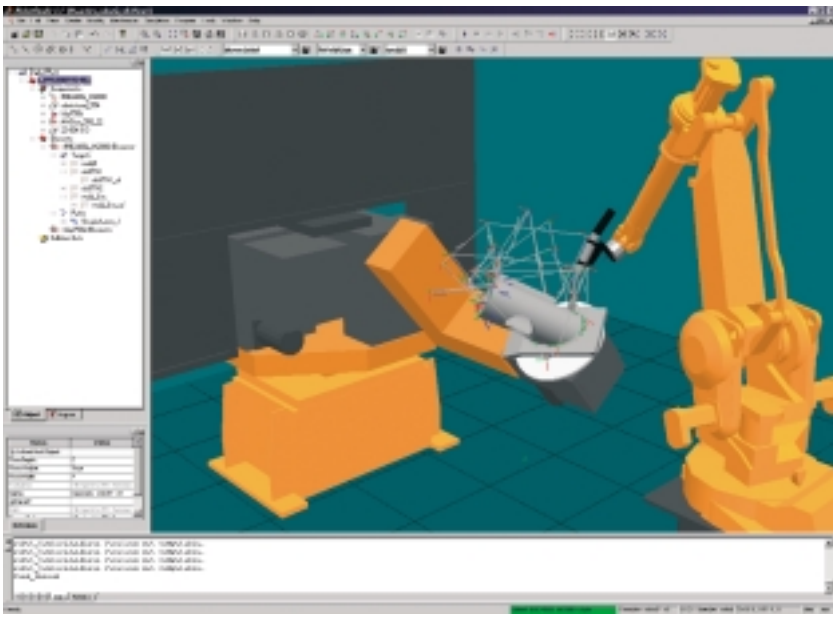
# Industrial$^{IT}$ for robotic applications

## Off-line programming is just like having the robot on your PC!

Ulrika Sallsten

**Off-line programming is the best way to maximize return on investment for robot systems. ABB's simulation and off-line programming software, RobotStudio, allows robot programming to be done on a PC in the office without shutting down production. It also enables robot programs to be prepared in advance, increasing overall productivity.**

All those things you can do on-line with your robot, ie on the shop floor, can now be done off-line. RobotStudio is the first, easy-to-use software for simulation and true off-line programming of a robot system on a standard Windows PC. By using an exact replica of the real ABB robot controller, RobotStudio can generate precise robot programs. The virtual controller uses the same software that is used to control the robot, and it generates executable RAPID-programs. This use of a virtual controller concept makes ABB the only supplier offering true off-line programming.



To achieve true off-line programming, RobotStudio includes the source code from the ABB S4 robot controller. RobotStudio´s virtual controller uses an exact replica of the real robot controller to simulate the robot.

Through the use of this tool, customers enjoy less risk by being able to evaluate new robotics solutions before the systems are up and running, and/or before any investments are made. Even before the physical equipment is installed, new robotic systems can be configured – resulting in shorter time-to-production. Plant flexibility is also improved as automation scenarios and production changeovers can be designed, optimized and verified off-line without interrupting production.

### Maximizing ROI

Cost-efficient off-line programming is the best way to maximize return on

Torsten Werner, Comtri's CEO, Production Manager, robot programmer and operator. "For us, RobotStudio means healthy progress."

investment (ROI) for a robot system. RobotStudio reduces the life-cycle cost of a robot system in that it reduces the risk during planning by allowing the system to be evaluated before it is built. It then speeds up the installation by making it possible to create and test the robot programs as well as train personnel before the system is up and running. Finally, it improves system uptime by moving the task of adjusting robot programs from the shop floor to the office, thereby freeing up formerly occupied – and precious – production capacity.

The robot programmer creates the robot programs on a PC and tests different alternatives in the digital 'robot cell' in order to find an optimized solution. Later, when changing the programmed part, it is much easier for engineers to reprogram and tune the ABB robots, reducing programming cost and time. These cost reductions come in the form of quicker start up, shorter changeover, and increased productivity when modular solutions can be re-used on a large-scale.

There are many features that make programming quicker when done off-line. Examples are touch ups, moving of robot targets and path mirroring (exploiting symmetry and only programming one section, 'mirroring' it to cover the rest of the path) – all which make the work easier and faster.

"RobotStudio cuts programming time by 50% and I don't need to climb all over the parts to get the job done", says Torsten Werner, Robot Programmer at Comtri, a Swedish company providing services for indoor shooting ranges[1)].

In fact, off-line programming allows Torsten to use the robot for jobs that it previously could not do at all because of the long on-line programming time required, like etching out the cutting paths on rubber matting.

**True off-line programming**

***Program without disturbing production***

- Quicker start-up
- Shorter changeover

***Knowledge before investment***

- Better solutions
- Reduced risk

***Increased productivity***

- Better part quality
- Off-line optimization

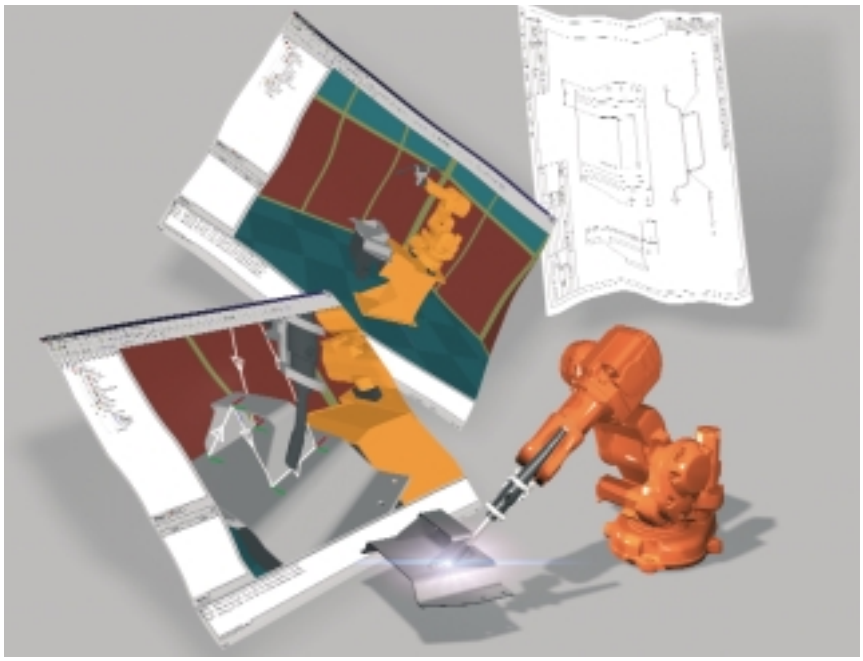
"The rubber matting forms the front of the bullet trap – the surface the bullet penetrates. For a large indoor shooting range, the matting alone can take a couple of weeks to prepare – just over half that time with robot assistance. But that was of no use as the robot was fully occupied with other things at this stage of the manufacturing process", explains Torsten.

### Covering all angles

Last year there were a lot of late nights in the workshop for Torsten and his robot. Now he can program a new part from the comfort of his home. But the robot has to put in a lot more hours, RobotStudio has seen to that – apart from having to weld and cut other parts like bullet-proof doors, Torsten is even

1) Comtri AB's clients include the Swedish Police Force and Ministry of Defense, as well as private security companies.

RobotStudio enables simulation and off-line programming of robot systems. The software package has the largest installed base of any robot simulation product on the market.



considering taking in sub-contracting work for the robot!

The manufacturing industry has a lot to gain from simulating robots off-line. For example, the risk of making costly mistakes is reduced because the software confirms that the robot can reach all the programmed positions. It also calculates the cycle time required. This means reduced prototype testing requirements, less downtime and more efficient production planning.

By visualizing solutions in 3D, the risk of collision is reduced to zero. This, in turn, increases overall safety; the programmer discovers his mistakes on the PC instead of on the shop floor.

As RobotStudio imports CAD files, the software works with very exact data. The robot programmer will then be able to generate more accurate robot programs, which in turn will give still higher product quality.

While the robot is speeding up production at Comtri, Finance Manager Karin Söderberg is able to accurately cost the next project.

"Since RobotStudio can accurately project the cycle time for each component, we can accurately budget bigger and more complicated projects. The indoor shooting range we're about to start work on is four times bigger than anything we've ever built".

## VBA compliant

RobotStudio is an open system. It interfaces with Microsoft Office, making it possible to use these familiar applications to extend its functionality. Like Office, it includes Visual Basic for Applications (VBA), letting the user customize its functionality for his special needs. For example, it is easy to export data to Excel. Microsoft recently approved a full API (Application Programming Interface) version of RobotStudio for customized process applications. This way, operators and plant management are better armed to make timely decisions.

## Extended functionality

RobotStudio is available in both German and English. The software features customized templates that enable support for special processes, like stud welding. For high-quality CAD-models, RobotStudio supports CATIA as well as other common CAD formats. It also includes an intelligent wizard, making it easy to create robot tools.

## Largest installed base

A 'lite' version of RobotStudio is included with every ABB robot so that all users get the opportunity to try out this new way of working. RobotStudio Lite forms the largest installed base of any robot simulation product on the market.

RobotStudio is now firmly established as a successful tool, enabling the automation industry to increase productivity and improve quality still further.

**Author**

**Ulrika Sallsten**
ABB Robotics AB
SE-41250 Gothenburg
Sweden
ulrika.sallsten@se.abb.com
Fax: +46 31 773 8540