



Offline programming for robots

Industrial robots
RoboDK is a new offline programming application for industrial robots. Here, in an interview with Sensor Readings, CEO Albert Nubiola says the application gives users 'huge freedom'

Offline programming (OLP) seems like such a logical method of managing industrial robots that it's difficult to find a good enough reason to do it any other way. OLP, mostly in the form of robot simulation software, is a relatively new development in industrial robotics but it has been gaining popularity over the past few years.

Previously, the majority of robots were programmed using the teach pendant method. A teach pendant, also known as a "teach box", is a hand-held device often attached to the robot which has numerous buttons and a screen with which to program the robot, usually on-site, requiring the robot to be isolated from the production line and not do any work.

This downtime can clearly be costly, even if the robot is out of action for a few minutes, let alone a few hours or a few days. Offline programming drastically reduces and can even eliminate the need to take the robot away from the automated cell and, therefore, is far more cost-effective.

That's the theory. But in practice, the offline programming solutions released so far have been prohibitively costly for many companies.

RoboDK, a new simulator for industrial robots, is aiming to change that. RoboDK is the result of many years' development at École de technologie supérieure (ETS) university in Montreal, Canada. It is the commercial spin-off from RoKiSim, an educational simulator for industrial robotics that the university made available for free.

"RoKiSim was a basic simulator but we realised that

people used it a lot," says Albert Nubiola, founder and CEO of RoboDK. "We got a lot of feedback and we used it to build the commercial version, RoboDK.

"There is a demand for cheaper and more effective offline programming solutions. Current solutions are too specific and expensive. You often end up using more than one software, or plugins, to accomplish simple tasks."

Nubiola says RoboDK integrates many features in one software application – offline-programming; robot milling from numerical control programming languages such as G-code, or high-level programming languages such as APT; robot accuracy checks such as ISO 9283 or ballbar testing; robot calibration; and so on.

"The RoboDK API gives you huge freedom to integrate everything the way you want, allowing you to simulate almost anything. Also, with the RoboDK API you can program robots using Python programming and run your programs in realtime, or use one single script to simulate and generate the robot program."

“RoboDK is highly customisable and we help our customers achieve what they need”

Albert Nubiola, CEO, RoboDK

Perhaps the reason why OLP solutions in the past have been expensive is because OLP is complex. Unlike the teach pendant method, which tends to concentrate only on one robot at a time, OLP makes a graphical representation of the entire workspace – including the robot and all the machines and instruments connected to the robot.

Using an OLP app, an offline programmer can design the system on a computer using a virtual representation of the workspace and a simulation of the robot. Only when the program has been finalised will it need to be installed into the robot and its linked machines, minimising and possibly eliminating any downtime.

RoboDK has hundreds of simulated robots in its library, all based on data taken from real-world robots made by all the leading makers, such as ABB, FANUC, Kuka and Motoman. Any one of these virtual robots can be used in the RoboDK virtual workspace to easily design a system and workflow.

Unusually for an industrial application, RoboDK is also available for Mac, Linux and Android, as well as Windows, of course. Nubiola claims RoboDK was the first cross-platform application of its type, and says the team intends to keep updating the software to make it available for as many users on as many platforms as possible. RoboDK is an "active project", he says, and it is being updated and improved with each project that they become involved in.

Having been involved in research and industrial robotics for eight years, and having helped develop RoboDK itself, Nubiola says he finds it surprising to see engineers using Notepad to program their robots in assembler-like programming languages.

"RoboDK is highly customisable and we help our customers achieve what they need," says Nubiola.

RoboDK is approaching 2,000 downloads since launch at the start of the year, and the customers come from a variety of backgrounds. "They can be engineers, integrators, maintenance departments, robot programmers, and so on."

Nubiola says his team saw that maintenance personnel in factories needed ways to validate the 'health state' of their robots. The common practice has been to use something called the "ballbar test" to check the accuracy of CNCs.

"The ballbar test has been used for CNCs for a long time," says Nubiola. "Now with RoboDK it is possible to easily make this test to robots."

There is no doubt that this "health state" check to robots can reduce scrap parts. Integrating a robot into a production line may be expensive. However, over the years, buyers have seen an increase in hardware choices and decrease in price. Software will likely follow a similar trend. RoboDK believes it is well-positioned to satisfy industry needs.

The download comes with a set of examples explained in the Examples section. An online library of more than 200 robots, tools and external axis can be accessed directly from the application.

You can also preview or download robots from the library in the library section.

RoboDK also comes with several examples:

Example 1: Pick and place

Simple pick and place simulation.

Example 2: Pick and place with Python

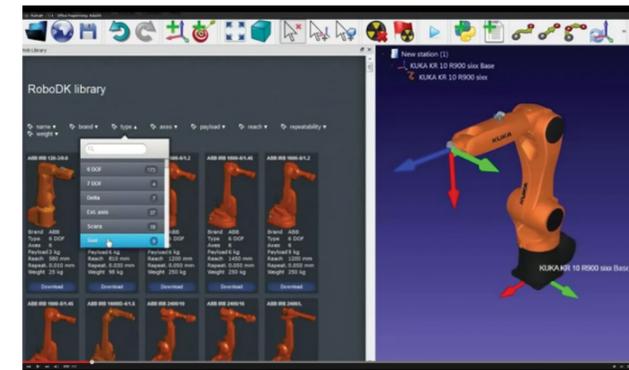
Pick and place using Python. This example shows how to use Python to program a robot.

Example 3: Drawing with a robot

Simulates a robot drawing an SVG image. This example shows how to use an external Python library to easily draw an SVG image with a robot.

Example 4: Robot milling

Shows how to machine or weld. The example uses an APT file [CNC program] to make the robot path. ●



A screenshot from inside the RoboDK software application

Main features of RoboDK

Offline programming: Offline programming has never been easier thanks to RoboDK. You don't need to learn brand-specific languages anymore. RoboDK handles the robot controller syntax and outputs the right program for your robot. Try a basic Pick and Place example.

CNC friendly: Use your robot like a CNC. Convert CAM files into robot programs, your robot can be used like a 5-axis CNC. You can easily simulate the accuracy of CNCs for a long time," says Nubiola. "Now with RoboDK it is possible to easily make this test to robots."

Multipatform: RoboDK is the first multipatform robot offline programming software. It works on Windows, Mac, Linux and Android devices. It even works on your phone or tablet! Check the download section.

Download page:
<http://robotdk.com/download.php>

Robot accuracy: Certificate robots. Check the accuracy of your robots with a ballbar test. Obtain a PDF report describing the accuracy and repeatability of your robots. RoboDK allows you to calibrate your robots and improve production results. Contact us for more information.

Python powered: RoboDK is a robot development kit that allows you to program any robot from any brand through Python. Python is easy to learn yet powerful and flexible. Robot offline programming has no limits with RoboDK's Python API.

Extended library: The RoboDK Library has many robots, external axes and tools from different brands. We are constantly adding new robots to RoboDK. The library can be directly accessed from our desktop app.