COSYLAB



Advancing humanity.
Engineering remarkable.

Why OEMs choose us

In semiconductor equipment, machine control software is increasingly the limiting factor for precision, throughput, and time to production. We help equipment OEMs in metrology, inspection, ion implantation and advanced packaging develop new tools and upgrade existing platforms, with lower integration risk, predictable delivery, and full IP ownership transferred to you.

Here is what we guarantee on every engagement:



White-box by default

Full source code, no proprietary platforms, no lock-in – on every engagement.



Process agility: we fit in or build up

We work inside your engineering processes and toolchains, or bring audit-ready practices where they are still taking shape.

DE-RISK TOOL DEVELOPMENT

This will not become another delayed, unstable tool.

We surface integration and schedule risk early – before design freeze, not at acceptance.

INDUSTRIAL-READY BY DESIGN

You can certify, maintain, and evolve this system long-term.

Audit-ready documentation and traceability are built in, not retrofitted at the end.

DETERMINISTIC CONTROL THAT SCALES

Performance will not collapse as complexity increases.

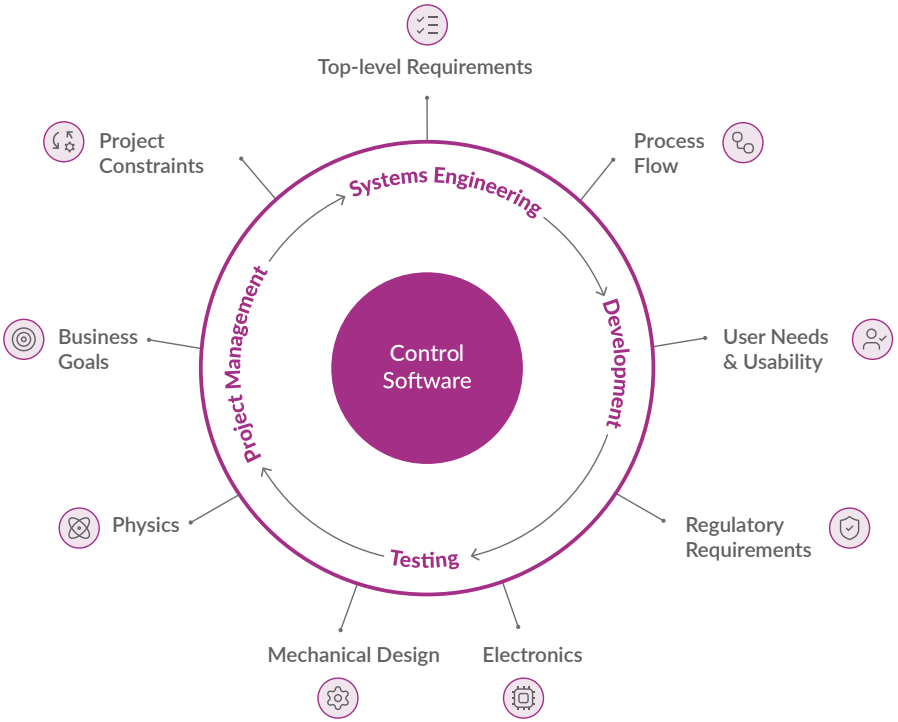
Real-time synchronisation across motion, vision, and data – sustained at higher tool complexity.

FULL IP OWNERSHIP & CONTROL

Whatever we develop together, it's fully yours.

White-box solutions, no proprietary platforms, no vendor lock-in. Your IP, your toolchain.

Your challenge & our approach



Software Control – The glue of every complex device

In successful deep-tech projects, software control engineering requires a holistic, systems-engineering approach that goes far beyond great code.

It connects software, hardware, and people through clear processes, documentation, and strong project leadership.

Our engineering services – from architecture to industrial-ready



01 Feasibility & architecture design

Define the machine control architecture and surface integration risk before development begins – a fixed-price, time-bound engagement that ends with a concrete, costed engineering and project plan.

WHAT WE DO

- Architecture definition
- Use case & interface mapping
- Hardware specification
- Risk identification
- Make-vs-buy analysis

WHAT YOU RECEIVE

- Machine control architecture document
- Subsystem interface register
- Scoped, costed plan for the development phase

BEST FIT

New tool development · Modernisation · Integration recovery

02 Machine control software development

Deterministic, modular machine control software covering the entire control stack – PLC, motion, vision, data acquisition, timing and synchronisation. Greenfield or brownfield.

WHAT WE DO

- PLC programming
- Real-time control
- Recipe execution
- Fast machine protection
- Motion control

WHAT YOU RECEIVE

- Machine control software – source & binaries
- Safety interlock and machine protection
- White-box solution – full IP transfer

BEST FIT

New tool development · Platform modernisation · Capability augmentation



Each service stands on its own – pick what you need:

☑ 01 ☐ 02 ☑ 03 ☐ 04

One, several or all four.

03 Electronics & firmware development

Custom electronics and firmware – VHDL on FPGA, and embedded firmware – where standard components cannot meet the deterministic timing, precision, or environmental requirements of your machine.

WHAT WE DO

- FPGA development
- Sub-nanosecond synchronisation
- Cleanroom, vacuum & harsh environments
- Embedded firmware
- VHDL & digital design

WHAT YOU RECEIVE

- FPGA bitstream and source, build environment
- Custom PCB design files, BOM, prototypes
- Hardware test reports including EMC

BEST FIT

Inspection & metrology · Demanding environments · Sub-nanosecond timing

04 Verification, validation & commissioning

Supporting fab acceptance through structured verification, traceability, and commissioning – so your machine is certifiable and stays maintainable long-term without rebuilding.

WHAT WE DO

- Test strategy & specification
- Audit readiness
- Subsystem & integration testing
- On-site commissioning
- Performance & acceptance testing

WHAT YOU RECEIVE

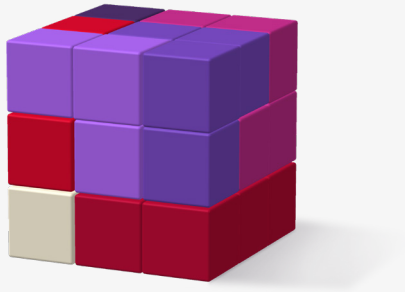
- Verification and validation report
- Audit-ready traceability documentation
- Structured handover package and training

BEST FIT

Pre-acceptance · Lab-to-fab transition · Certification preparation

What our customers value most

- Going beyond software: seeing the whole system, from each subsystem up to the overarching architecture.
- Being the glue that makes the pieces fit together, and staying until the machine runs.
- Starting confidently before the requirements have even been written.
- Spotting risks early and coming back with a proposal for how to solve them.
- Working inside the customer's tools, processes and rules without friction, on site or fully remote.



"We needed a partner who could combine software engineering with real physics knowledge – a combination that's harder to find than it sounds, and move fast. When we needed to deliver under tight timelines, Cosylab stepped in, got up to speed quickly, and delivered. What I valued most was the level of the engineers, the responsiveness, and the trust that was built from day one.

Head of Equipment Development Program
Ion Beam Services

"I've worked with software suppliers before, but Cosylab brought a different level of support and availability. They combine genuine engineering and physics expertise with a collaborative approach that makes complex projects run more smoothly, even when the starting point isn't perfectly defined.

General Software and Simulation Manager
Ion Beam Services

Heritage

25 years across accelerators, fusion, medtech, and more – bringing reliability and compliance to every project.

PROVEN IN INDUSTRIES WHERE FAILURE IS NOT AN OPTION

- Particle accelerators
- Proton & radiation therapy
- Semiconductor equipment
- Fusion energy
- Quantum technologies

1000+
successful projects

25
years of experience & know-how

200+
skilled engineers

5
locations worldwide

30+
PhD holders from STEM fields

20%
annual growth rate over 15 years

Certified with
ISO 9001, 13485

Highest credit rating
SB1 (AA by S&P)

Compliant with
ISO 14971, IEC 62304

Our references

FAIR · CERN · ESS European Spallation Source · PAL · SLAC National Accelerator Laboratory · SNS Spallation Neutron Source · Jefferson Lab · INFN · ALBA · diamond · HZB · DESY. · MAX IV · IMP · PSI · Brookhaven National Laboratory · iter · SINAP · QST

SEMICONDUCTOR EQUIPMENT

Machine control software for complex tools.

#System Architecture
#Systems Engineering
#Integration
#Deterministic Control
#Industrial Ready

Slovenia HQ office
T: +386 1 477 66 76
E: info@cosylab.com

USA
T: +1 630 364 27 44
E: usa@cosylab.com

Switzerland
T: +41 56 560 50 43
E: switzerland@cosylab.com

Japan
T: +81 3 6275 0400
E: japan@cosylab.com

China
T: +86 512 6813 3600
E: china@cosylab.com

About Cosylab

Cosylab is the leading provider of software solutions for the world's most complex, precise and advanced control systems. Our expertise enables organisations to discover scientific breakthroughs, offer state-of-the-art cancer treatment and healthcare innovations, and bring clean fusion power to the future energy market. We provide software products and services to the largest medical device manufacturers and cancer centres worldwide.

We have contributed to the particle accelerator community in the scientific, medical and industrial sectors, working on complex, distributed and highly regulated projects. Our clients include the most innovative and cutting-edge accelerator applications such as FAIR, SLAC, DIAMOND, RIKEN, Nusano, AVO ADAM and many more. With our efficient support and up-to-date expertise, we enable organisations to keep their focus on their scientific and business objectives.

Through its headquarters in the EU and subsidiaries across Europe, North America and Asia, Cosylab has worked on hundreds of multi-year, multi-people projects worldwide.

Let's scope your control system together.

https://cosylab.com/solutions/semiconductor

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