



**Rockwell
Automation**

The connected cement plant

Extracting more value at every stage of your process



Solutions to meet **cement** needs

You are faced with a wide range of challenges daily.

And the working environments don't make it any easier. Harsh operating conditions and complex processes are intensified with disparate systems and lack of real-time information.

Does this sound all too familiar?

Luckily, there is a way to mitigate these challenges. Optimizing and maintaining critical operations in your cement plant demands expertise and modern, integrated Automation Solutions. We offer a wide range of process solutions that safeguard your operations and meet economic and performance requirements. These solutions are scalable, flexible and easy to integrate, helping you increase productivity, lower costs, reduce energy consumption and improve safety.

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THE WORLD IS CHANGING – SO ARE CEMENT NEEDS

Worldwide trends will greatly impact the cement industry in the near future. The world population is expected to grow from 7.6 to 9.7 billion people by the year 2050 – a growth of 22 percent. Of that growth, an additional 2.5 billion people are expected to live in cities, increasing the demand for solid urban infrastructure.

These changes in world population will directly impact the cement industry. Global cement demand is set to grow between 12 and 23 percent by 2050. And we can't ignore the need for green construction and de-carbonization. New investments and policy in place bolster the need to meet these global emissions targets in cement production.



22%

population growth
and urbanization.

Source: IEA Study | May 2018

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The challenges you face

With a changing world and a changing cement industry, cement producers are required to be agile in their operations. Remaining stagnant is no longer an option. Companies focusing their efforts on effective change can help grow the industry as a whole while remaining productive and profitable.

There are four key areas where cement producers can create focused change:

- **ENERGY PERFORMANCE:** Ranges in energy can make up between 20 to 40 percent of all operational costs.
- **OPERATIONS COSTS:** Labor maintenance and other production costs compromise 30 percent of operation costs.
- **MAINTAINED QUALITY:** Variations in raw materials and fuels cause changes in the end product.
- **EMISSION REDUCTION:** The cement industry accounts for at least five percent emissions of greenhouse gases.



The direct CO₂ intensity of cement needs to decline by .3% annually through 2030, even as cement production is expected to grow.

Source: IEA Study | May 2018

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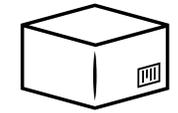


HOW DO WE OVERCOME THESE CHALLENGES?

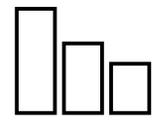
Rockwell Automation® helps cement producers plan their digital transformation journey from start to finish. Proper planning and project management allows challenges to be identified and addressed in the early stages of a project - before the entire project is derailed. Adhering to a project plan keeps your digital transformation initiatives on budget and on schedule.



Cost optimization



Supply chain efficiency



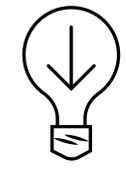
Emissions reduction



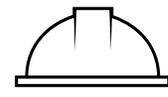
Process efficiency



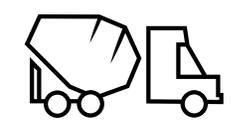
Improved worker performance



Energy and fuel optimization



Enhanced safety



Asset efficiency

Why Rockwell Automation?

A partner that combines expertise and technology



SEGMENT EXPERTISE / INTEGRATED SERVICES AND SOLUTIONS



The cement, IT and automation expertise you expect



Technology leadership in process control and analytics



An unmatched network of partners

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The connected cement plant

A connected plant offers major opportunities for companies to improve operational efficiencies, reduce safety risks, and drive better decision-making.

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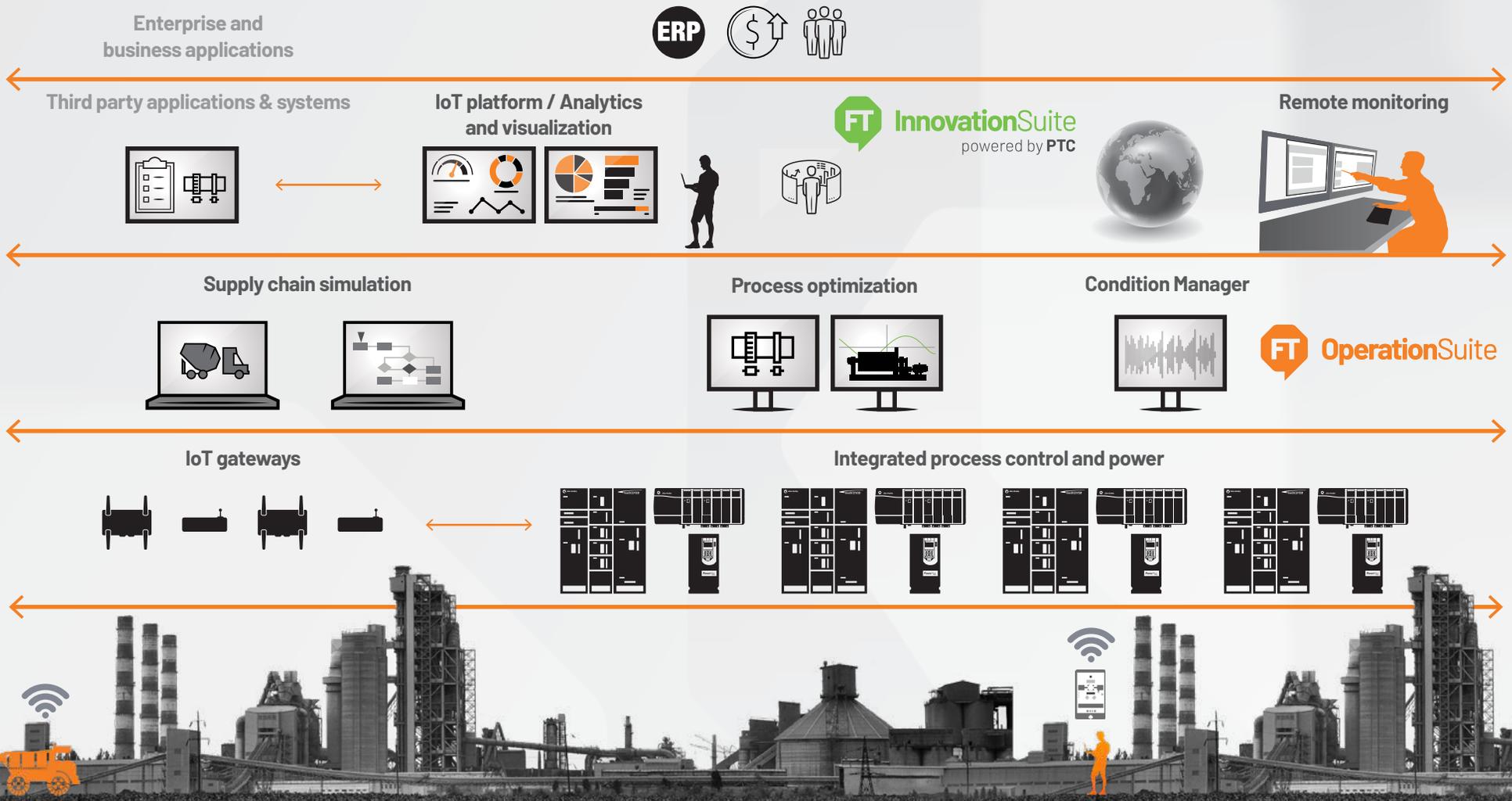
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The connected cement plant

End-to-end architecture and systems integration



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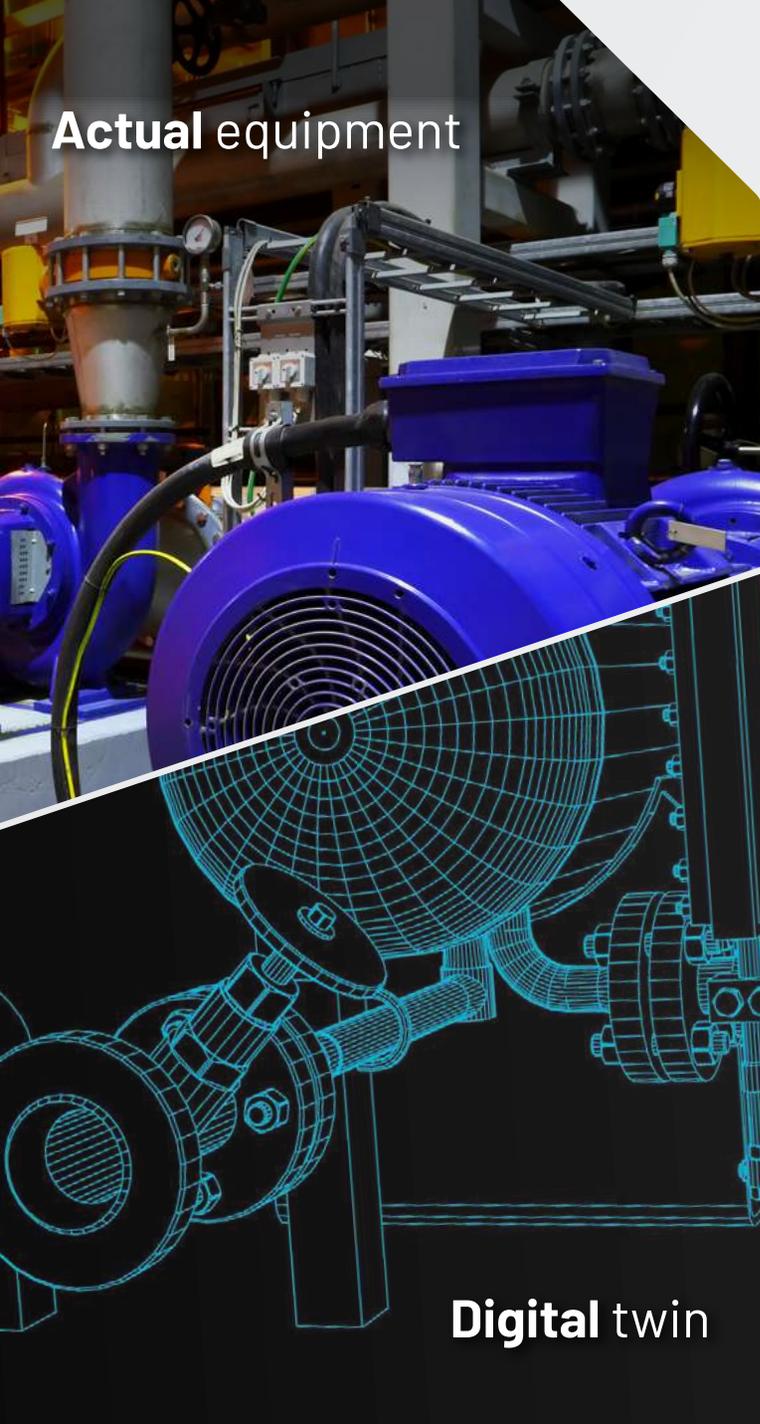
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Actual equipment



Digital twin

The connected cement plant

DIGITAL TWIN CONCEPT

Enabling reduced capex and opex optimization

DIGITAL TWIN FEATURES

Mechanical CAD

Process control

Virtual commissioning

Operator training

Electrical CAD

Mathematical modeling

Mobility

Virtual training

DIGITAL TWIN BENEFITS

Better prototyping

Easily design and build the next generation of equipment with confidence.

Validate your strategies

Optimize throughput with simple, real-time 3D simulation of complex dynamic processes.

Virtual commissioning

Design, test, validate and commission systems before they are put into service.

Operator training

Reduce risk and improve operations by training workforce in a safe virtual environment.

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Increase operational efficiency

Tested and validated architectures and dedicated functionalities for cement operations help you get the most out of your process and equipment, improving your overall productivity while optimizing your energy consumption.

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PROCESS MANAGEMENT AND OPTIMIZATION

PROCESS AUTOMATION AND CONTROL

Integration between critical areas of your plant is essential to optimizing your cement plant. Our cement solution connects process, discrete, power, information and safety control into one plant-wide infrastructure. An **integrated system** reduces engineering risks and facilitates operations, maintenance and operational changes.

ENGINEERING AND OPERATIONS EFFICIENCY: STANDARDS AND LIBRARIES FOR THE CEMENT INDUSTRY

We worked with leading cement companies to develop process libraries and functionalities to serve the cement industry. These tested libraries and functionalities enable **faster commissioning**, and provide opportunities to recognize **operational efficiencies** through **robust standardization**. All this adds up to **cost savings** for new plants and plant expansions.



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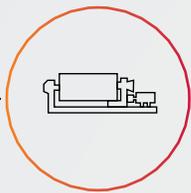
Process management and optimization

Process stabilization, production quality, emissions reduction, energy efficiency



Utilities

- Reduce energy costs
- Manage use of alternative fuels



Mills

- Reduce energy cost
- Increase throughput
- Reducing sizing variability
- Improve product quality
- Smoother cement type transitions



Material blending

- Reduce blend variability
- Reduce blend costs
- Improve raw material resource usage
- Improve downstream performance



Pyroprocessing

- Increase throughput
- Decrease product variability
- Reduce energy costs
- Improve product quality
- Reduce emissions
- Improve heat recovery
- Longer campaign run and refractory life



Analytics

- Production metrics
- Production accounting
- Energy efficiency



Quality

- Software virtual analyzer
- Predicts quality or process variable



Environmental

- Improve environmental compliance

ENERGY MANAGEMENT AND POWER

ENERGY OPTIMIZATION: PLANT-WIDE ENERGY VISIBILITY

Better visibility into energy use in a production context makes it possible to identify savings opportunities. We can help provide efficient administration of energy consumption across the plant. Energy management systems optimize energy consumption and reduce emissions.

INTELLIGENT PACKAGED POWER

Integrated power and control architecture enables a power management strategy that brings an immediate, measurable impact on operational efficiency. Intelligent power systems reduce downtime and improve safety.



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Get the **most** **out of your** **assets**

Embedded analytics allow cement customers to quickly identify issues before they occur.

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ASSET PERFORMANCE MANAGEMENT

ASSET HEALTH, CONDITION MONITORING AND PREDICTIVE ANALYTICS

Manage assets with solutions that range from basic asset health and asset performance measurement up to advanced pattern recognition tools that “learn” to look for data patterns associated with failure. With digital maintenance and reliability transformation in the heavy industries, companies have the potential to increase asset availability by five to 15 percent and reduce maintenance costs by 18 to 25 percent.

EMBEDDED ARTIFICIAL INTELLIGENCE (AI) ALLOWS OPTIMIZATION AT THE OPERATION LEVEL

Artificial intelligence embedded in the control system provides immediate value from managing data at the edge. Self-configuration allows the user to define the problem so the system can define the solution. Self-learning is achieved through an AI module that plugs into the backplane of the controller.

5-15%
INCREASED
asset availability

18-25%
REDUCED
maintenance costs

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Quarry-to-packaging visibility **enables better business decisions**

When you collect, aggregate and analyze data across operations, you can spot trends and interdependencies that are missed when data lives in silos. With this type of information, you can make more informed decisions.

Quarry-to-packaging integration

Our FactoryTalk® solution allows cement companies to collect data from nearly any source within the enterprise and quickly build applications and decision tools.

Emissions
ERP
LIMS
EAM



FT InnovationSuite
powered by PTC

Metrics / KPIs Inventory
Downtime Quality
OEE Energy

Analytics platform



Visualization
consolidation



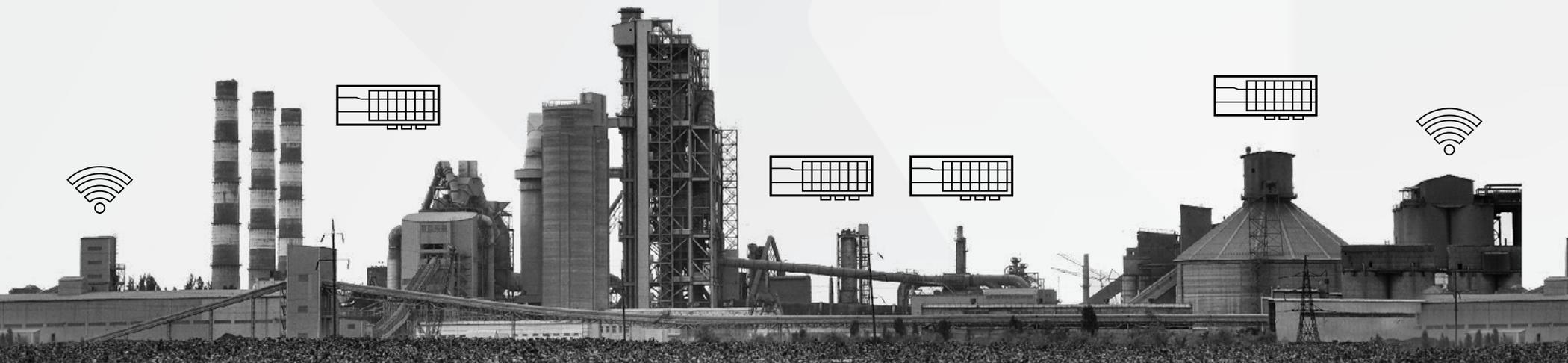
Remote monitoring

Human interfaces

Arena® Supply chain management

FT OperationSuite

Historian



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Modernize and **empower your workforce**

New technologies are expanding human possibility. Incorporating these technologies into your workers' daily lives can ease workforce transitions, increase worker productivity, foster collaboration, and provide a safer, more engaging environment for all employees.

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WORKER SAFETY AND EFFICIENCY

MOBILE REAL-TIME INFORMATION

By nature, cement operations are intense. Harsh operating conditions and complex processes are intensified with disparate systems. Field workers often find themselves servicing or operating equipment without a direct view into how the specific piece of equipment is performing. This lack of visibility and information can reduce productivity and result in unsafe operations.

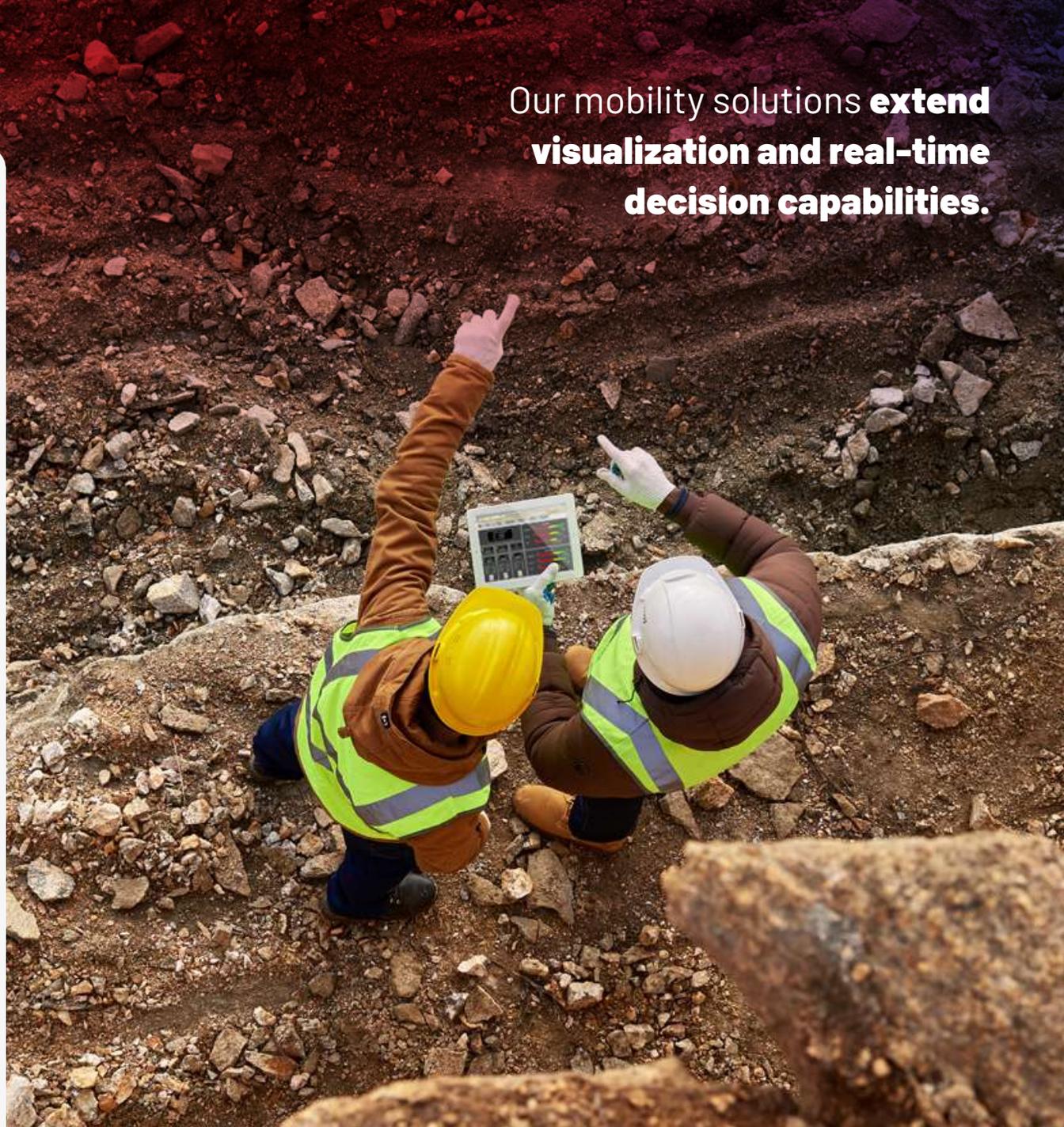
Our mobility solutions extend visualization and real-time decision capabilities to browser-based remote users including mobile devices. With features like voice command recognition and on-demand, real-time access from anywhere, every team member benefits from this visibility into the plant.

57%

greater employee productivity/efficiency possible with mobile technology

Source: Motorola / mobientech.com

Our mobility solutions **extend visualization and real-time decision capabilities.**



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WORKER SAFETY AND EFFICIENCY

AUGMENTED REALITY

Superimpose digital information onto real objects or equipment, providing field personnel with real-time information in context of the true process. This technology helps cement companies enable remote expert advice for equipment maintenance and augment the training process to create customized, memorable instruction for new workers.

SEE THE RESULTS

- Better employee **productivity**
- **Safer** operations
- **Remote** collaboration
- **Expert** advice



51%

of respondents said that their company had already seen a measurable ROI when it came to using AR for employee training / knowledge transfer

Source: PTC / IDC

Design, build and **upgrade** with **confidence**

New projects and upgrades can be risky to undertake. Reduce your risk of overspend and delays with better up-front planning, fewer vendors, and tested project methodology and architectures.

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Rockwell Automation services

Minimizing risk. Maximizing productivity.



Workforce training and support

- Field engineering support
- On-site training, virtual classrooms and e-learning
- On-site subject matter experts
- Remote monitoring and analytics



People and asset safety

- Electrical safety
- Arc flash studies
- Machine safety



Asset and plant optimization

- Inventory services
- Asset modernization
- Asset performance



Information infrastructure and security

- Assessments and program development
- Infrastructure development and management
- Incident response and recovery planning



Product and application lifecycle support

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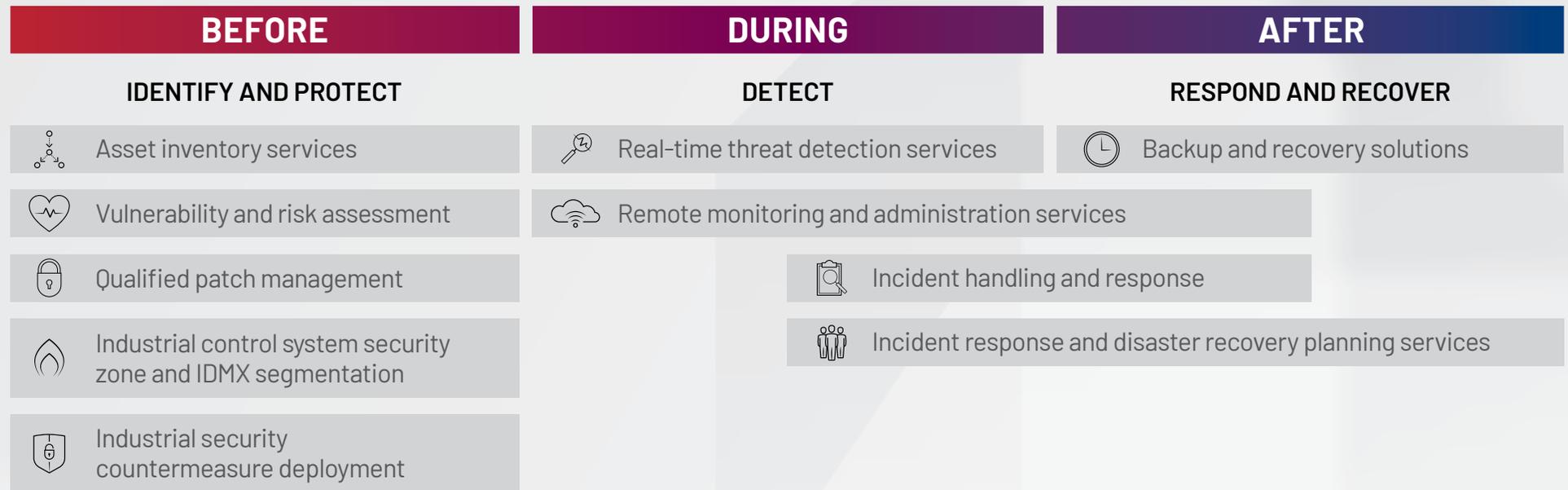
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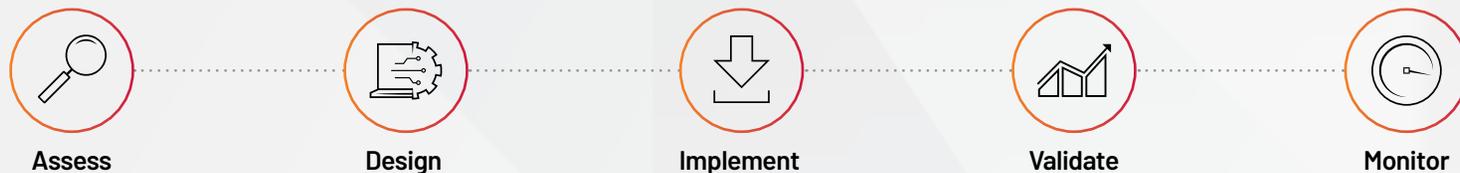
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A proactive approach to industrial cyber security

Attack continuum



BUILD A SECURE, ROBUST, FUTURE-READY NETWORK FOR YOUR CONNECTED CEMENT PLANT



A holistic approach to help you design, deploy, and **manage your network infrastructure**

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Cybersecurity

Solutions and services

Validated solutions / architectures

Comprised of a collection of Cisco® and Rockwell Automation® validated designs, our architectures are tested for performance, availability, repeatability, scalability and security. This means you get fast, tested access to 'future-ready' network design.

Cybersecurity services

From assessment to a response plan deployment, we can provide a full lifecycle service focused on industrial security. Our experts understand how to securely bring together IT and OT, and help secure your infrastructure, protect assets, and maintain network availability.



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Improve operational efficiencies, reduce safety risks, and drive better decision-making



Connect with us.    

rockwellautomation.com

expanding **human possibility**[™]

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