



SERVICE BRIEF

Virtual Commissioning

Commission your control system against a simulated plant before it reaches site.



Control system engineering, integration and analytics since 1997
ISO 9001 certified • Cyber Essentials • CHAS • Constructionline • SafeContractor

www.matrixsystems.co.uk
enquiries@matrixsystems.co.uk
0121 240 7454

THE CHALLENGE

Find the problems before site does

Site commissioning is the most expensive place to find a mistake. Crews wait, production waits, and logic gets fixed under pressure on live equipment. Virtual commissioning moves most of that work earlier: the real control program runs against a simulated plant, so sequences, interlocks and screens are proven before anyone travels.

Time on site

Every day of commissioning holds up production and keeps crews on site. Logic errors found there cost far more than the same errors found in the office.

Testing on live equipment

Proving interlocks and fault handling on real plant puts people, product and equipment at risk.

Late surprises

Interfaces between suppliers, screens and sequences often meet for the first time on site, where every problem becomes urgent.

Operators not ready

Operators first see the new system on the day it goes live, with production depending on it.

AT A GLANCE

CONTROLLER

Your real program

The control program itself runs in an emulated controller, not a rewrite of it.

PLANT

Simulated I/O and process

Equipment responds to commands, and process models feed back to your control loops.

OPERATORS

SCADA connected

Screens, alarms and commands tested end to end against the simulation.

OUR ANSWER

The real control program, proven against a simulated plant, before site.

We run your actual PLC program in an emulated controller and connect it to a simulation of your plant: equipment that responds, process values that move, and the operator screens that will run it. Sequences, interlocks, alarms and faults are tested and recorded long before installation, so site time is spent proving the real equipment, not debugging logic.

WHAT WE OFFER

What virtual commissioning covers

Use it on a new system before factory acceptance, or on a running plant to prove a change before it is downloaded.

SERVICE 01

Emulated controller

Your PLC program runs unchanged in an emulated controller (for Siemens S7-1500, PLCSIM Advanced) on our test systems, so we test the code that will run on site.

SERVICE 02

Simulated I/O and plant behaviour

Inputs are driven and equipment responds: motors run, valves move, levels and temperatures change. Process models close the loop with your controllers.

SERVICE 03

SCADA and HMI against the simulation

Operator screens, alarms, trends and commands are connected to the emulated controller and tested end to end, before any panel is built.

SERVICE 04

Sequence, interlock and fault testing

Normal runs, holds, aborts, restarts, failed sensors and tripped drives, each tested against the functional specification and recorded.

SERVICE 05

Changes to running plants

A copy of the program that runs today is simulated, so a modification is proven against it before it goes anywhere near your plant.

SERVICE 06

Witnessed tests and familiarisation

Your engineers can witness tests on the simulation before factory acceptance, and operators can see the new screens before go-live.

WHERE IT FITS

An extra test stage, not a replacement for testing

Virtual commissioning sits between design and factory acceptance. It catches most logic and interface errors early, so factory and site acceptance can concentrate on what only real equipment can show: wiring, instruments, mechanics and the process itself.

BEFORE AND AFTER

What changes with virtual commissioning

The same tests are run either way. The difference is where they run, and what happens when one fails.

Commissioning on site only

The program meets the plant for the first time at installation.

- Logic errors found with crews and production waiting
- Interlocks and faults tested on live equipment
- Interfaces between suppliers first meet on site
- Operators see the system on go-live day
- Fixes made under pressure, and harder to document

With virtual commissioning

The program is proven against a simulated plant first.

- Logic errors found in the office, fixed and retested
- Faults and trips simulated safely, as often as needed
- Interfaces tested before the equipment arrives
- Screens and alarms reviewed by your team in advance
- Site time spent on real equipment and the process

What we simulate

Part of the system	How it is simulated	What it proves
Controller	Your PLC program in an emulated controller, configured like the real one	The code that will run on site
Inputs and outputs	Simulated signals with realistic feedback: run signals, valve limits, levels	I/O handling and equipment logic
Process	Models of levels, flows, temperatures and pressures, closed loop with your controllers	Control loops and process sequences
Operator interface	SCADA and HMI connected to the emulated controller	Screens, alarms, trends and commands
Communications	OPC UA and controller links to the simulated system	Data exchange and addressing
Faults	Failed sensors, tripped drives, lost communications and out-of-range values, injected on demand	Fault handling and recovery
Safety logic	Safety functions exercised in simulation to find errors early	Logic only; safety acceptance is on real equipment

HOW WE DELIVER

From specification to proven program

Virtual commissioning is planned from the start of the project, so the simulation is ready when the code is.

01 Model

The I/O list, process description and equipment behaviour turned into a model of your plant.

02 Connect

The program loaded into the emulated controller and connected to the simulated I/O and SCADA.

03 Test

Sequences, interlocks, alarms and faults tested against the functional specification and recorded.

04 Witness

Your engineers witness the tests on the simulation; changes made and retested.

05 Accept

Factory acceptance focused on hardware and integration, with the logic already proven.

06 Site

Site acceptance on the real equipment, with a shorter, calmer commissioning.

OUR ENGINEERING TOOLCHAIN

Built for repeatable simulation

PLCSIM automation

Project copies prepared, loaded and run in PLCSIM Advanced without manual steps.

Commissioning SCADA

Generated from the PLC program; it can only write to a simulated controller.

I/O gateway

Drives simulated inputs, logs every value it forces and releases them all at the end.

Test plans

Sequence and interlock tests written as tables, traced to the functional specification.

Process simulator

Closed-loop models of the process, running with your control loops.

Version control

Program, model and test results kept together, so every test can be rerun.

PROOF, NOT PROMISES

How we prove it

- Each test traced to a requirement in the functional design specification
- Results recorded, with failures logged, fixed and retested
- The tested program version recorded, so site runs exactly what was proven
- Simulation writes are confined to the emulated controller, never to a real one
- Your engineers can witness any test before factory acceptance

WHERE THE LINE IS

Simulation proves logic against a model of your plant, within that model. It never replaces tests on the real equipment, and it is never safety acceptance. Wiring, instruments, mechanics and the process itself are proven at factory and site acceptance.

WHAT YOU RECEIVE

Evidence before site

✓ Simulation model and scope	✓ Inspection and test plan	✓ Sequence and interlock test pack
✓ Test records and deviation register	✓ Tested program version and change log	✓ Alarm list and HMI interface
✓ FAT and SAT protocols and records	✓ Functional design specification	✓ As-built source code

QUESTIONS CUSTOMERS ASK

Does it replace FAT and SAT?

No. It comes before them, so they can focus on the real equipment and the process.

Can we use it on an existing plant?

Yes. A copy of the program that runs today is simulated, so a change is proven before it is downloaded.

Do we need a 3D model of the plant?

No. The simulation models how equipment and process behave, which is what the control program needs.

ABOUT MATRIX

Standards-led, fully documented control systems that you own and can support.

Matrix International (UK) Ltd has designed, built and supported industrial control systems since 1997. We take projects from specification and electrical design, through PLC, DCS and SCADA software, to installation, commissioning and long-term support, and we build the analysis software that shows how a plant is really performing. We are ISO 9001 certified and hold Cyber Essentials, CHAS, Constructionline and SafeContractor accreditation.

Siemens TIA Portal, S7 and PCS 7 • Rockwell • ABB • Schneider • Mitsubishi • Beckhoff • Emerson DeltaV • Honeywell • GE • WinCC, Ignition, AVEVA (Wonderware), FactoryTalk, iFIX and Citect SCADA

**Talk to us about virtual
commissioning**

enquiries@matrixsystems.co.uk
0121 240 7454
www.matrixsystems.co.uk