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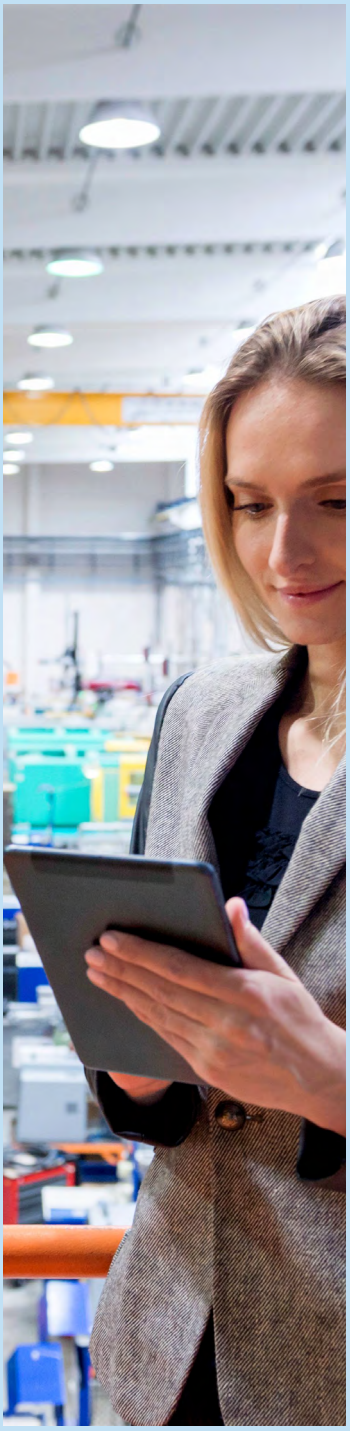

# AI AND AUTOMATION IN THE MANUFACTURING SECTOR


## Abstract

Over the past few years, artificial intelligence (AI) and robotic process automation (RPA) have stabilized in the hype cycle leading to organizations taking a more methodical approach towards adoption of such enterprise wide initiatives. Going forward, this year, RPA and AI will join forces to create digital workers for more than 40% of enterprises [(01)].

As the manufacturing industry gears itself up towards this fourth industrial revolution, we examine the role of robotic process automation in driving efficiencies and productivity improvement across business functions in an enterprise.


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## Robotic process automation: Making the business case

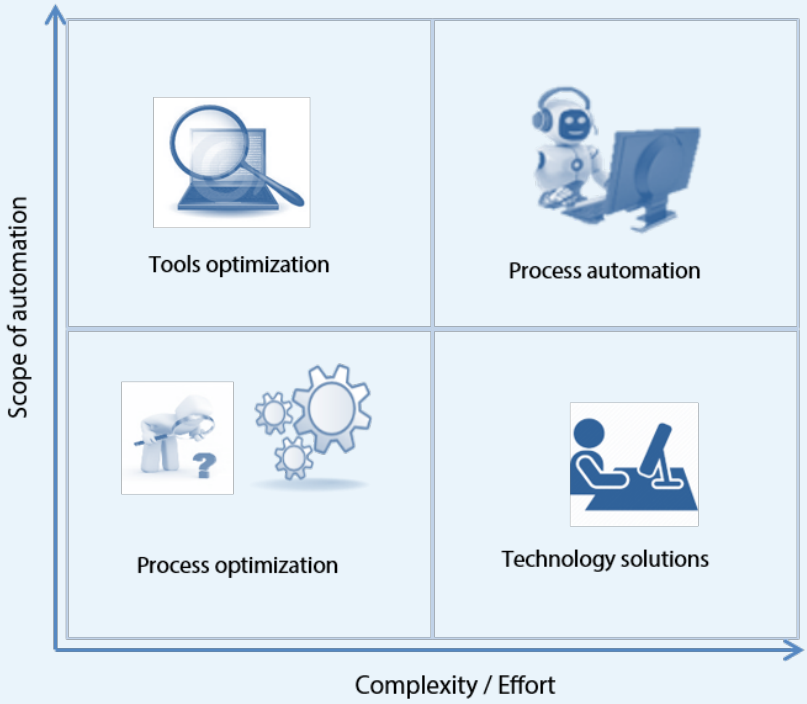


*Figure 1: RPA fitment matrix*

One of the most overlooked critical success factor for an automation initiative is selecting the right business process. As per a recent study across 400 enterprise buyers of RPA, lack of clarity on the business case is the top impediment (41% respondents voted) to considering RPA adoption within an organization[02].

The case for RPA is at the intersection of repetitive tasks and volumes of those transactions in an enterprise. Selecting the right business process for automation depends on a number of factors. One of the key aspects to consider is whether the business problem could be solved by process optimization, tool upgrade or a script based programming project. Scope for automation and complexity of effort involved are primary drivers of making the business case for RPA.

## AI and RPA in the manufacturing sector: Key trends

The manufacturing industry is at the cross-roads of the next stage of evolution. The art of the possible in the future will be driven not just by emerging digital disruptions like AI, Internet of Things, sensors and RPA – rather by a fusion and interplay between them.

Leading manufacturers that are early adopters of AI and automation across the value chain are seeing the following areas in this hot seat of innovation:

1. Combining sensors and data with assessing, learning and modeling to understand spatial relationships
2. Digital twins for non-invasive predictive maintenance
3. RPA in business functions – ERP systems, finance and accounting, sourcing and procurement, human resources, etc.
4. RPA in IT functions – Application management services (AMS) and infrastructure management services (IMS)

A lot of opportunities are available at the intersection of the above areas. For example, processes that are automated using RPA might accelerate AI adoption in the same areas within an enterprise. Let us examine each of the areas and the automation opportunities in brief:

**Sensors, data and modeling:**

Different processes in the manufacturing shop floor, warehouses, etc., involve industrial robotics. These hardware bots can be fitted with sensors that regularly feed data back to assessing and learning systems in the IT landscape. Over a period of time, the data captured can be analyzed using machine learning algorithms and used to understand spatial relationship between robots and the surrounding environment and machine parts, material boxes, etc. Data feed marked as errors in processes like soldering, cutting, filing, picking, transporting, etc., can be relayed back to the sensors via self-learning algorithms.

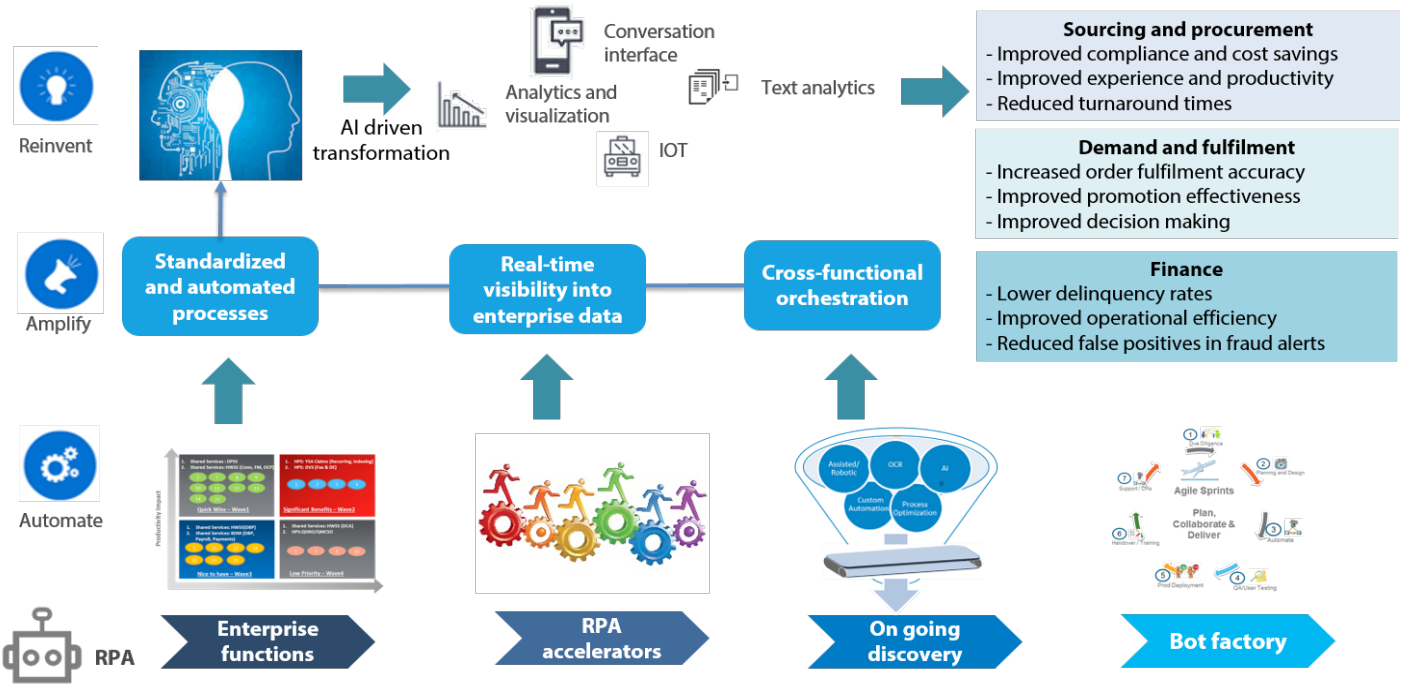


*Figure 2: Leveraging symphonies between AI and automation*

Such auto-correction techniques can be achieved through integrating sensors, data and machine learning models. This ensures minimal and optimal movement and usage of robotic arms. Benefits of such spatial relationship modeling and optimization include reduced maintenance costs, accuracy and reliability of mechanized automation, predictive maintenance to avoid overhead costs and breakdown costs.

**Digital twins for non-invasive predictive maintenance**

A digitized version of a hardware such as IT assets, engines or industrial heavy equipment is a digital twin. In the manufacturing set-up, such digital twins have been used for a while to optimize operation and maintenance of physical assets and processes. The same concept can be extended to IT operations to create digital simulation models which can be integrated with AI predictive analytics, to deliver self-healing, ticketless IT eco-system.

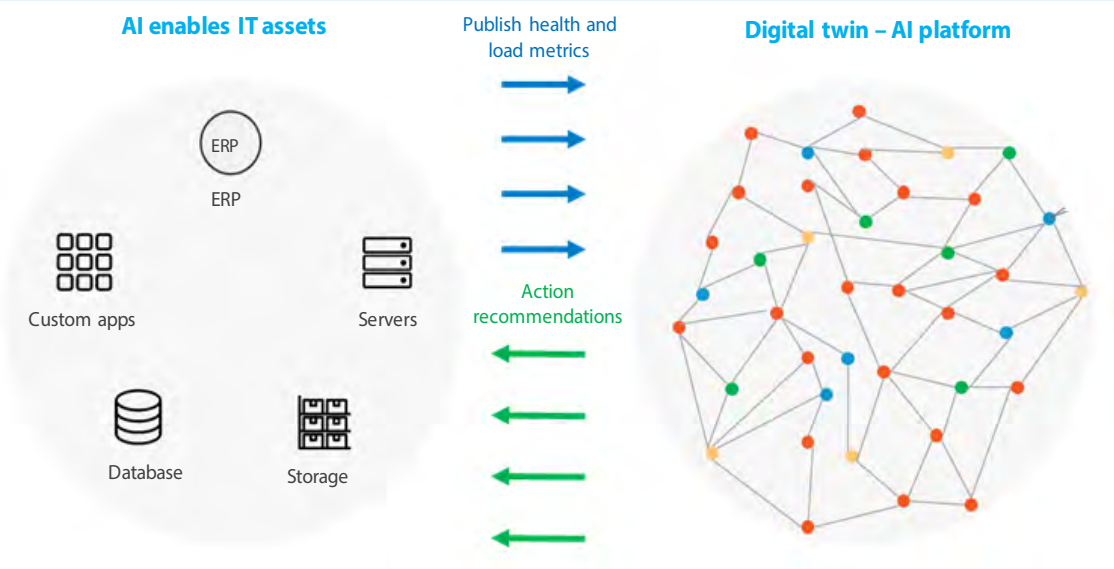


*Figure 3: Digital twin model*

There will be certain intelligent nodes in the digital twin that can be connected to other nodes in the model. These intelligent nodes build upon the machine learning model for predicting performance degradation as per historic trends and data.

Health and load metrics from AI enabled IT assets are constantly published to ensure the digital twin is synchronized in real time with the actual assets. Self-healing action recommendations from a set of pre-defined action repository is fed back to the IT asset ecosystem for maintenance actions. This digital twin along with machine learning based feedback aids non-intrusive predictive maintenance and self-healing of IT assets. The same can be applied to heavy equipment machinery in production e.g. aircraft engines, excavators and mining equipment, cranes and lifts, etc.

**RPA in business functions**

*1. ERP systems based automation*

Manual and repetitive tasks involving ERP systems including data extraction, updating, deletion, configuration, master SKU data maintenance, etc., that can be automated using robotic process automation [03].

*A few key areas automated in ERP systems using RPA are:*

***Report generation:*** RPA can be used to auto-generate frequently needed reports such as inventory levels, pricing updates of parts, accounts payable by period, etc. by collecting information from several enterprise applications. Such reports can provide real-time insights as well as provide insights to enable executive decision and intervention.

***Inventory management:*** With AI in manufacturing, we can envision inter-connected shop floors where planning, production and quality control are seamlessly interconnected thereby providing intelligent real-time visibility into efficiency of operations. For example, stock level batch updates and stock-keeping records can be integrated with inventory levels, reorder levels, part numbers, etc., to automate monitoring, stock keeping, reordering, and more.

***Application integration software:*** Orchestration between ERP systems and other external enterprise systems including websites, CRM, human resource (HR) platforms, payment systems and supplier relationship management systems, can be automated to aid complex decision making systems [04].

| Tower | Automation area |
|---|---|
| Procure to pay | Vendor data management |
| | PO management |
| | T&E, P-card processing |
| | Accounts payable activities |
| | Goods received/Inward receipt |
| Record to report | Journal entry preparation (JV) and posting |
| | Service desk automation |
| | Travel and expense activity |
| Order to cash | MDM |
| | MIS reporting |

*Figure 4: Sample candidates for automation*

*2. Finance and accounting (F&A)*

A few areas in finance and accounting including accounts payable/ accounts receivable (AR/AP), general accounting, fixed assets, project accounting, enterprise accounting and many more, can be automated with the help of automation tools. A snapshot of typical F&A processes that are good candidates for automation is captured in figure 5[05].

Several processes that take a lot of finance team's time including reconciliation, retrieving data from invoicing and payment systems, generation of periodic reports like monthly, quarterly reports,

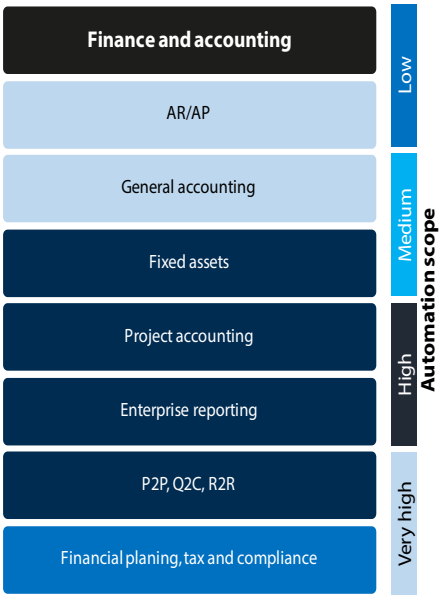


*Figure 5: RPA heat map for finance and accounting use cases*

matching data with payment instruments etc., can be automated using RPA.

For example, we have observed processes in AP/AR such as vendor master data management, payment proposals and processing, vendor query handling, periodic reconciliations and closures, AP management reporting, invoice processing, payment processing, managing cash advances, customer master data management, customer query handling, customer invoicing and collections management, to be highly tenable for automation.

A few other tools in the automation ecosystem that play a complementary role in this area include optical character recognition (OCR), mainframe screen extraction adapters, pdf extractors, etc., to ensure digitized data inputs are fed into the RPA platform. While enterprise OCR tools as well as certain in-built OCR tools in some RPA platforms come in handy in such scenarios, several factors including accuracy, precision, auto-correction based on rules etc., are crucial evaluation factors in choosing the right use cases.

| Automation of invoice processing | Clearing of GL accounts |
|---|---|
| PR to RFQ to PO automation | Aging downloads and analysis |
| Master data maintenance for auditing | Bank statements loading to ERP |
| Automation of non-PO invoice processing | Payroll records reconciliation |
| Correction of SB errors | Connectivity to customer portals (checking status of invoices, downloading remittances) |
| Price updates and updates | Bad debt allowance calculation, booking |
| Duplicate invoice recognition | Order to receive (OTR) pricing adjustment |
| Auto-correction of error emails with invoices | Open to receive processing for exception scenarios |
| Appropriate calculation of credit payables | JE prep/submission |
| AP close | Account recon |
| A/R cash app | T&E close |

*Figure 6: A few F&A use cases for AI and RPA*

## 3. Sourcing and procurement

Repetitive and analytics based sourcing and procurement use cases across the source-settle value chain can be automated using AI and RPA to ensure process compliance and increased user efficiency. An effective automation solution will provide multi-channel user interface (chat bots, voice assistants, web based, etc.) on top of the procurement applications. This sourcing and procurement automation is achieved through a symphony of advanced analytics, conversational interface, smart process workflows, contextual recommendations and insights on procurement.

Some of the advantages of implementing AI and RPA in the procurement area include enhanced multi-channel experience, efficient procurement process, increased procurement agility and cognitive awareness.

| Interactive | Specify procurement needs through natural language via voice/chat |
|---|---|
| Cognitive | Real-time analytics and insightful recommendations |
| Efficient | Contextual information as you go about your procurement |
| Agile | Multi-channel procurement experience that learns over time |
| Compliant | Maximizing strategic harmony between data, people and process |

*Figure 7: Benefits and efficiencies from RPA*

A few use cases in procurement automation in manufacturing as observed by us include the following:

1. Recommendation: Proactive recommendation of suppliers, data recommendation for purchase order (PO) creation, leverage supplier information to provide rationalization recommendations and payment recommendations for invoices

2. Insights: Multi RFX (request for information, request for proposal, request for quote, and request for bid) scoring and awarding using what-If analysis, market intelligence around supplier, commodity pricing during PO creation, ready access to procurement insights for better decision making, flip contracts to PO and catalogue

3. Compliance: Proactive checks for duplicate PO and invoice, budget compliance while raising PO, contractual compliance with PO and invoice, enabling 3-way match – PO, GRN (goods received notification) and invoice

4. Support: Approval and pending workflow notifications, sell side conversational interface, multi-channel conversational interfaces, creation of templates for invoices/PO/contracts via images

Robotic process automation provides real-time visibility into operations from order management to inventory control, fulfilment and accounts receivable. This results in streamlined processes that ensures smooth co-ordination and understanding among the manufacturer, distributer and customers.

## 4. Human resources

The following business processes in the HR area have been observed by us as conducive to automation:

- **Onboard / Offboard**
  - » Automating HR activities such as creation of staff record, onboarding for payroll, parking administration, enrolment in benefits schemes, granting access rights to systems and buildings, etc.
  - » IT tasks such as adding/removing user accounts, email addresses, windows access rights (active directory), intranet profiles, creating printing quotas, etc.
- **Payroll and benefits administration**
  - » Time load/accruals, zero gross, reconciliations, off-cycle pay, benefits administration, etc.
- **Workforce administration**
  - » Employee data management, organization data management, transfer administration, termination/ exit administration, employee help desk, etc.
- **Learning administration**
  - » Classroom training administration, roster and satisfaction survey update, e-learning content management, administer assessments, certification management

- **Performance management**
  - » Administer reviews, batch job updates, workflow automation

From our experience of having worked upon automating several HR processes for our clients, we have observed some key benefits including:

- Seamless experience for new employees and compliant and accurate closure for offboarding, including payroll administration and pension administration
- Improved speed and accuracy of service, reduced risk of payroll or administrative error
- Improved regulatory compliance and accurate communication with employees
- Increased accuracy and compliance, improved data quality, increased visibility and management of training

The following subset of processes were also identified as automation candidates in the onboarding process for a client through a discovery process:

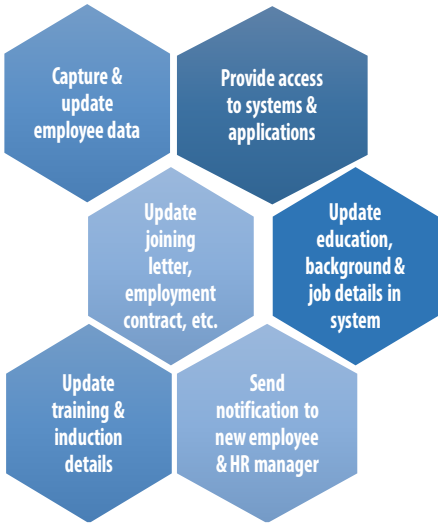


*Figure 8: Sample HR processes identified for automation during a discovery process*

To summarize, deterministic automation use cases are slightly more prevalent in HR functions over AI use cases in the manufacturing sector. RPA combined with HR chat bots provide significant business value for HR executives, especially in the areas of recruitment, payroll, helpdesk, learning and development.

**RPA in IT functions:**

Some of the key areas leveraging AI and automation in application management services and infrastructure management services include:

***Service request chatbot:*** Self-service catalogued IT requests using conversational AI including user access, password reset, provisioning, and license commissioning

***Alert management:*** False alerts suppression using adaptive thresholds and ticket creation for priority alerts

***Configuration consistency checker:*** Detect and correct configuration inconsistencies in files deployed in mirrored environment

***Ticket triaging:*** Auto-route incoming tickets to assignment groups, update ticket status, send email to requestor with updates, etc.

***Job failure:*** Self-healing of job failures using past failure knowledge, restart job by auto-monitoring and automated triggers

***Health checks:*** Monitoring IT assets, periodic health checks, status reporting, diagnosis and reporting

Here is a glimpse into the catalog of automation opportunities in IT operations around some of the key focus areas:


*Figure 9: A glimpse of Infosys catalogue of IT operations automation solutions*

## Conclusion

AI and automation is seeing accelerated adoption by manufacturing players increasingly in functions like finance, planning, procurement and IT operations. Identifying and selecting the right use cases, cross-functional orchestration, real-time visibility into enterprise data and process standardization are emerging as critical success factors in enterprise automation initiatives.

Infosys AI and Automation Services has helped clients across manufacturing and other industries with AI and automation, and scale it too. Learn how we can help you achieve the same. Write to us at aiautomation@infosys.com.

## About the Author

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Nanda leads the AI and Automation practice for manufacturing and automotive sectors in North America and is based out of Dallas, Texas. As part of Infosys AI and Automation Services, his team is helping clients recognize value across the automation adoption cycle. He has managed large business transformations across F&A, S&P, HR, ITSM and contact centers by partnering with UiPath, Automation Anywhere, BluePrism, PegaSystems, Microsoft Azure ML, IBM Watson, etc. Over the years, he has built a large repository of AI and RPA case studies that can be readily referenced for most business challenges. He holds an MBA from The University of Iowa and has over 16 years of experience across technology, consulting and business development.

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