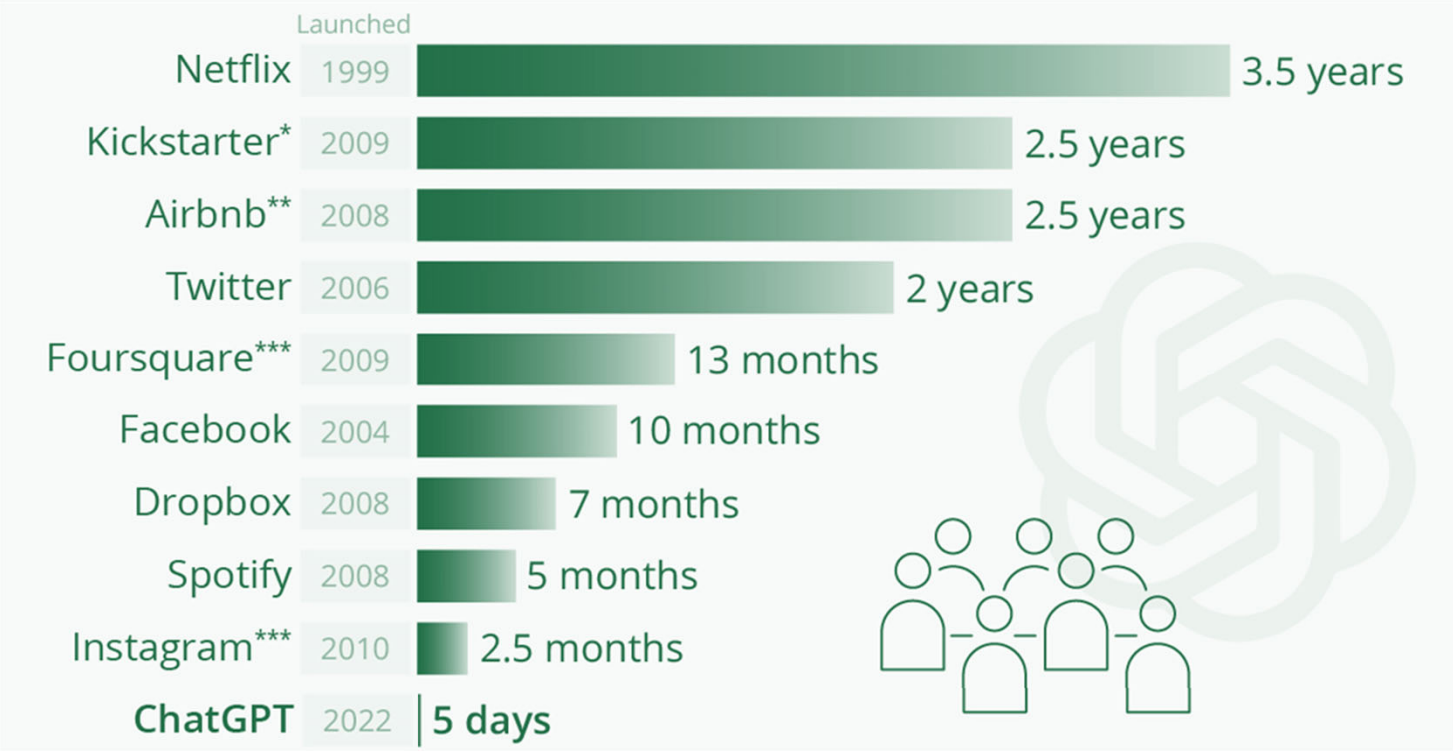
2014: Amazon launches Alexa

2015: Alpha Go

2020s

2022: November ChatGPT launched - **Generative AI takes off**

Speed of Adoption: Launch → 1MM Users



Source: Statista

ChatGPT Model	Year	Parameters
GPT	2018	117M
GPT-2	2019	1.5B
GPT-3	2020	175B
GPT-4	2023	>1.7T

The Chat-GPT4o model has an estimated 1.7 Trillion parameters in it's training data!
By contrast the previous version utilized only 175B.

Top 10 Standalone AI Tools in 2025

Rank	Tool	Category	Monthly Active Users (MAUs)
1	ChatGPT	Conversational AI	600M+
2	Google Gemini	Conversational AI	350M+
3	Grammarly	Writing Assistant	89M
4	Claude (Anthropic)	Conversational AI	105M
5	Perplexity AI	Conversational Search	133M
6	Midjourney	Image Generation	24.7M
7	Microsoft Copilot	Productivity Assistant	101M
8	Jasper AI	Content Generation	(MAUs not disclosed)
9	Runway ML	Video Generation	(MAUs not disclosed)
10	Synthesia	Video Generation	(MAUs not disclosed)

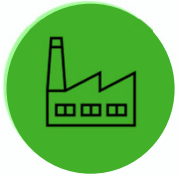
Notes: Some tools like Jasper AI, Runway ML, and Synthesia have not publicly disclosed MAU figures.

Sources: Business Insider, TweakTown, Financial Times (FT.com), Backlinko, OpenAIJourney, Grammarly Reports, Microsoft AI Insights.

AI is Everywhere

ENTERTAINMENT

PUBLIC AND PRIVATE TRANSPORTATION



MANUFACTURING

HEALTHCARE

SERVICE INDUSTRY

RETAIL AND WHOLESALE

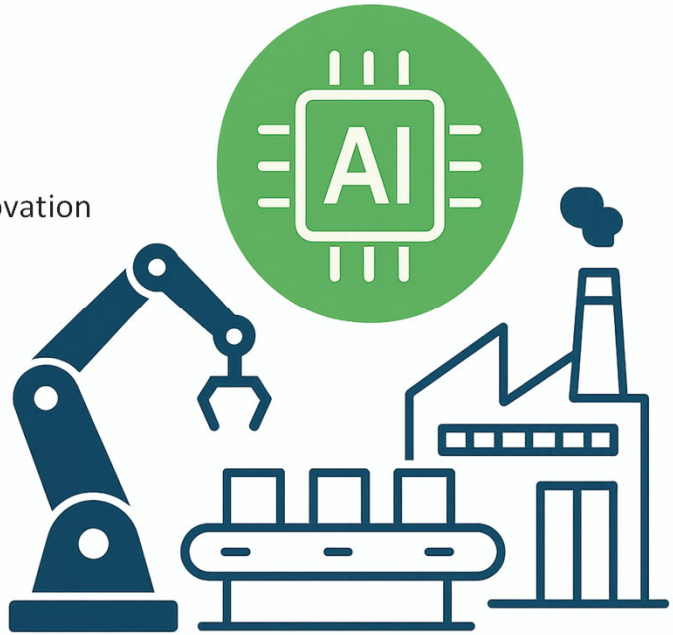
HOMES

ENERGY

Why AI Matters in Manufacturing

The Macro View

- AI's rising influence across all industries sectors
- Global pressures within the supply chain and talent pool are necessitating innovation
- Automation powered by AI will spur the Industry 5.0 revolution



Sector Specific

- High potential for efficiency, accuracy, and adaptability
- AI based MES and operator instructions
- R&D to facilitate A/B testing

The Challenges Manufacturers Face

Pain Points AI Helps Solve:

- Skilled labor shortages - Automate routine tasks and augment workforce capabilities to mitigate labor gaps.
- Supply chain unpredictability - Use predictive analytics to anticipate disruptions and optimize logistics planning.
- Rising operational costs - Improve efficiency, reduce waste, and optimize resource utilization through AI-driven insights.
- Quality control limitations - Enhance defect detection and process consistency using computer vision and real-time monitoring.
- Energy Consumption and Sustainability - AI enables real-time energy monitoring and optimization to support ESG goals and reduce costs.

How can manufacturers harness AI to achieve meaningful outcomes—without incurring excessive cost, risk, or complexity?

Understanding AI in the Manufacturing Context

Core Technologies

- Machine Learning & Deep Learning – Algorithms that learn from data to predict, classify, and optimize processes
- Predictive Analytics – Forecasting maintenance needs, demand trends, and process outcome
- Computer Vision – Visual inspection for defects and quality control
- Intelligent Automation – Automating repetitive and rule-based tasks with adaptive intelligence

How It Works

- Large Data Sets – Historical and real-time data are the fuel for AI
- Complex Algorithms – AI models that learn patterns and relationships
- Automated Decisions – Real-time decision-making based on insights
- Human in the Loop Decisions – AI supports decisions, but people stay in control

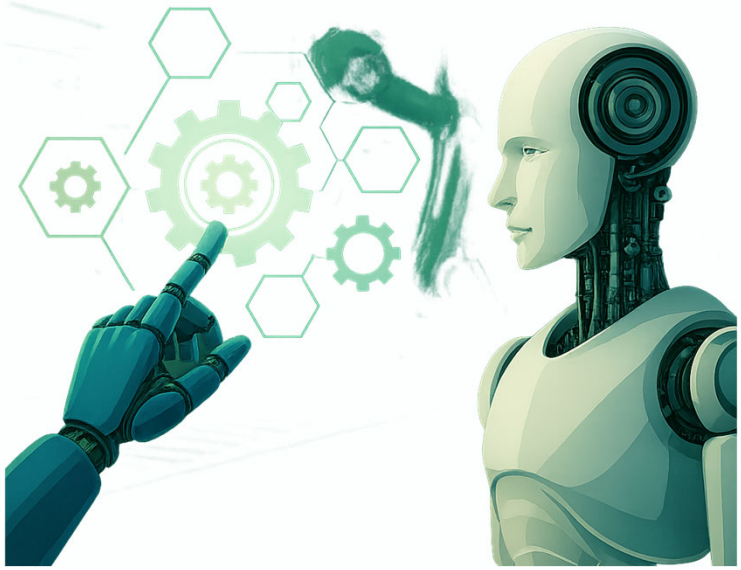
AI’s Role in Manufacturing Systems

Breaking Down Data Silos with AI Integration

- Unified Data Access across ERP, MRP, MES, and IoT platforms
- Interconnected Systems enable real-time insights and smarter automation
- End-to-End Visibility enhances collaboration across planning, production, and quality

Practical Examples

- Dynamic Scheduling – AI adapts schedules based on live inputs and constraints
- Real Time Shop Floor Insights – Instant visibility into production status and equipment health
- AI Powered Visual Inspections – Detect defects with precision using computer vision



High-Impact AI Applications

Predictive Maintenance

- Reduce Unplanned - anticipates equipment failures before they occur.

Example: Reali time condition monitoring and predictive failure alerts using sensor data

Quality Assurance

- Enhance Product Consistency - Detect quality issues early to reduce defects and rework.

Example: AI-powered computer vision for high-speed defect detection on production lines

Demand Forecasting & Inventory Optimization

- Improve Planning Accuracy - AI analyzes historical sales, seasonality, and market trends to forecast demand more precisely.

Example: AI-powered models adjust inventory levels in real-time to reduce stockouts and excess inventory

More Strategic AI Use Cases

Process Optimization

- ❑ Identify and Eliminate Bottlenecks - Use AI to detect inefficiencies and reduce production delays across workflows.

Example: AI analyzes machine performance and queue times to optimize resource allocation

Data-Driven Decision Support

- ❑ Enhance Operational Planning – AI driven dashboards enable real-time scenario analysis and smarter decision making.

Example: Supervisors adjust production flow instantly based on predictive throughput insights

Featured Use Case: Smart Factory

- ❑ Tangible Productivity Gains - implementation of AI can deliver measurable results in throughput, uptime, and waste reduction.

Example: AI-led automation improved OEE (Overall Equipment Effectiveness) by 25% in 6 months

Case Study - Tier 1 Manufacturer's AI Transformation

Example: Global Chemical Producer

- Operates across chemicals, materials, industrial solutions, and agriculture

Challenges

- Low reaction efficiency and high waste in chemical processes
- Complex quality control across diverse product lines
- High energy consumption and safety critical operations

AI-Driven Solutions

- Machine learning to optimize reaction yield and reduce by products
- Predictive maintenance to reduce downtime and extend equipment life
- AI-powered sensors for real-time quality assurance
- Smart energy management to minimize emissions and lower energy costs

Debunking AI Myths

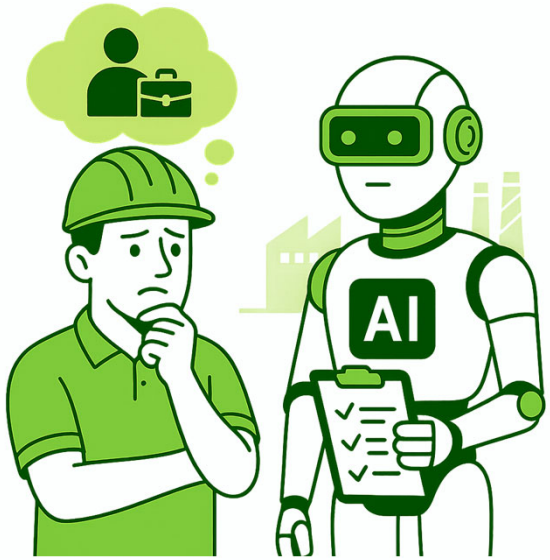
Myth 1 – AI is a plug and play application

- AI requires clean, well-structured data, model training, and thoughtful integration with your workflows
- It's a strategic capability, not a one-click upgrade

Myth 2 – AI will replace the jobs of humans

- AI augments human decision making, shifts tasks, not jobs, and creates new roles and opportunities
- Humans remain central to oversight, creativity, and judgment

Companies that successfully implement AI focus on reskilling their workforce and realigning processes, not reducing headcount.



Debunking AI Myths

Myth 1 - Only big players can afford AI

- Reality: AI is now modular, scalable, and affordable.
- Cloud-based tools and subscription pricing make enterprise-grade AI accessible to small and mid-size manufacturers.

Myth 2 – AI is all hype

- Reality: Tangible results > Buzzwords
- AI delivers measurable ROI with reduced downtime, better forecasting, and improved product quality.

Companies that start small with pilot AI projects often see positive ROI within 6–12 months.

The Evolution – From Industry 4.0 to 5.0

Next Wave of Manufacturing:

- Human-AI Collaboration - Blending machine intelligence with human judgment for smarter decisions on the shop floor
- Sustainable Production Through Intelligence - AI-driven systems optimize resource usage and reduce environmental impact across operations

Emerging Innovations:

- Edge AI for Real-Time Local Decision-Making - Decentralized AI enables faster, on-site responses without latency or cloud dependency
- AI-Infused ERP/MES for Adaptive Planning - Dynamic systems that learn and adjust to changes in demand, materials, and capacity in real time

Companies that successfully implement AI focus on reskilling their workforce and realigning processes, not reducing headcount.

Case Study - Large Electronics Manufacturer

Leading Electronics Manufacturer Across Consumer Electronics, Mobile, and Appliances

Challenges:

- Need for faster, more cost-effective production without quality compromise
- Complex global supply chain
- High energy usage and environmental impact

AI-Driven Solutions

- AI automation to speed up production and reduce human error
- AI-optimized supply chain for logistics and inventory efficiency
- AI-powered inspection robots for real-time quality control
- Smart energy systems for reduced carbon output and lower costs

AI in Your Facility – Where to Begin

High Impact Areas for Initial Focus

- Production Throughput - Use AI to streamline workflows, balance workloads, and minimize machine downtime
- Logistics Optimization - Improve inventory accuracy, route efficiency, and warehouse automation with real-time AI insights
- Human Efficiency - Augment labor productivity through AI-assisted tools, training optimization, and ergonomic automation
- Predictive Maintenance - Use AI to anticipate equipment failures before they happen, reducing downtime and maintenance costs
- Quality Control - Apply computer vision and machine learning for real-time defect detection and product consistency
- Demand Forecasting - Leverage AI to improve planning accuracy and optimize inventory across supply chains
- Energy Management - Optimize energy use in your facility through AI-powered monitoring and efficiency recommendations

AI-Powered Capabilities to Explore

Applications to Pilot:

- Autonomous Robotics – Deploy robots for material handling to reduce manual effort and increase throughput
- AI-Assisted Scheduling – Automate complex scheduling based on constraints like shift availability, order priority, and resource load
- Real-Time Dashboards – Use live operational data to support faster, data-driven decision-making at all levels
- Intelligent Work Instructions – Guide operators with AI-generated task prompts based on current system status and demand
- Anomaly Detection – Identify outliers in operations, quality, or energy usage before they escalate

What's one repetitive task you would automate today?

Managing the Cost of AI Implementation

Cost Considerations

- Data Maturity & Quality – AI performance depends heavily on data accuracy, structure, and availability; poor data inflates cost and reduces ROI
- Custom Development vs. Prebuilt Tools – Building bespoke models requires more time and budget; pre-trained models or low-code platforms can reduce upfront investment
- Deployment Strategy: On-Premise vs. Cloud vs. Edge
  - On-premise: High control, higher cost
  - Cloud: Scalable, faster to deploy, variable operating costs
  - Edge: Localized decisions with low latency, useful for smart devices and shop floor environments

Managing the Cost of AI Implementation

Budget-Conscious Tactics:

- Leverage SaaS AI Platforms – Reduce infrastructure and development costs by using cloud-based AI tools with scalable pricing
- Adopt Pre-Trained Models – Deploy models trained on common manufacturing tasks to accelerate results without custom development
- Reuse ERP/MES Data – Extract untapped value from existing systems by applying AI to historical and real-time operational data

Starting Your AI Journey – A Roadmap

Step by Step

- ❑ Define Business Challenges – Clearly articulate the pain points or inefficiencies you want AI to solve
- ❑ Select a Testable Use Case – Begin with a small, low-risk application to validate value and feasibility
- ❑ Cross-Functional Alignment – Ensure collaboration between IT, Operations, and Finance for resource and change readiness

Quick-Start Readiness Checklist:

- ❑ Labeled/Structured Data – Do you have usable, organized data for AI models to train on?
- ❑ Tech Stack Compatibility – Are your ERP/MES and other systems ready for AI integration?
- ❑ Team Willingness – Is your workforce prepared and open to adopting AI-driven processes?

Measuring Success – Is my AI delivering

Key Metrics to track

- Downtime Reduction -Track how predictive maintenance and process automation minimize unplanned equipment downtime.
- Quality Yield Improvement - Measure improvements in defect rates, product consistency, and rework reduction.
- Time, Cost, and ROI Gains - Evaluate labor hours saved, operating cost reductions, and ROI from AI investments.
- Employee Experience - Gauge satisfaction and adoption by frontline workers using augmented tools and decision systems.

Avoiding Common Pitfalls

Signs of Trouble

- Poor or unstructured data quality
- AI model shows little or no performance improvement
- Lack of stakeholder buy-in or alignment with workflows

Advice

- Continuously monitor system performance
- Iterate and fine-tune models based on feedback
- Encourage cross-functional collaboration and ownership

Wrap Up

Final Takeaways

- AI isn’t a one size fits all—target it strategically
- Small wins build momentum
- Companies that act early will lead the industry shift

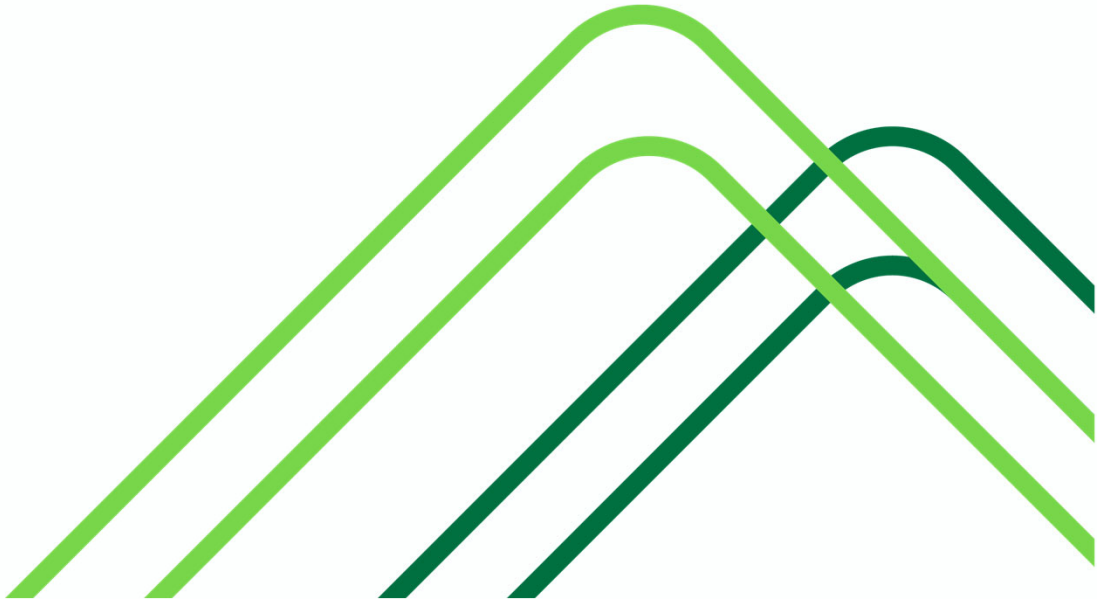
Advice

- Monitor continuously, adjust iteratively

Final Thoughts

“The best way to predict the future is to create it”

Thoughts and Questions



uhy-us.com

Audit | Tax | Advisory | Consulting

"UHY" is the brand name under which UHY LLP and UHY Advisors, Inc. provide professional services. The two firms operate as separate legal entities in an alternative practice structure. UHY LLP is a licensed independent CPA firm that performs attest services. UHY Advisors, Inc. provides tax and business consulting services through wholly owned subsidiary entities. UHY Advisors, Inc. and UHY LLP are U.S. members of Urbach Hacker Young International Limited (UHY International), a UK company, and form part of the international UHY network of legally independent accounting and consulting firms. Any services described herein are provided by UHY Advisors and/or UHY LLP (as the case may be) and not by UHY International or any other member firm of UHYI. Neither UHY International nor any member of UHY International has any liability for services provided by other members.
©2024 UHY. All rights reserved.