Multifunction Stone Processing

QD
The robotics
®solution

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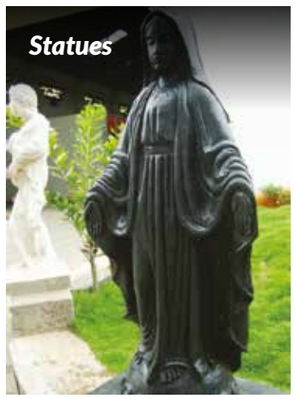
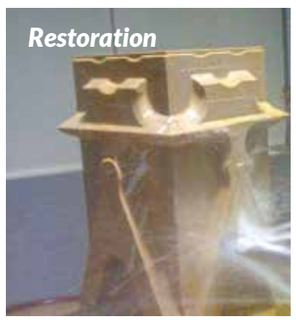
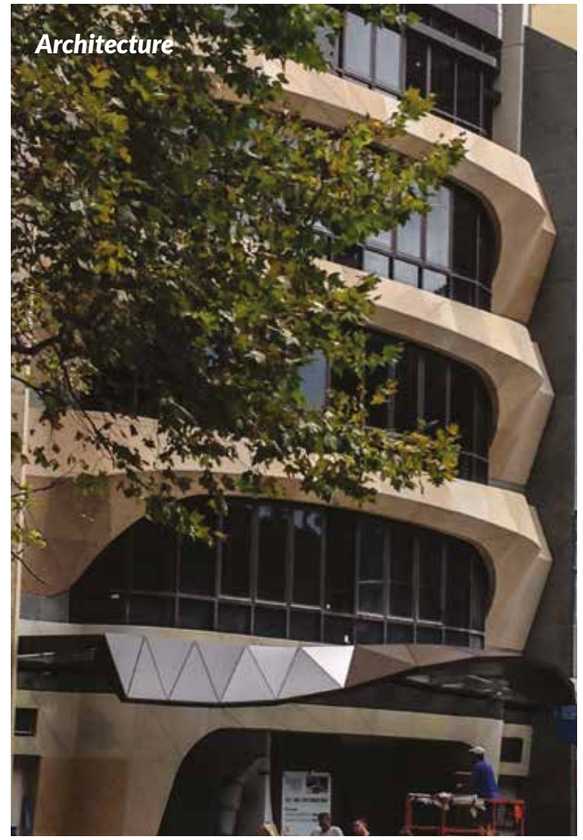
QD The robotics® solution

YOU IMMAGINE... HE CREATES!

1.





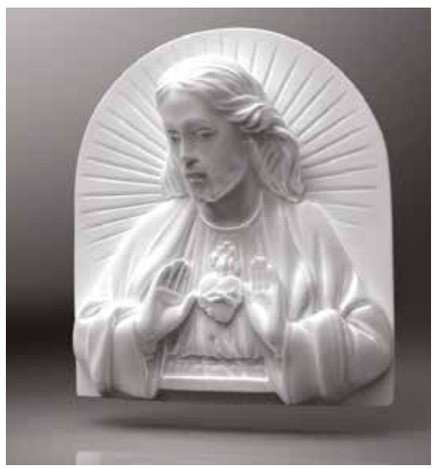


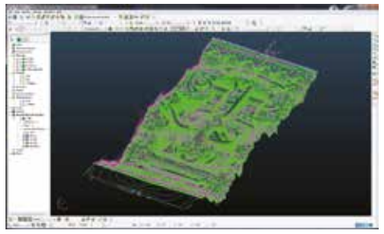
THE PRODUCTION PROCESS

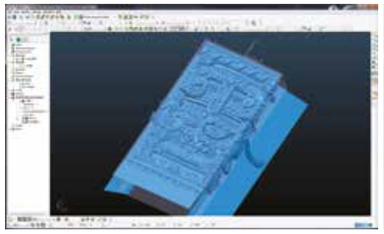
2.

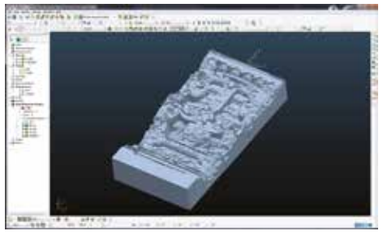
1. 3D model creation

The starting point of the process is to create the 3D image of your piece.
You can either create a model and acquire the 3D imagine with a scanner, or directly draw it on the computer.



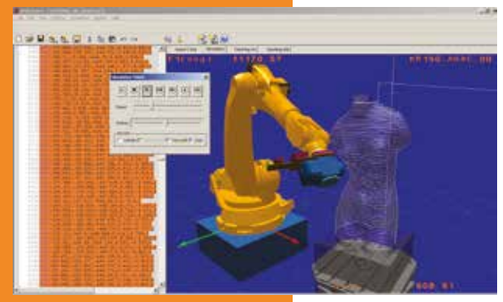






2. Programming and simulation

Once the 3D image is ready, programming the robot is the next part: it is easier than it seems with the dedicated program suite



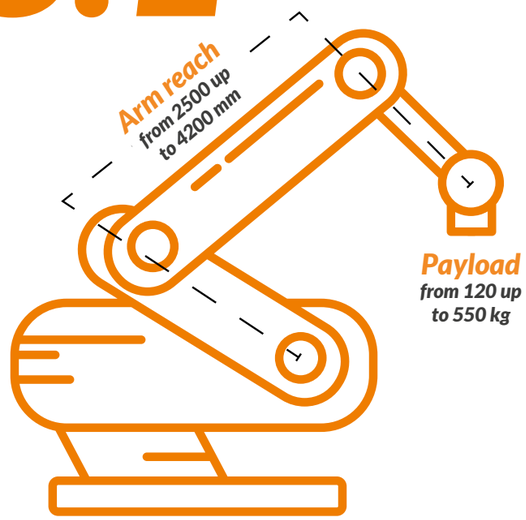
3. Production

The last step is to load the stone block on the machine and...press the start button!

TECHNICAL DATA

Robots & Spindles

3.1



Robots

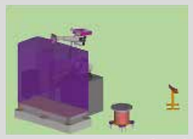
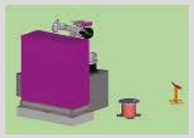
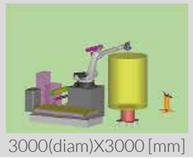
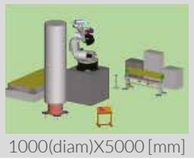
Robots have two very important dimensional factors: arm reach and payload.

The ***arm reach*** influences the size envelope the robot can cover, so the longer its arm reach, the larger the piece he can work.

The ***payload*** is accountable for how much weight can be mounted on the wrist of the robot and that he can carry.

The robot is always matched with the spindle (or other end-effector) that is about half the max payload of the robot: this makes the robot stiffer during heavy milling jobs reducing the impact of vibrations on the robot's structure and helping extend its working life.

All robots used are FOUNDRY protected and Absolute Measured for higher resistance in harsh environments and higher precision.

ROBOT ARM - REACH 2700 mm	ROBOT ARM - REACH 3100 mm	ROBOT ARM - REACH 3326 mm
 1000X2000X2900 [mm]	 1600X3200X3000 [mm]	 1300X3100X3100 [mm]
 2000(diam)X3000 [mm]	 3000(diam)X3000 [mm]	 3000(diam)X3500 [mm]
 1000(diam)X3500 [mm]	 1000(diam)X4000 [mm]	 1000(diam)X5000 [mm]

Spindles

Spindles are a key component that must be correctly matched first of all with the type of material that will be carved: the harder the material, more power - and, ultimately, torque - will be needed along with, for example, a more robust tool holder (ISO40 to ISO50).

On larger spindles can be mounted larger tools and longer extensions, making the work faster, especially in the roughing phase: for example, the largest 30kW spindle can accept roughing discs with diameters up to 800-900 mm.

Spindles, matched with a tool rack, allow to automatically change the tool, thus making the machine operator-free for the whole working cycle, that be even weeks long on complex pieces.

POWER (KW) [S6]	MAX RPM	MAX TORQUE (NM @ RPM) [S6]	HOLDER	BLADE [MM]
6 [7.2]	12000	9.5 @ 6000 [11.4]	ISO40	300
15 [18]	12000	31.8 @ 4500 [38.2]	ISO40	380
20 [24]	12000	95.5 @ 2000 [114.5]	ISO50	650
30 [36]	10000	255 @ 1275 [270]	ISO50	800

TECHNICAL DATA

Accessories

3.2

Rotary tables

The payload range goes from a minimum of 8 tons up to 30 tons.

The structure is a welded steel frame and the table is designed to carry the work load with high accuracy: the reduction gearboxes are the top level zero backlash device and the bearing is dimensioned with a very high safety factor keeping into account the different inertia data of the working piece

piece dimensions robot+rotary table [m]	0.8x0.8x1.5	1x1x2	1.5x1.5x3	2x2x4
material	marbles	marbles	marbles & granites	

robot (payload [kg], reach [mm])	120R2500	150R2700	150R3100	210R3100	240R3326	480R3326
spindle	6kw	15kw		22kw		30kw
	15Nm	26Nm		75Nm		250Nm
	ISO40	ISO40		ISO50		ISO50
blade [mm]	280	400		550		800
tool shank length [mm]	150	350		500		700

rotary table [ton]	8	upto	upto	upto
tool rack [no. tools]	10	20	30	25

Linear track

Linear tracks are used to broaden the working range of the robot. The teeth bar is a high precision and tempered type, and it is mounted on a machined groove to able to be easily maintained or replaced.

The linear track is equipped with leveling screw to be able to guarantee the correct fine positioning. The transmission gear box is a high accuracy with zero backlash.

Tool racks

The rack is designed to allow the machine performing the automatic tool changing.
The welded steel frame is provided to hold different tools and with an open/close steel cover to protect tool holders from milling dust.

Scanning Systems

The scanning systems are used to acquire 3D images of real pieces and human figures with high detail and texture/color.

There different types of systems depending on the accuracy, resolution and field of view that is required, and models are either hand-held or mounted on tripods.

WATERJET CUTTING

4.

Plug&Play

The most complex and risky procedure in using both the spindle and the waterjet cutting is the passage between the two, considering the high pressures involved.

For this purpose, it has been developed the PLUG&PLAY concept: the waterjet head becomes a tool, so that the spindle itself can pick it up and work like it would with any other tool.

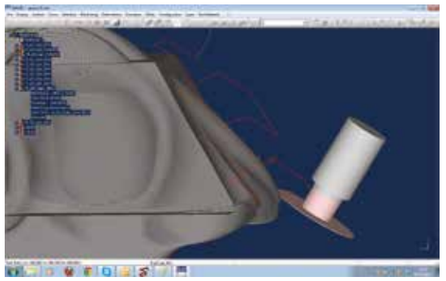
The waterjet components have thus been mounted on a frame equipped with the tool holder to fit the spindle.

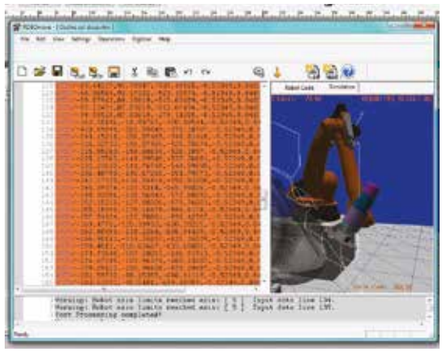
All-in-One

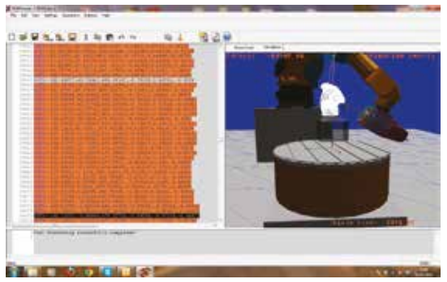
With the PLUG&PLAY concept the simple robotic milling unit can become easily and quickly a complete and multifunction machining center, having on one side a rotating table to mill stone, on the other a waterjet cutting table where with the same machine is possible to cut in 5 axis up to 45°.

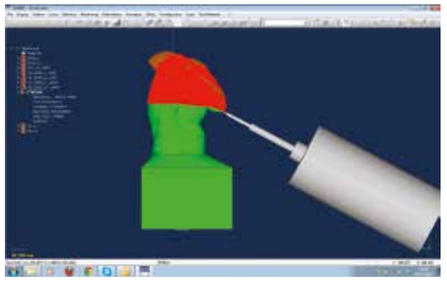
SOFTWARE

5.





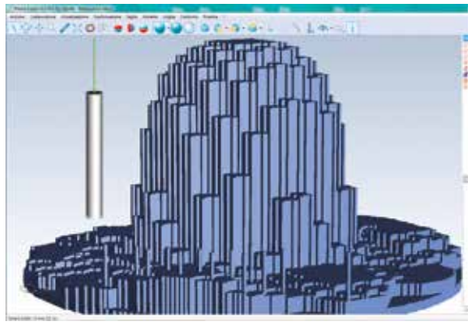


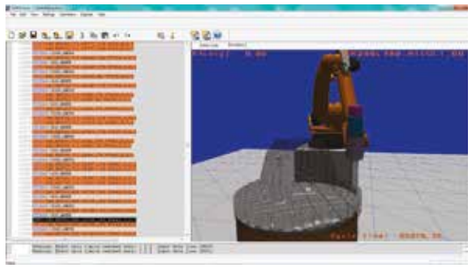


The solution is based on the most innovative programming and robot software tools that are entirely developed within QD: from programs virtual simulation to machine and process management.

Cam systems

To be able to use the robot to its maximum performances the CAM systems we supply are able to create in a simple way tool paths to manage blades, core drill, conical mills and any kind of tool.
The CAM solution can also efficiently control material rework for any tool, 5 axes finishing and tool/shank collisions avoidance.





RoböMOVE

Virtual simulation and post processing

By the use of QD developed simulator and post processor RoböMOVE it is possible to fully simulate the working program.

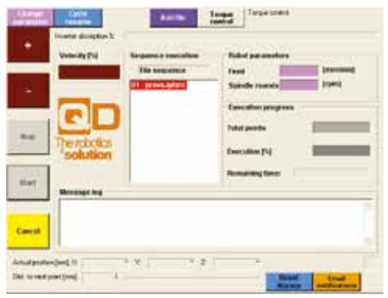
RoböMOVE allows to optimize the motion of the robot, rotary tables, linear rails or special kinematics.

The virtual simulation allows the user to check collisions, avoid singularities and manage the tool path areas that are not reachable by the robot.

QD CNC

User interface, robot and process management

The most advanced process interface for a robot milling systems: it allows to fully control the robot program and robot cell by managing production programs, technological parameters (speeds, spindle rounds, tool force control) all while the robot is working.



CASE HISTORY

6.

SERVICE

7.

QD is able to provide the most complete solution including after sales.

Remote support

QD is always connected to its systems around the world to be able to supply a remote support service.

Programming support

A large team of expert programmers and designers can sit next to our customers to help in the production of complex projects.

We can design, program, manage,optimize the production carried out by our customer robots.

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