LISTEN. THINK. SOLVE.®

Intelligent Motor Control Solutions

"Enabling Smart Manufacturing"

Martin Štubňa

Manager – Component Business

PUBLIC INFORMATION

Allen-Bradley • Rockwell Software

Rockwell Automation

Rockwell Automation

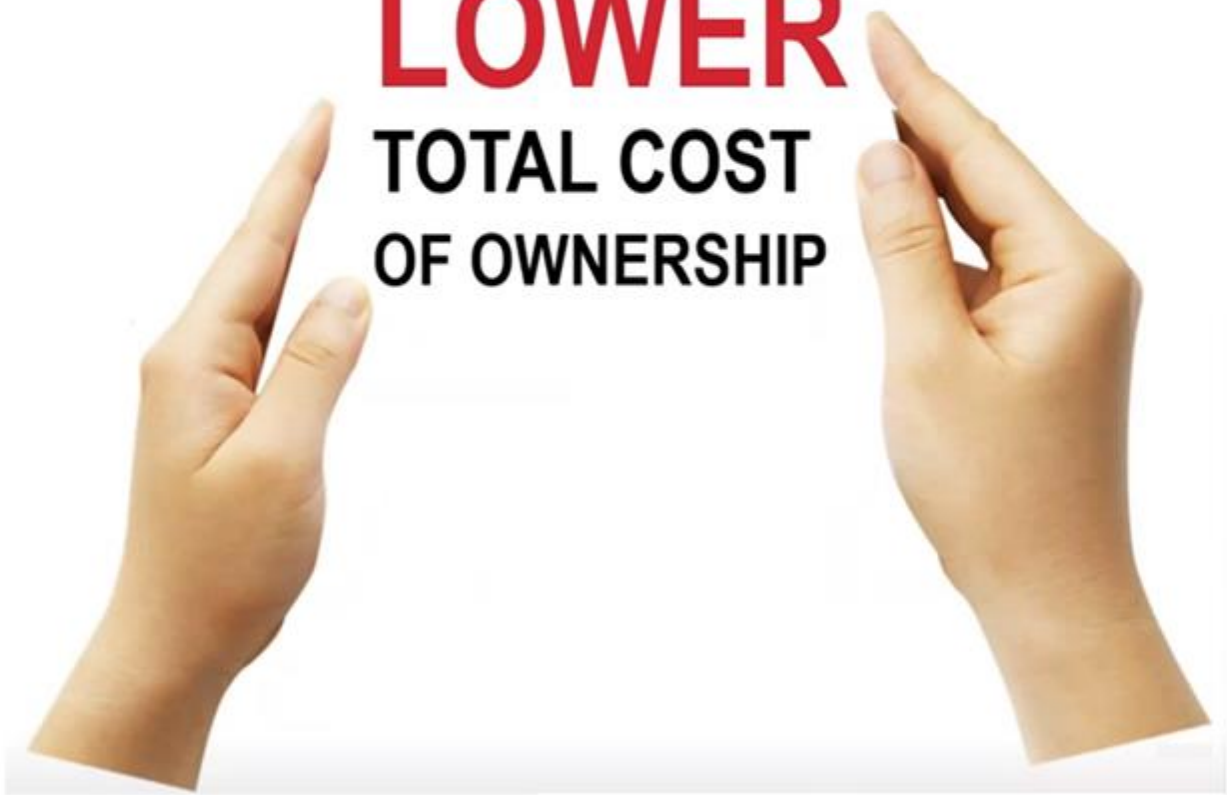
INTELLIGENT MOTOR CONTROL SOLUTIONS

DELIVER IMMEDIATE VALUE & LONG-TERM FLEXIBILITY

LOWER

TOTAL COST

OF OWNERSHIP



Rockwell Automation

INTELLIGENT MOTOR CONTROL SOLUTIONS

DELIVER IMMEDIATE VALUE & LONG-TERM FLEXIBILITY

ENERGY EFFICIENCY

DEVELOPMENT TIME

INSTALLATION COSTS

DOWNTIME & MAINTENANCE

PERSONNEL/EQUIPMENT PROTECTION

LOWER

TOTAL COST

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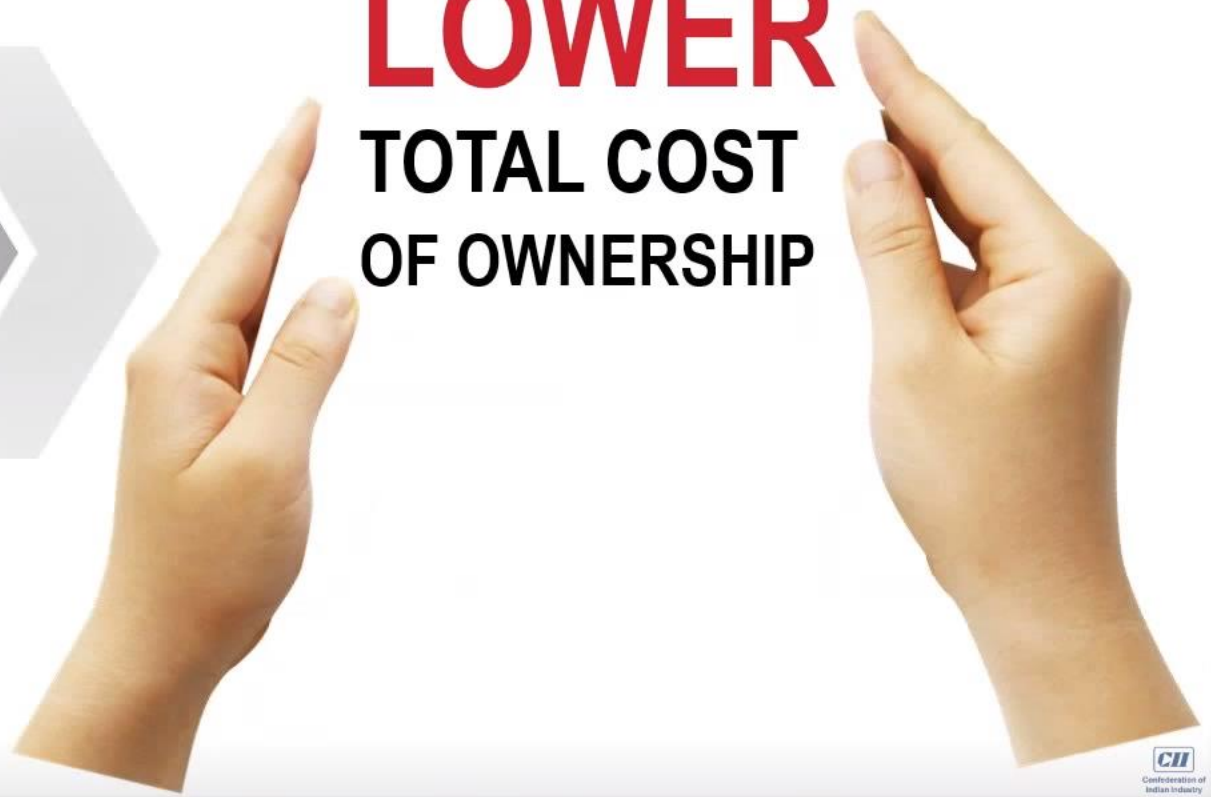
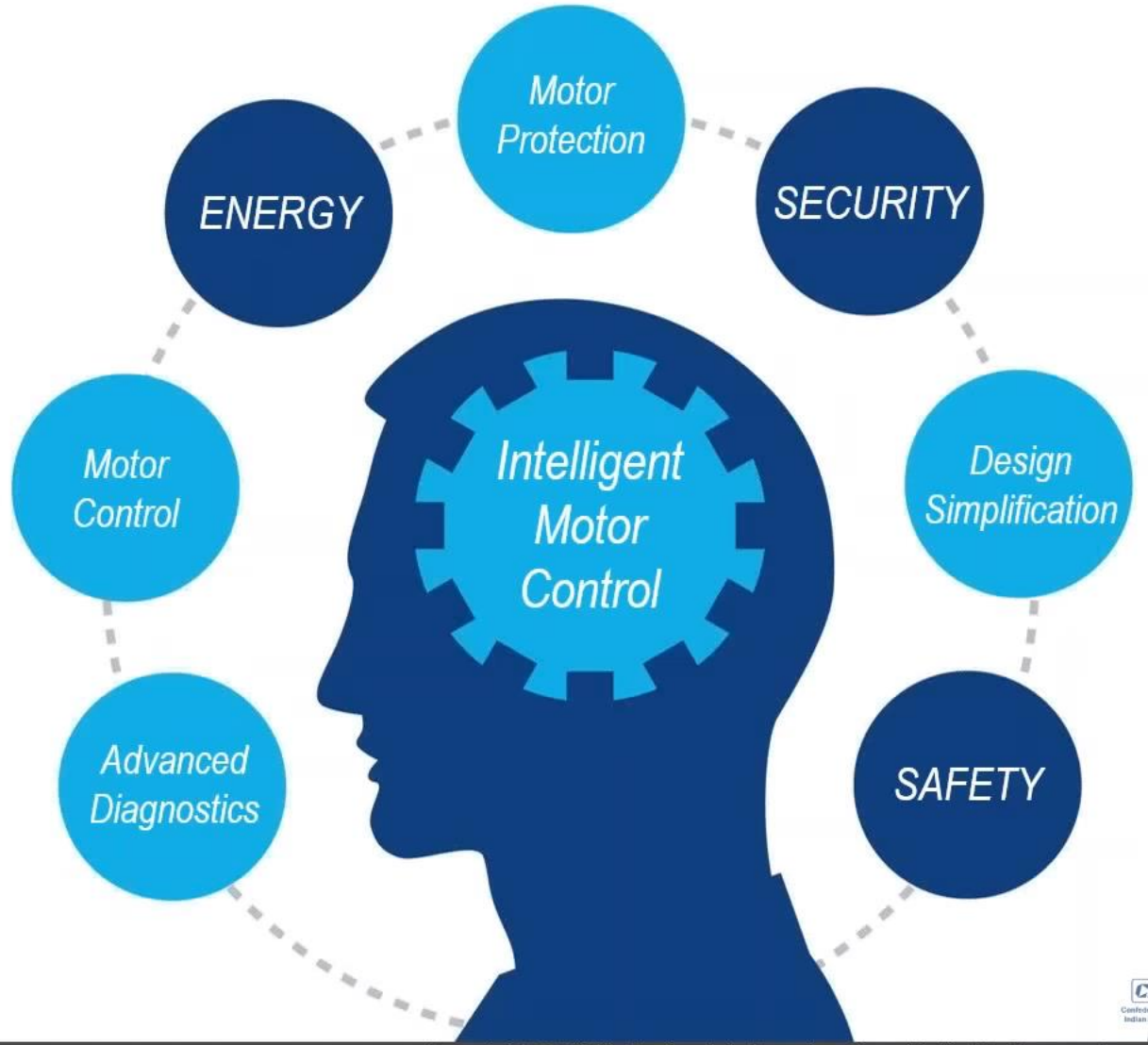


What is Intelligent Motor Control ?

Rockwell Automation

A future-proof architecture that applies sophisticated control technologies with communication capabilities helping you improve system performance and gain operation efficiencies across your Connected Enterprise.

- Maximize your asset availability
- Improve time to market
- Enhanced energy management
- Protect your personnel and assets



Intelligent Motor Control

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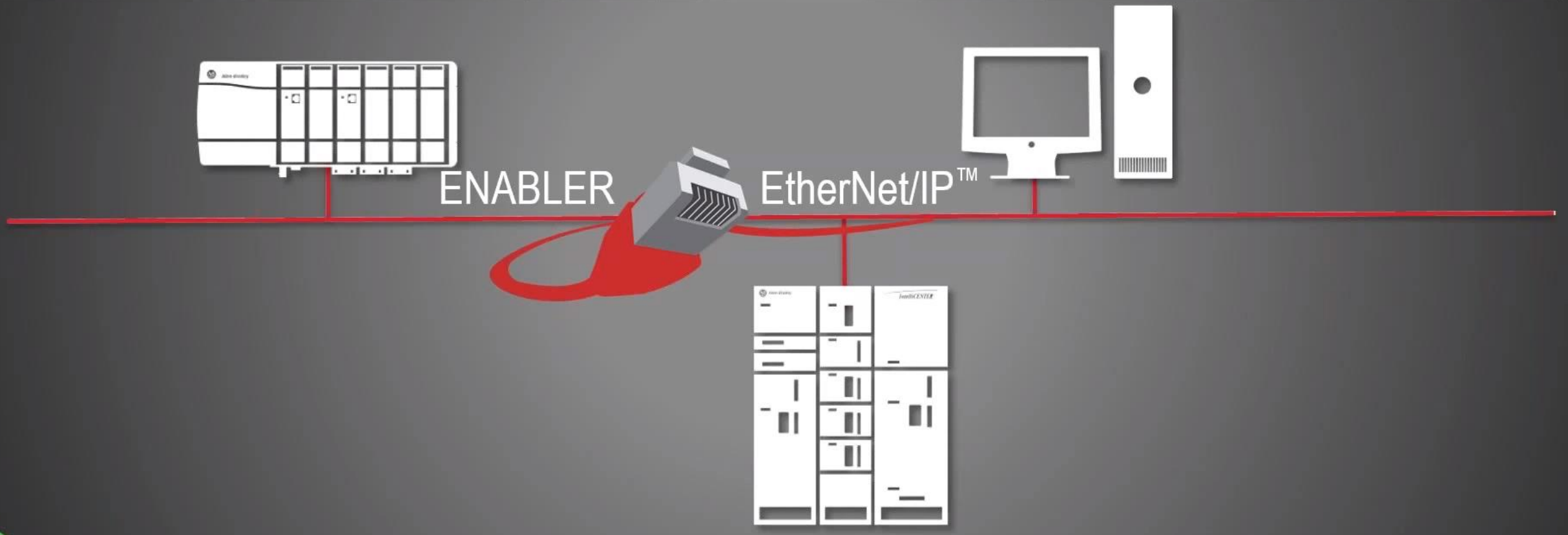
Single network:
Full access to any device from any location



Motor Control Technologies

Scalable Low Voltage & Medium Voltage Solutions

Rockwell Automation

Across-the-Line Starters

Full Voltage

Fixed Speed

Motor Control Technologies

Scalable Low Voltage & Medium Voltage Solutions

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Full Voltage
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Soft Starters

Reduced Voltage
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Reduced Voltage
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Variable Frequency Drives

Variable Speed

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Motor Control Centers

Centralized Motor Control

Connected Enterprise
Intelligent Motor Control

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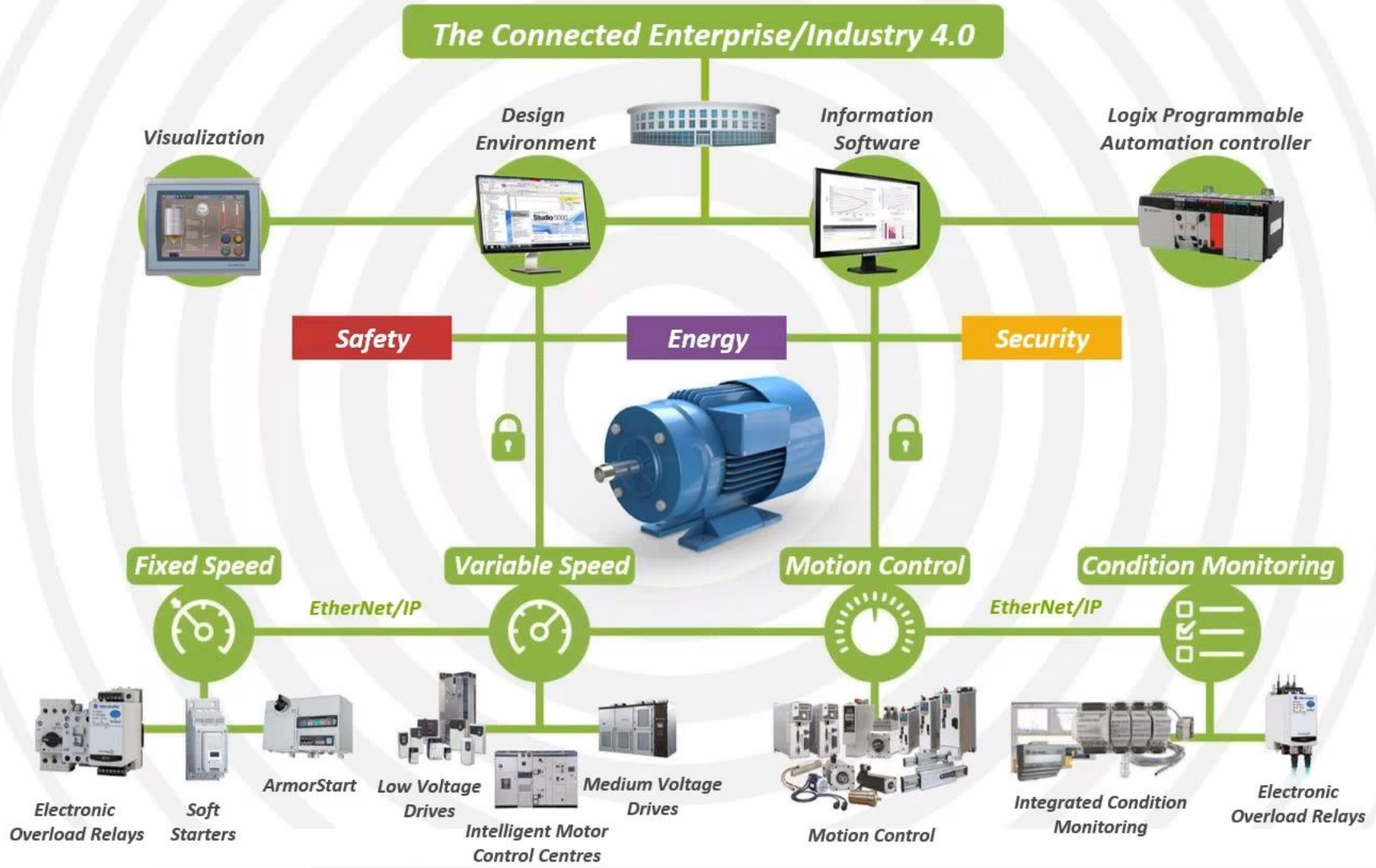

Benefits of IMC

Conventional v Intelligent Motor Control

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FLC – 47.5 Amps
Motor 6

Warning..
Vibration alert
Pump 7

- Current
- % Thermal Capacity Utilization
- Trip/Warning Histories
- Time to Trip
- Time to Reset
- Operational Hours
- Number of Starts
- Voltage
- Energy & Power

Time to trip

Warning..
Starts per hour exceeded

Intelligent Motor Control provides key diagnostic information that enables you to optimise performance with real-time access to operation and performance trends.

Access to production and machine data helps you to make informed decisions that improve production and mitigate downtime, increase productivity and boost profitability, offering substantial benefits over conventional approaches.

The conventional approach

Many devices are still hard wired and unable to communicate with higher level control systems and are therefore unable to provide access to real-time data

- No access to real-time data
- ON, OFF and Tripped – no pre-warnings possible
- User manual fault finding process – no diagnostics data
- Unnecessary downtime periods
- Higher maintenance costs possible
- Changing parameters requires a specialist engineer
- Hard to track and record energy costs

The Today's Intelligent approach

- Seamless communication and system visibility for increased performance and flexibility
- Operate and maintain motor performance through intelligent equipment and networks
- Reduce unplanned downtime with alarms and advanced diagnostic information
- Monitor energy consumption
- Remote monitoring helps keep personnel away from potential hazards
- Simplified troubleshooting and reduced start-up times

CII Confederation of Indian Industry

PUBLIC INFORMATION

Motors – The Workhorse of the Factory !

Rockwell Automation

Motor costs

- *Motors are the largest consumer of energy in industry*
- *Motors consume in excess of 50% of energy in industrial applications*
- *A motor costs 10 times its initial purchase price each year*
- *Reducing the speed of a motor by 20% saves 50% in running costs*

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Why motors fail

- The most common causes of motor failure are …
- Thermal Overloads
- Single phasing
- Bearing failure
- Rotor failure
- Stator failure
- Contaminants

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Cost of downtime

- Loss of production
- Manufacturing scrappage
- Establishing cause of failure(Mechanical/Electrical)
- Motor and system repair costs
- Safety issues
- Impact on other equipment

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Increase productivity

- Reducing unplanned downtime improves productivity
- Be in control of your production process
- Reduce energy costs
- Make fact based decisions with advanced diagnostic information

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Maintenance options

- Advanced diagnostic information
- Preventative not reactive maintenance
- Planned downtime possible
- Be in control of your plant
- Reduced maintenance costs

Which motor is the most critical ?

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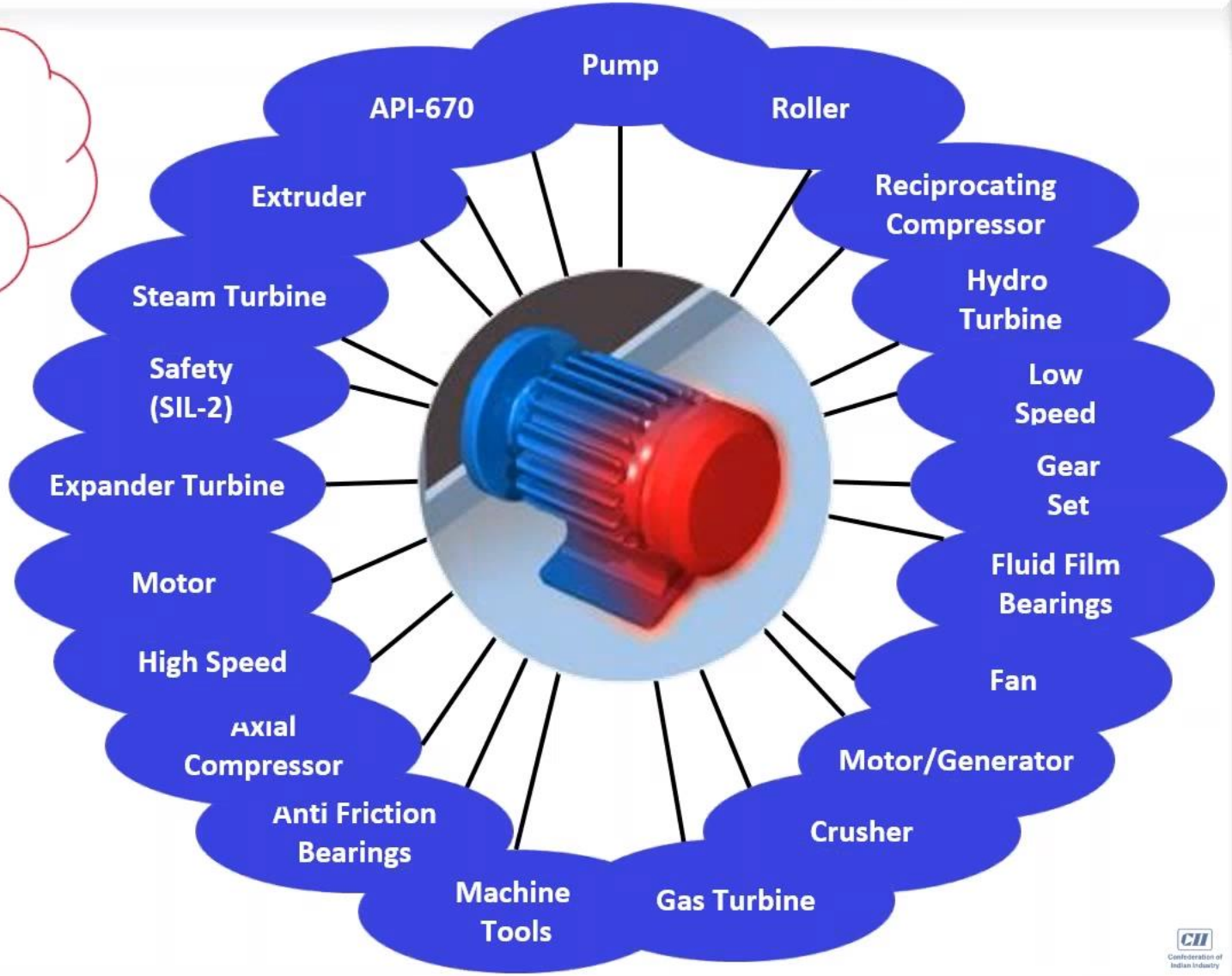
Is it the smallest motor ?

Is it the largest motor ?

- It depends on the application needs !
- Conventional motor control solutions may not offer the control and protection options you require !



Energy Management

Conventional vs IMC Solution

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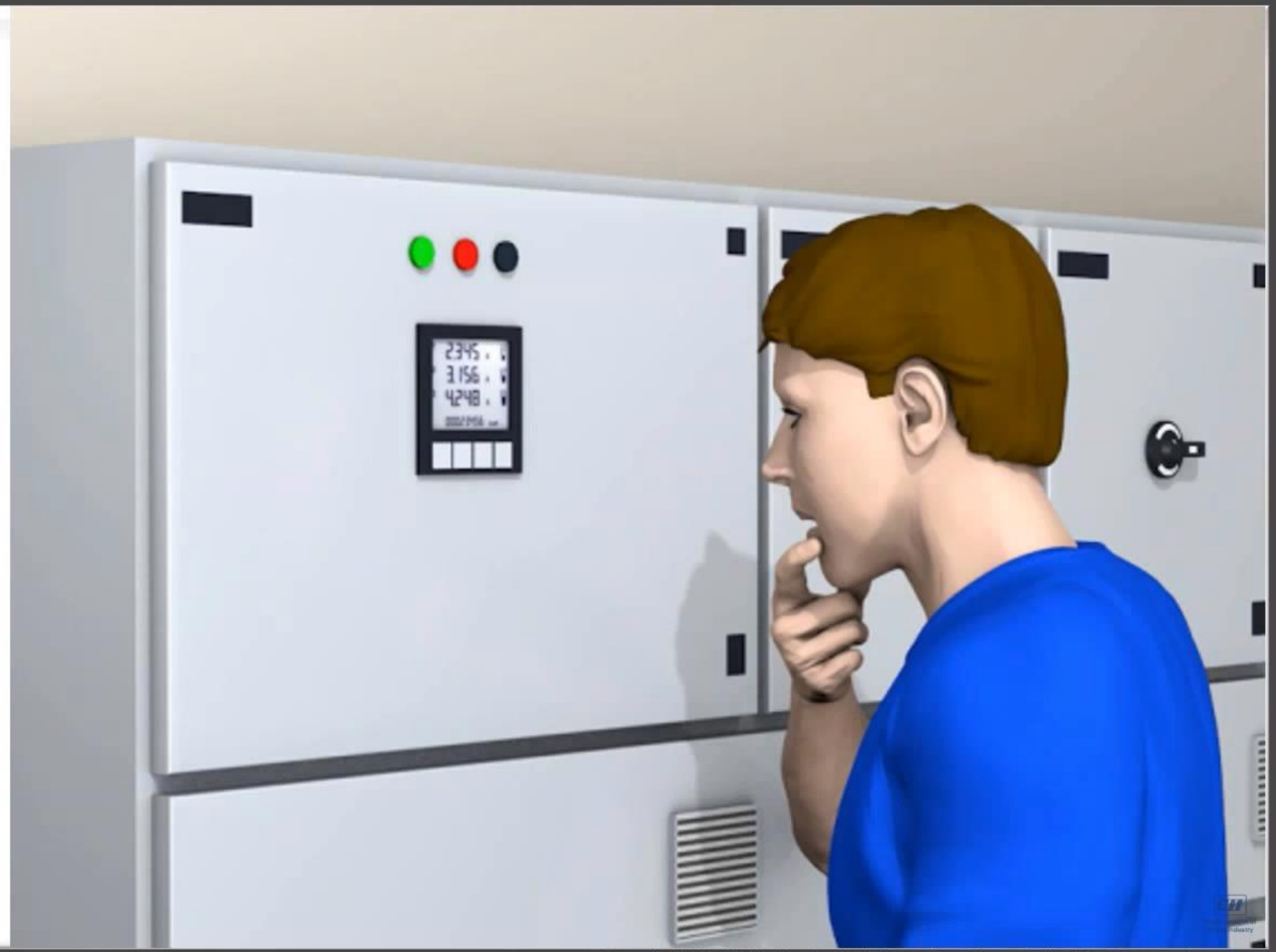
Conventional Solution

Issues

- Only total power consumption information available
- No data available from individual motors without additional costs
- Information only available locally and not remotely
- Load shedding options unknown
- No historical trend information
- Event snapshot information not available



Energy Management

Conventional vs IMC Solution

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Intelligent Motor Control

Benefits

- Energy consumption data available for each individual motor
- Data available anywhere which improves decision making
- Accurate historic data available
- Optimised energy management
- Reduced energy costs
- Email or SMS in case of unexpected consumption increase

Intelligent Motor Control

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The E300 is fully integrated into the Integrated Architecture®

- Network connectivity - *Native EtherNet/IP reduces hardware and engineering cost*
- Integrated into Logix – *Device profiles and faceplates reduce engineering time and project development*
- Automatic Device Configuration – *Reduces time to repair*

Simultaneous real-time control, configuration, and data acquisition

E300 –Electronic Overload Relay

- Intelligent, Scalable, Modular
- 0.5 … 200A with various mounting styles
- Current and voltage / Power measurement
- PTC and Ground-fault protection
- Embedded Inputs/Outputs
- Integrated into Logix Architecture
- Dual-port Ethernet/IP with Device Level Ring
- Embedded Web-server

Embedded Diagnostics

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Current

Embedded Diagnostics

Current

Time to Reset

Trip / Warning Histories

Number of Starts

Voltage & Energy
(Future Capability)

% Thermal
Capacity Utilization

Time to Trip

Operational Hours

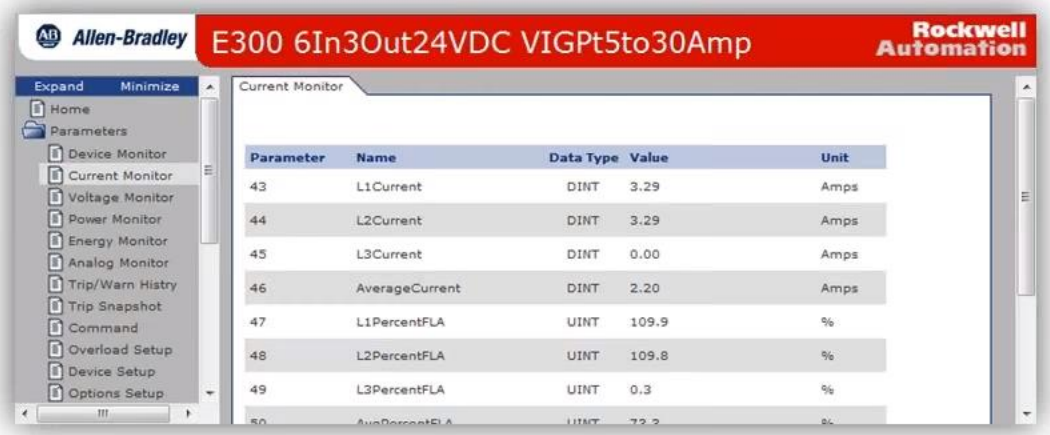
Scalable Solutions

The modular design allows users to have choices in each of the sensing, control, and communications modules with additional accessories to tailor the E300 overload relay or exact needs of the application:

- Multiple Sensing Capabilities *(Current, Ground Fault Current, and Voltage and Power)*
- Simplified Control Wiring *(120V AC, 240V AC, and 24V DC)*
- Wide Current Range *(10:1 and Higher)*
- Expansion I/O *(Digital and Analog I/O)*
- Operator Interfaces (Multiple Languages)
- Stocked Modules for Fast Replacement

Motor Diagnostics

- The E300 provides a wide variety of diagnostic information to monitor motor performance and proactively alert users to possible motor issues
- This information can trigger either manual or automatic intervention before the occurrence of an unplanned shutdown
  - Voltage, Current, and Energy
  - CIP Energy Enabled
  - Trip / Warning Histories
  - % Thermal Capacity Utilization
  - Motor Winding Temperature
  - Trip Snap Shot
  - Time to Trip
  - Time to Reset
  - Operational Hours
  - Number of Starts

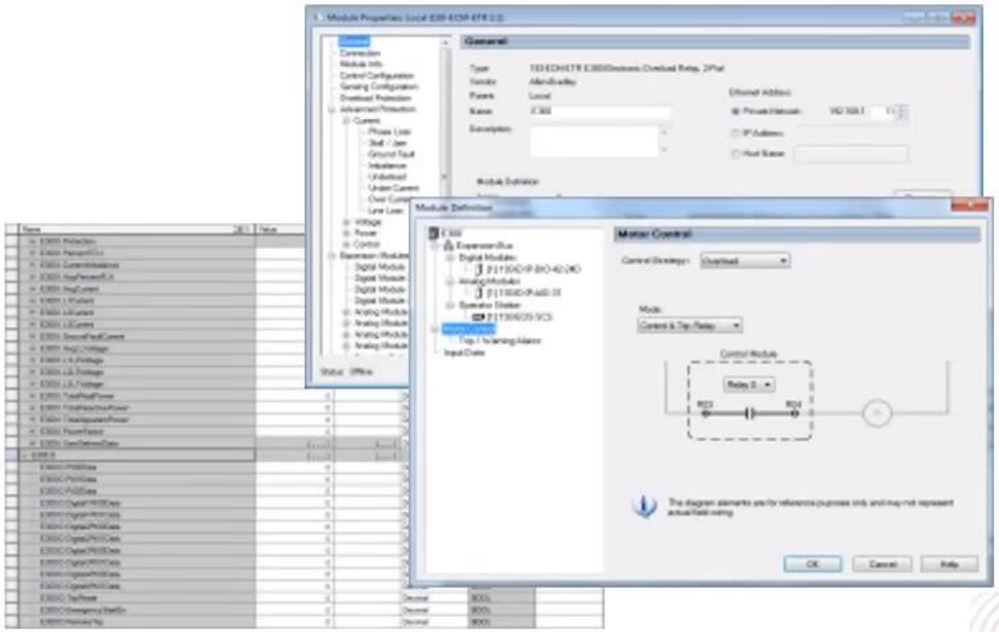


E300 – User friendly design & commissioning

- Add On Profile for Studio5000 aids programming into Logix
- Add-on Instructions provide the Logic for Hand/auto control
- Dual-port Ethernet/IP allows Star, Linear or Ring Topology
- Auto Device Configuration (ADC)
- Embedded web server
- Supports SMTP messaging

And also:

- Wide current adjustment range of 1:10
- Choice of mounting style



E300 Electronic Overload Advanced Diagnostics

Conventional v IMC Solution

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Conventional Solution

Issues

- Overload trips without warning
- Location of motor or cause of trip unknown
- Loss of production and potential scrappage costs
- Reduced motor life
- A restart of the motor could cause additional damage
- Productivity levels impacted

E300 Electronic Overload Advanced Diagnostics

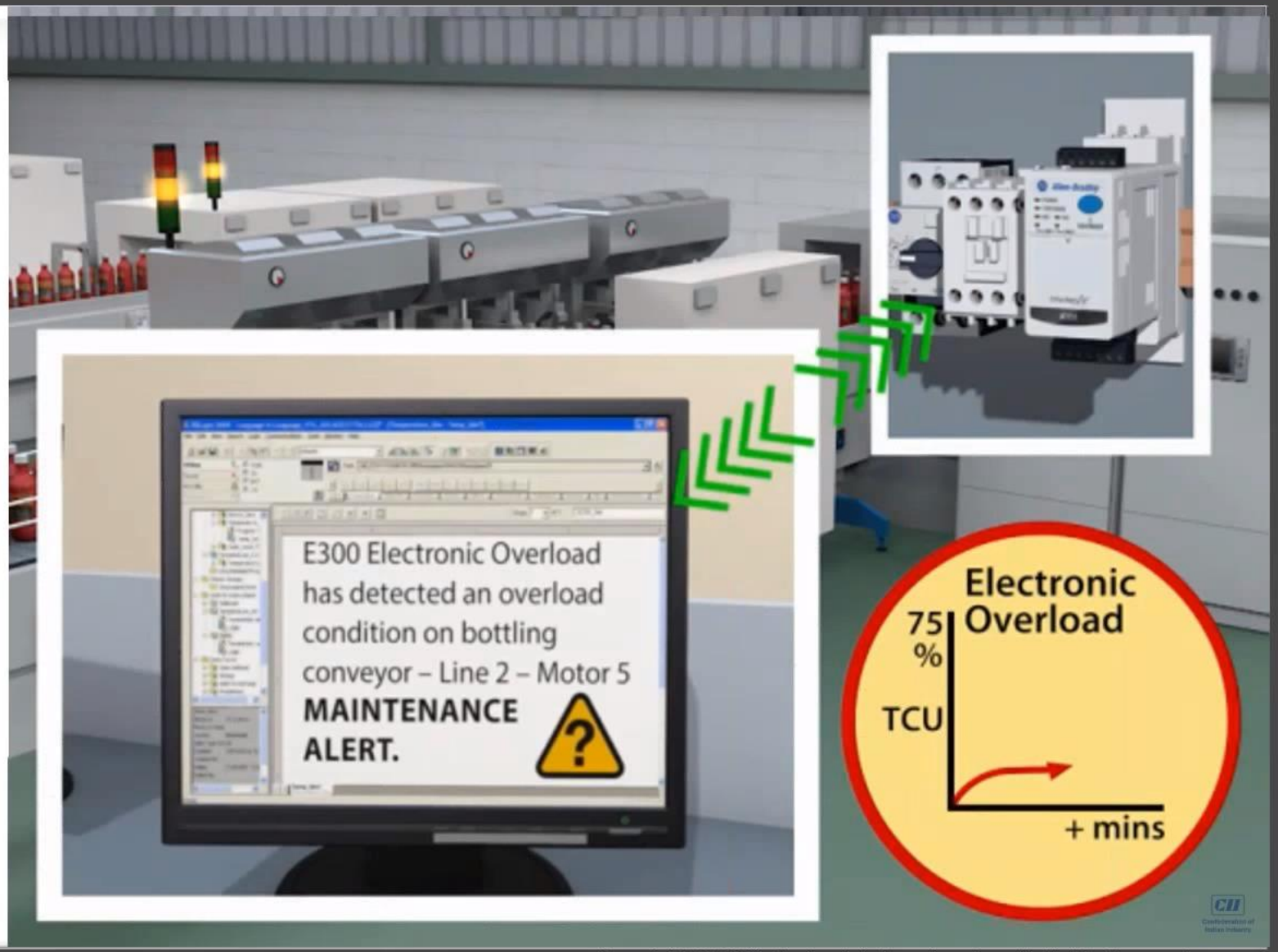
Conventional v IMC Solution

Rockwell Automation

Intelligent Motor Control

Benefits

- Early warning provided from diagnostics information
- Minimal or no loss of production / downtime
- Preventive maintenance solution
- Restart of process simplified and under control
- Simplified troubleshooting
- Trend information can highlight issues before they occur



Commercial Benefits of Intelligent Motor Control

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- **Conventional Solution**
- Locate, remove, replace and configure new drive/relay
- Time taken approximately **1.2 hours**
- Production costs US$ 13,000 per hour
- Controls/commissioning engineer required
- Total lost revenue UD$ 15,600

- **Intelligent Solution**
- Locate, remove, replace and configure new ADR embedded drive/relay
- Time taken approximately **15 minutes**
- Production costs US$ 13,000 per hour
- Shift electrician required
- Total lost revenue US$ 3,250

Benefits of Intelligent Motor Control

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Enterprise Customers:

- Real Time diagnostic information
- Minimized downtime Or Less maintenance time.
- Fast and simply system recovery
- Even network breakdown, local control can maintain
- Reduced equipment damage
- Easy to prepare maintenance schedule for preventing the serious fault coming

Panel Builders:

- Reduced panel installation costs and time over 30%
- Increased panel productivity over 30%
- Production process to become assembly line method
- Consolidated cable purchase

System Integrators & OEM:

- Reduced system design costs over 20%
- Reduced testing/commissioning costs over 50%
- Reduced overall documentation costs over 50%

Key Customers

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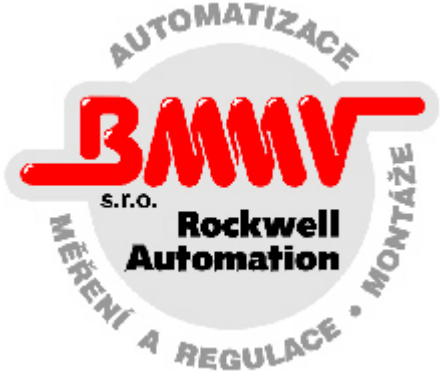

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