Spiro MPC:
Advanced control
out of the box

Contents
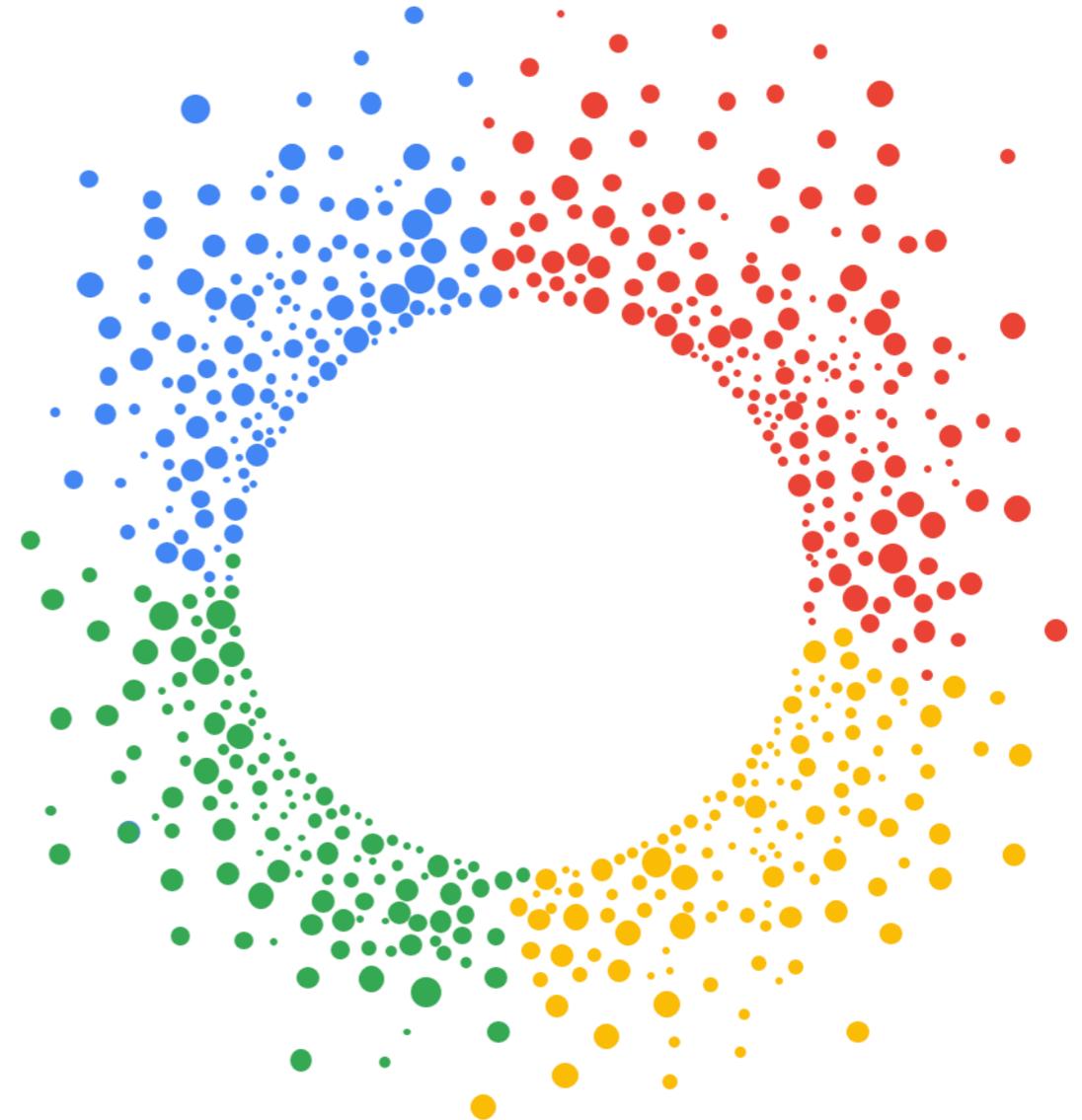
1 Spiro MPC:
Advanced control out of the box

Spiro MPC is a multivariable model predictive control application. The application comes embedded on a small footprint edge device, designed to connect to any control system easily. When embedded with Spiro MPC, the edge device is able to automate control of connected assets and can maintain processes at their optimal operating point.

By safely pushing processes to multiple constraints simultaneously, Spiro MPC increases plant profitability.

Spiro MPC employs highly efficient state space control algorithms which achieve millisecond execution frequency. By continuously monitoring and analysing sensor data, Spiro MPC can calculate and execute the optimal set of control moves needed to move a process to its most profitable limits.

In addition, support for cloud platform integration through the Industrial Internet of Things (IIOT) makes the solution future ready.

SPIRO EDGE DEVICE

Spiro MPC works like a hyper-intelligent operator able to work tirelessly 24/7

2

How Spiro MPC works

Using a model of the process together with sensor data captured by the edge device, Spiro MPC can map where a process is going and predict the impact that anticipated disturbances will have on your operation. Using this predictive information together with knowledge of operational constraints, Spiro MPC effects actions that minimise the impact of disturbances while also moving the process closer to the economic optimum point.

Maximum Moisture Limit (%)

4

3

Operation with Spiro MPC
• Lower variability
• Drives mean moisture level closer to optimum
• Lower energy consumption

2

Normal operation
• Higher variability
• Higher energy consumption
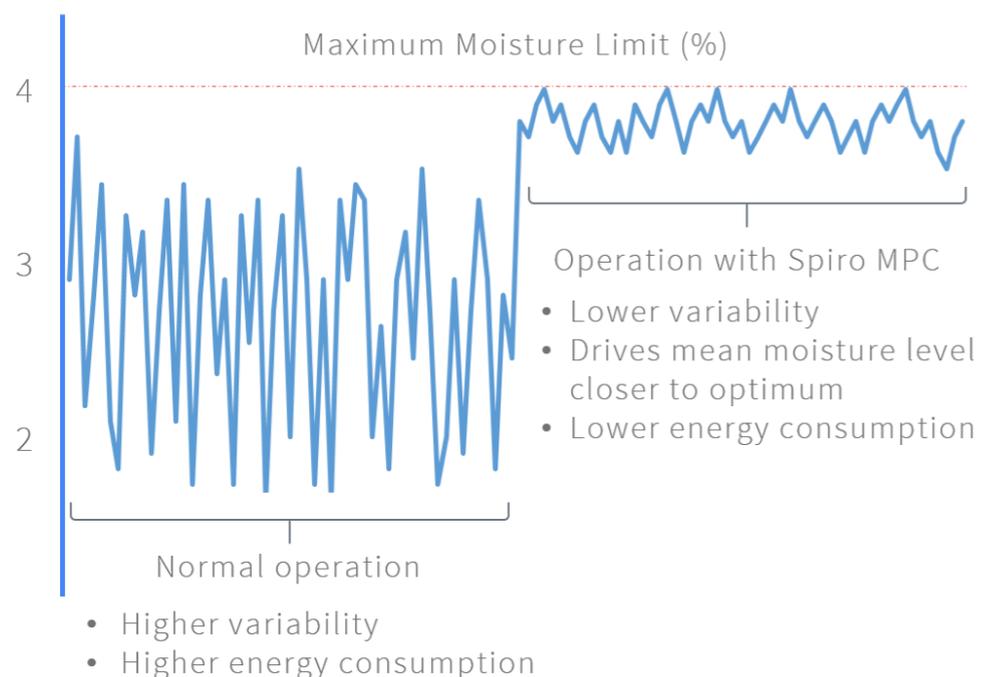
EXAMPLE APPLICATION: PRODUCT MOISTURE OVER TIME

Spiro MPC's model and tuning parameters are adapted to reflect the process under consideration.
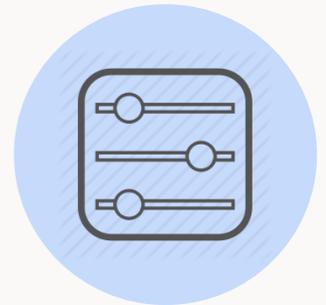
Spiro MPC monitors process sensor data as well as off-line measurements such as laboratory samples. It then instructs process actuators.

Using knowledge of the process economics, Spiro MPC drives the process to the most profitable limits.

By continuously monitoring the process and responding to disturbances, process operation is maintained at these limits 24/7.
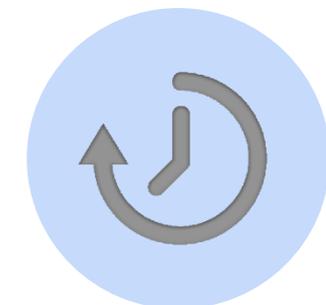
3

Why choose Spiro MPC?

Reliable, safe and secure

The runtime environment used, is in use in thousands of industrial applications across the world. Its reliability is well proven.

Cyber security is fundamental to the design architecture of the Spiro MPC solution, as opposed to being a mere add-on. The Spiro edge device upon which Spiro MPC is embedded, is designed to support security compliance, manage risk and increase resilience. Security features include secure boot to prevent uploading of unauthorised software, encryption for critical data using TPM (Trusted Platform Module) as well as user authentication.

The HMI and runtime employ role-based security ensuring that users can only access data and features assigned to them.

Having everything contained within one device creates a simple architecture which enhances security.
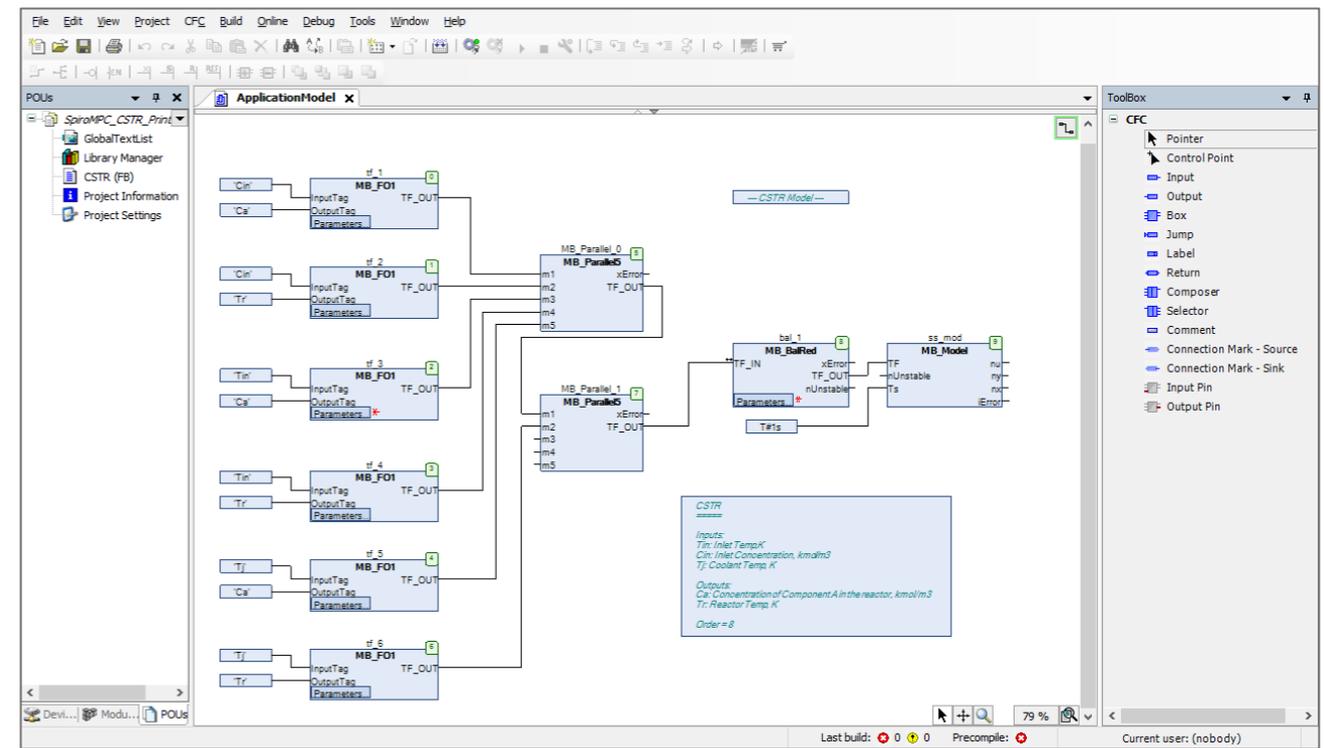
SPIRO MPC CONFIGURATION ENVIRONMENT

Versatile, light and intuitive

The Spiro edge device supports open industry standards including IEC 61131-3, OPC UA, Fieldbus, Industrial Ethernet and Modbus. Furthermore, Spiro MPC is supplied with a configuration environment that supports the PLC Open XML file format and is fully compliant to IEC 61131-3, supporting all five programming languages. Configuration can be carried out locally or remotely to the controller using a secure TCP/IP connection.

In addition to the basic IEC 61131-3 function blocks, Spiro MPC includes custom designed function blocks for advanced multivariable control; these employ fast code optimisation techniques that permit high execution frequency. The intuitive user interface of the customisable web-based HMI facilitates ease of use.

Low maintenance through self-learning

Spiro MPC can create, record and learn from data to continuously assess and improve the model of the process, meaning that Spiro MPC adapts to changes in the plant and delivers sustained benefits without a need for significant maintenance.

Without disturbing normal operation, Spiro MPC can stimulate the process to generate a rich data source to accelerate learning.

Maximum results

We developed Spiro MPC because manufacturers need better tools for turning data into actions, and better procedures to be able to safely push past operating within their comfort zone to instead operate at the limits of a process. By operating in this manner, major financial gains can be achieved.

The proprietary algorithms used by Spiro MPC can reduce process variability much further than traditional methods.
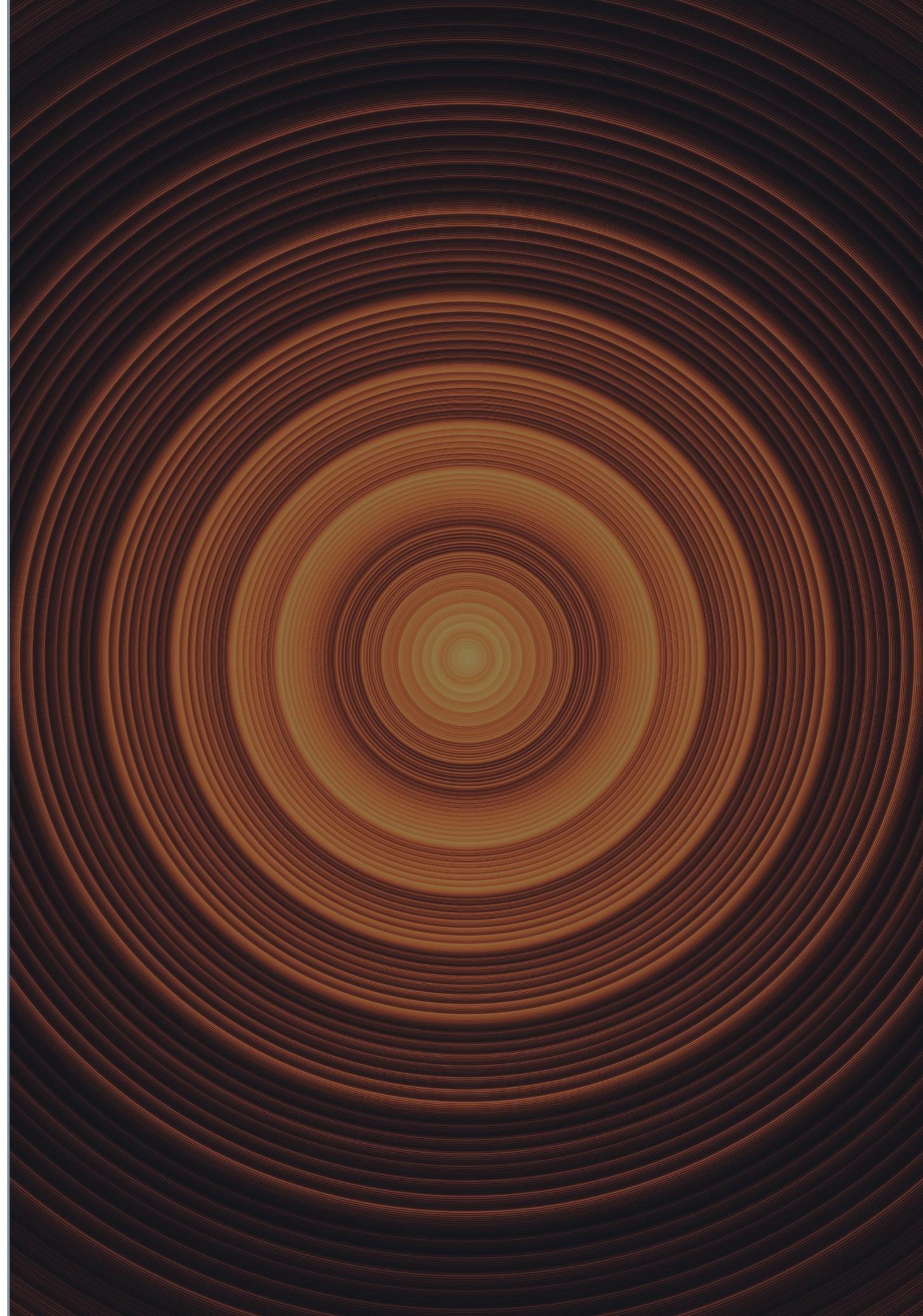
4 Benefits delivered

INCREASED PRODUCTION

Operating closer to equipment constraints improves productivity.

LOWER OPERATING COSTS

Lower energy consumption and less product giveaway.

IMPROVED PRODUCT QUALITY

Reduced process variability and increased process capability.

LOWER EMISSIONS

Lower specific energy consumption, reduced incidents of trips and better overall stability all contribute to lower environmental emissions.

BETTER OPERATIONAL RELIABILITY

Better stability means less wear on production equipment.

The benefits delivered by Spiro MPC all ultimately translate to **increased profitability**

Typically a full return on investment is achieved within **3-6 months**

5 Future ready: IIoT/Industry 4.0 connectivity

Industry 4.0 and the Industrial Internet of Things are fast becoming a reality in plants. This has been termed the fourth industrial revolution.

In 2008, the number of things connected to the internet surpassed the number of people on earth.

When supported by best practices in cyber security, this opens up tremendous opportunities for enhanced data analytics and application support. In addition to OPC UA, the Spiro edge device can support low-bandwidth messaging protocols such as MQTT and is ready to be used as an edge gateway providing real-time data to business intelligence and operational excellence software in the cloud.

6 Spiro MPC features

Virtual sensor capability. This is ideal for instances where it is difficult or even impossible to obtain continuous measurements of variables that are crucial to a process. This feature replicates the function of an online analyser.

Spiro MPC comes with self-learning technology as standard.

Customisable web-based operating graphics.

Built-in optimisation engine drives a process to the economic optimum.

Secure real-time data streaming to big data and analytic software in the cloud. Ready for the Industrial Internet of Things.

Role-based security so that operators and engineers can access only the information assigned to them.

Supports a wide range of communication protocols including Fieldbus, industrial Ethernet and OPC.

Designed with cyber security as a fundamental part of the architecture.

Industry standard IEC 61131-3 compliant.

Default tuning parameters work out of the box
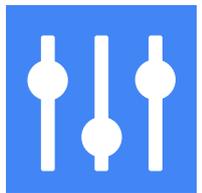
Comes embedded in rugged hardware with wall or DIN rail mounting.

Designed for 24/7 operation capability in harsh operating environments.

Built in constraint handling ensures that the process remains within a safe operating window.

7 Spiro MPC solution package

Site survey report

Involved throughout the life cycle of all our projects are Spiro Control's world-class engineers. They are experts in their field, and during an initial site survey will offer their opinion and will provide a full report covering instrument review, recommended actions and a value estimation of the benefits from installing a Spiro edge device with embedded Spiro MPC.

Spiro edge device

The Spiro edge device with embedded Spiro MPC succeeds in packaging a vast amount of cutting-edge technology into one secure piece of industrial hardware. This has been done to achieve simplification, increase reliability and security. It also means Spiro MPC has a small footprint.

Additionally, having everything contained within one device reduces the maintenance demand. For example, no internet connection is required to register or maintain the application.

Installation and configuration

Our implementation methodology has been developed over years of field experience to ensure that we can achieve the best results while minimising any disruption to normal operation.

Spiro Control's engineers will be on hand to adapt Spiro MPC's model and tuning parameters to reflect the process under consideration. Before commissioning, we simulate the application off-line to evaluate performance.

Training

A Spiro Control engineer will be present in the control room as the loop is closed and Spiro MPC begins to optimise the process.

We provide extensive product training to any potential on-site user before the handover is complete.

Benefit audit

Before the final handover, we review performance and calculate the benefits achieved by having Spiro MPC running.

Customer support

Spiro Control is dedicated to providing the best possible support to all clients. We want to ensure that Spiro MPC is always running and delivering the highest achievable benefits. The Spiro MPC solution package includes:

- Guaranteed device availability and service factor.
- Dedicated engineer for remote technical support and troubleshooting.
- Annual site visit with renewed benefit audit and health check.
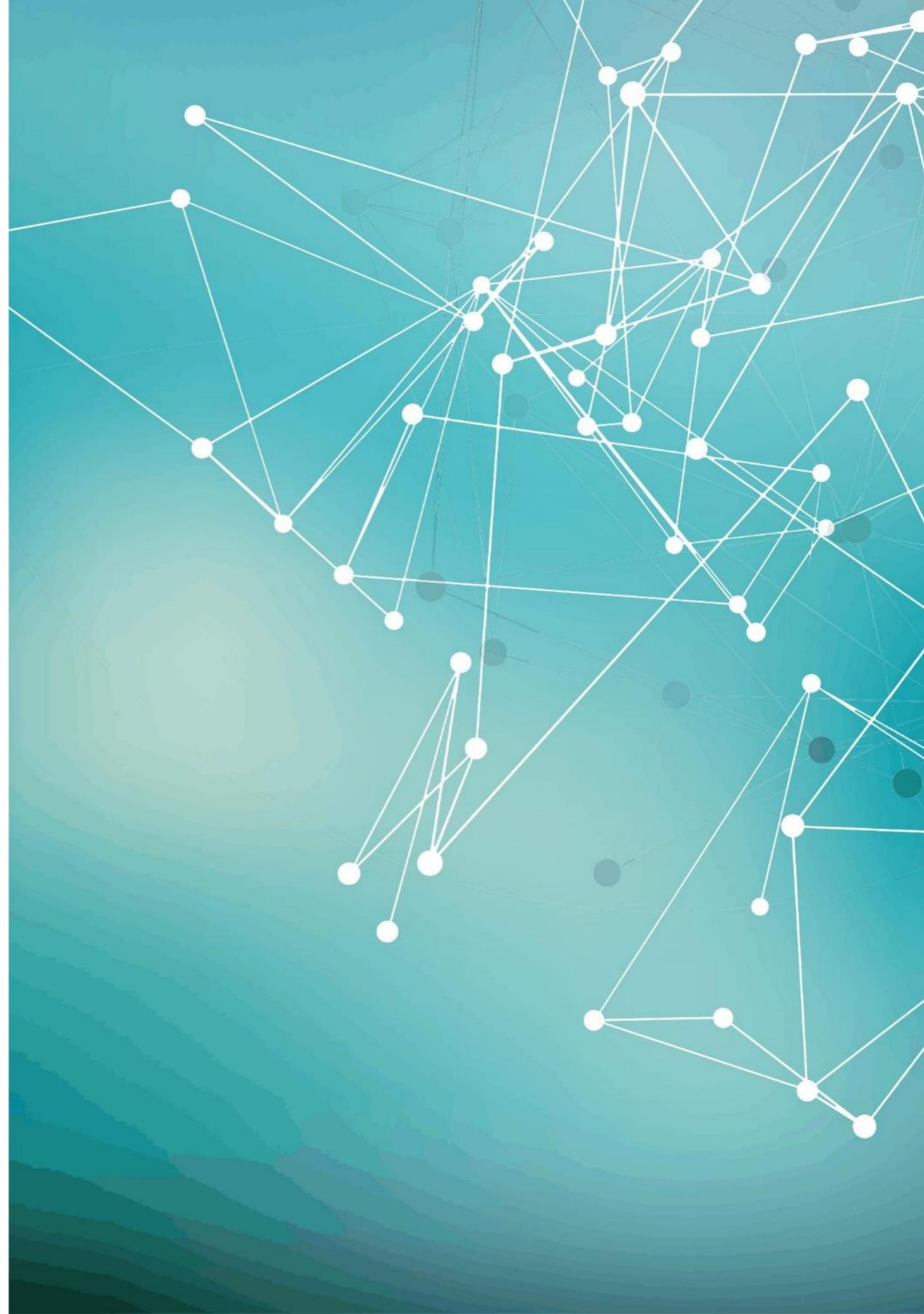
8 Spiro Control in brief

We are Spiro Control. An agile technology firm with vast expertise in process optimisation and process control. Our engineers add value through creative thinking, experience, and good judgement to secure project success and ensure rigorous management of risk. They have delivered advanced control solutions to clients across the world and in a broad range of industries, including refining, petrochemical, chemical, energy, polymer, food processing, pulp and paper and mining industries. We provide a range of services from fully installed solutions, to process control troubleshooting, control system design and implementation.

HQ — CHESTER

OFFICE — EINDHOVEN

PARTNER - PUNE

AGENT — ABU DHABI

PARTNER - PUNE
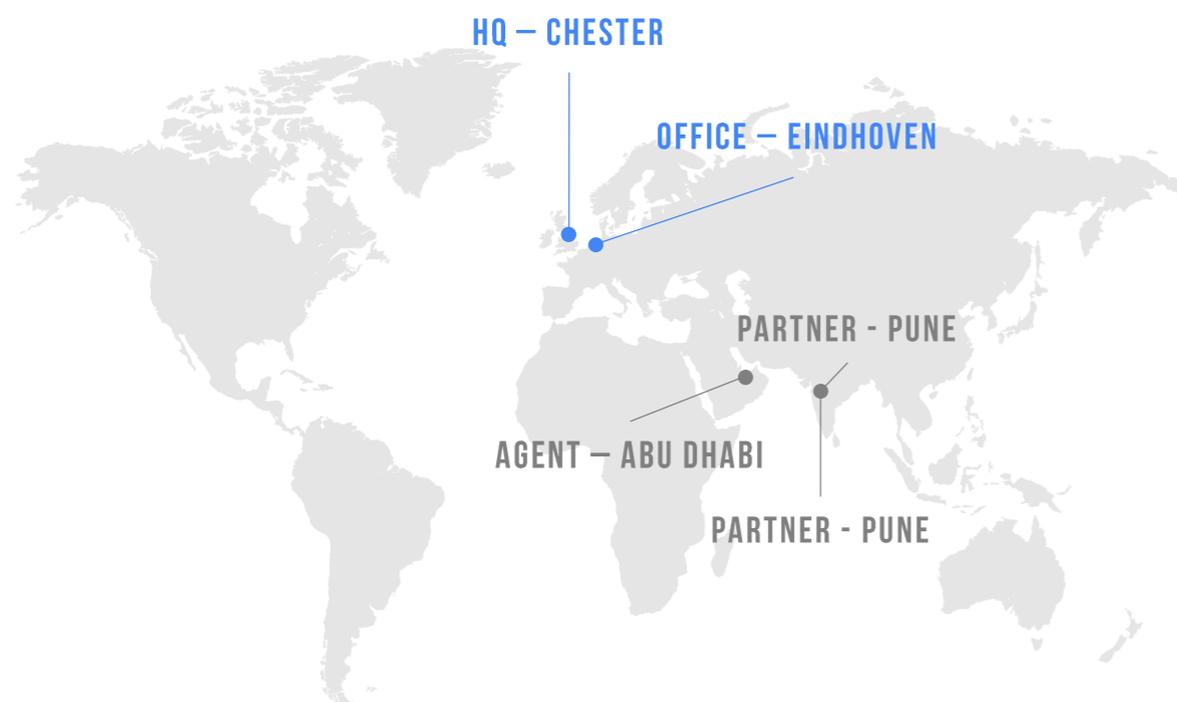
Making the complex, simple

9 Our technology

The company has built a strong reputation for building technology that is easy for customers to use and maintain, yet delivers a robust solution capable of tackling the most complex applications.

We constantly aspire to design and develop solutions that make the complex, simple.

Get in touch

Thornton Science Park
Pool Lane
Chester
CH2 4NU

Phone: +44 1244 568 941
Email: info@spirocontrol.com
Web: spirocontrol.com

Spiro