

ROBOFORM 350/550



Step into a dynamic manufacturing

ROBOFORM 350/550



Communication:
cellular phone



Connectors:
fibre-optic connector



Advanced technology

The ROBOFORM 350/550 series is exceptionally versatile since it delivers unequalled performance in a wide variety of applications: automotive, connectors, communication, medical, aeronautics, household appliances and many more.

The ROBOFORM 350/550 are the first to integrate Dynamic Process Control (DPControl), the new generation of numeric controls developed by CHARMILLES.

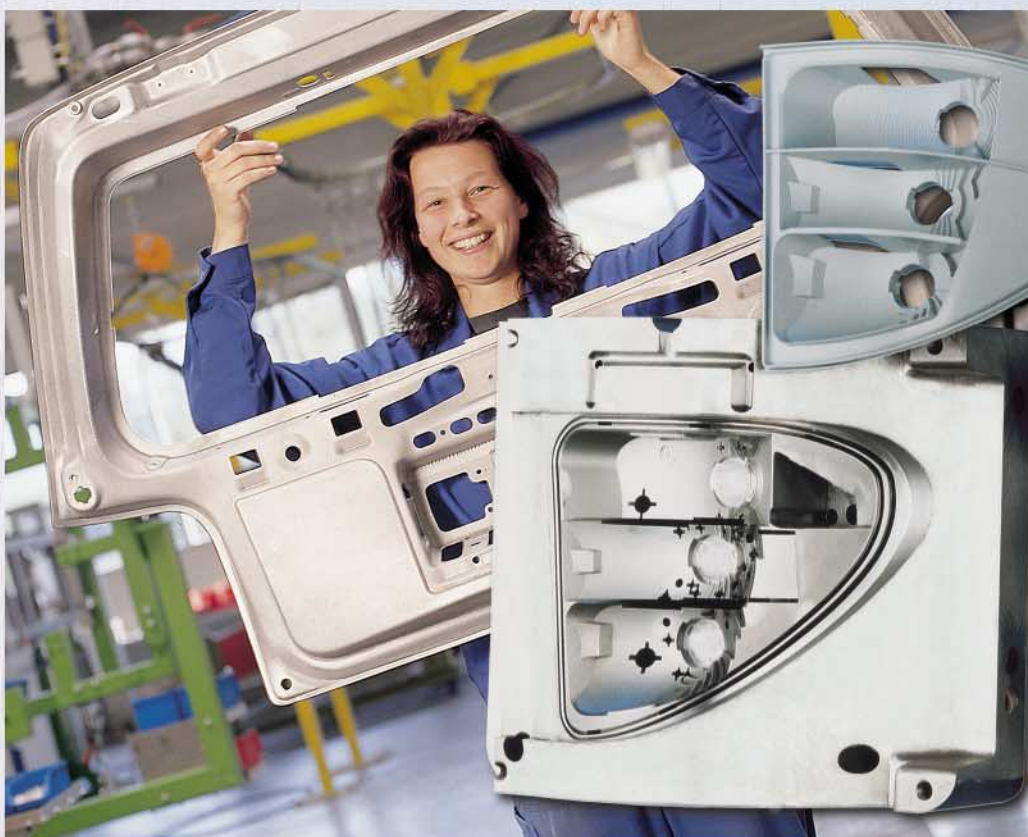
With a user interface dedicated to die-sinking, operators benefit from the unparalleled ease and efficiency of their working environment.

Automotive connector





Automotive:
GPS for dashboard



Tail lights

DPCControl, dedicated to die-sinking



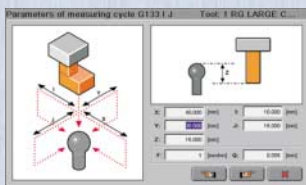
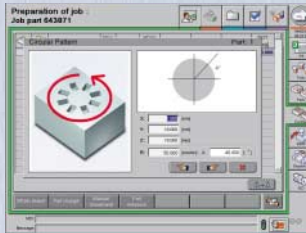
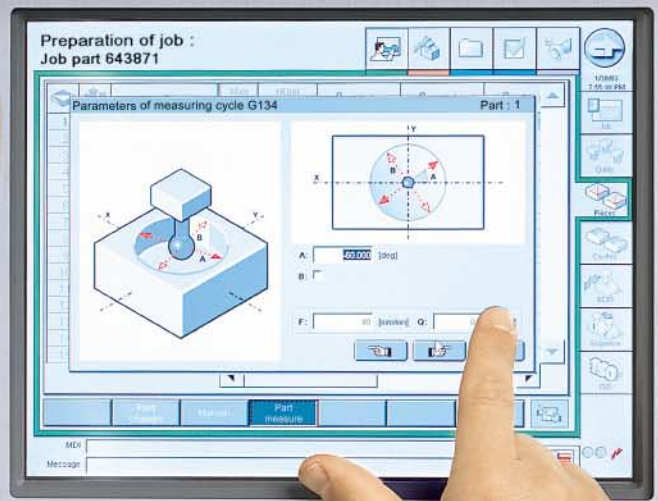
Standard Windows platform:

- Integrated PC
- Touch screen
- Windows controlled
- CD-ROM, floppy drive
- Network

A tailor-made interface

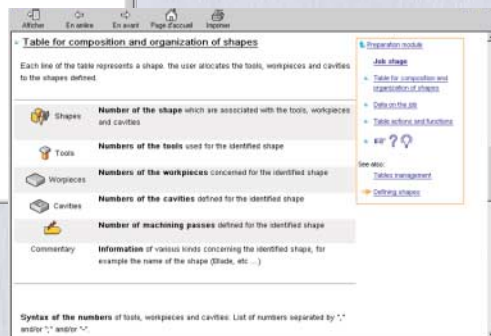
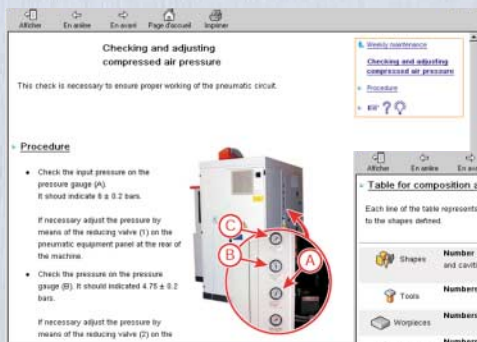
The new DPCControl (Dynamic Process Control) interface has been developed, based on the findings of a survey conducted among mold-making professionals. The study was instrumental in designing interface functions and optimizing screen ergonomics.

The user-friendliness of CHARMILLES interfaces – already a recognized standard in the industry – has been further enhanced to satisfy even more the stringent requirements of die-sinking professionals.



Interactive graphics

All operations such as measuring and machining cycles as well as cavity positioning are illustrated by graphics/icons designed to facilitate intuitive and spontaneous comprehension by the operator.



Integrated e-documentation

Large, cumbersome manuals are a thing of the past because they are now replaced by documentation in electronic format (HTML). When help is needed, the operator presses the F1 key on the keyboard to instantly receive easy-to-understand information about the current function.

DPCControl, active integration into the workshop

Dynamic manufacturing process

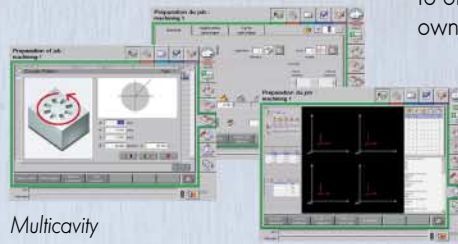
With DPCControl's new functions, the ROBOFORM 350/550 play a key active role in the manufacturing process.

EDM
parameter input

3

Flexible job organization

Whether you work on a PC or on the ROBOFORM 350/550, DPCControl allows you to organize the jobs according to your own priorities.



Multicavity

Verification and simulation

2

Measuring offset and positions

Absolutely imperative for preparing the job, measurements performed on a preset station are directly accessible via DPCControl.



Measuring on machine

Measuring at preset station



4

Close monitoring

Due to the automated protection features of Expert Systems, DPCControl delivers the results you demand.

Notification via SMS

All information related to machining status may be transmitted directly to the operator via SMS.

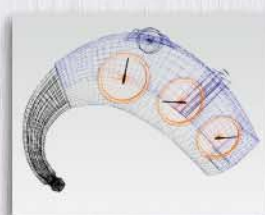


Electrode manufacturing



Electrode design

DPCControl suggests ideal electrode undersize and rationalizes the number of electrodes necessary for effective machining.

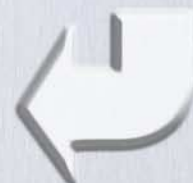


Job report

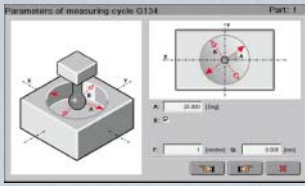
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Evaluation of completed job

DPCControl automatically creates a full report on job execution readily accessible to the operator via the network or directly on the machine.



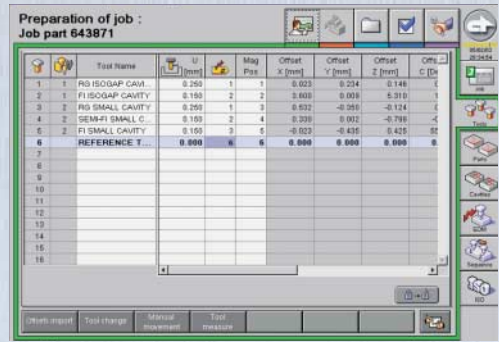
Interactive graphics programming



Measuring cycle

Innovative set-up functions

New automatic measuring cycles using high axis speeds considerably shorten job preparation time. What's more, DPControl communicates with a preset station, thus avoiding the need to enter values manually.



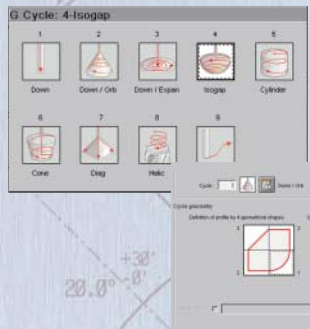
Electrode set-up

Optimum machining strategy

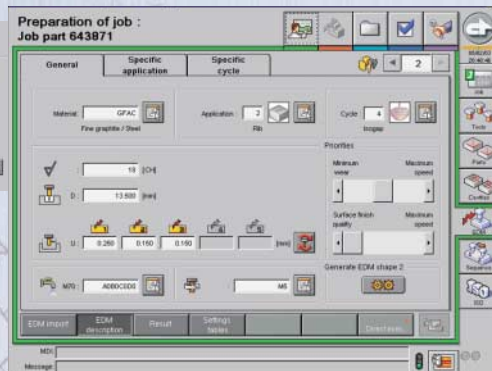
DPControl offers clear choices for each application and generates the optimum machining strategy for top performance.

On just one screen the operator enters machining parameters such as surface finish, machining depth, machining cycle and type of application in order to obtain the best possible generator performance.

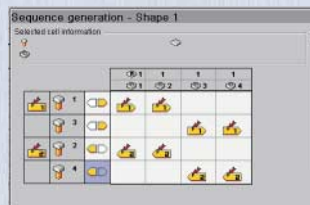
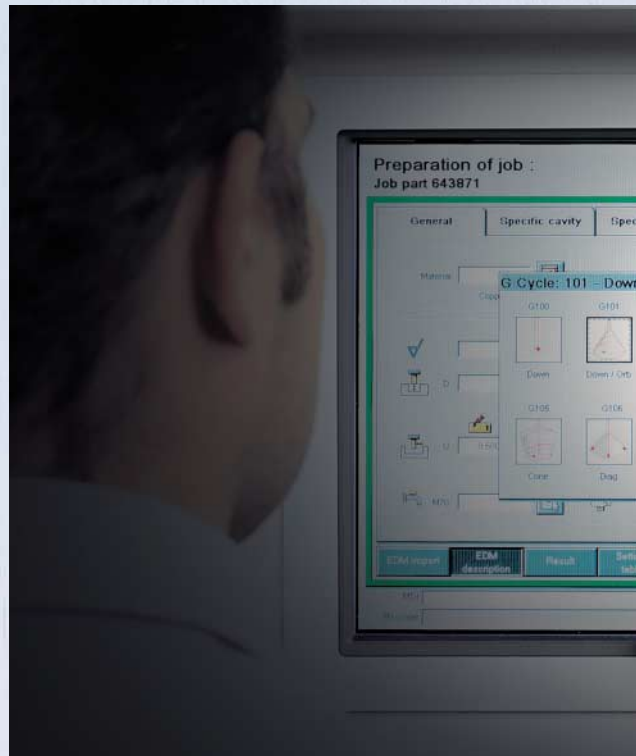
Machining cycle



Orbit patterns



EDM description



Sequence Assistant

Automated sequencing

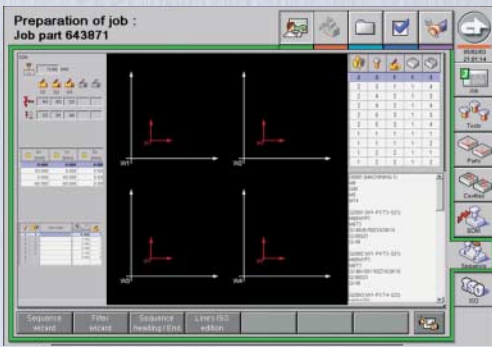
Choose your priorities

Based upon machining strategies, number of electrodes and workpieces, the Sequence screen automatically organizes successive machining phases.

If required, this can be modified according to criteria defined by the operator through the Sequence Assistant. Following validation, the ISO program is generated prior to machining.



Machining sequence



Job simulation

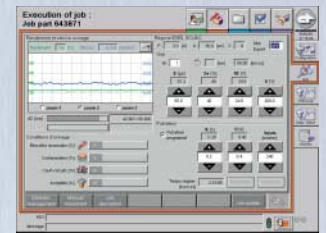
Detailed check by graphics simulation

This last phase prior to machining allows to visually verify on screen the proper sequencing. In other words, any verification by real axis movement is no longer needed. What's more, machining progress can be monitored during machining.



Close monitoring

With DPControl the operator has a precise overview of the evolution of output efficiency and of machining conditions. A multitude of functions are available such as graphics monitoring, visualization of current sequence as well as machining history.

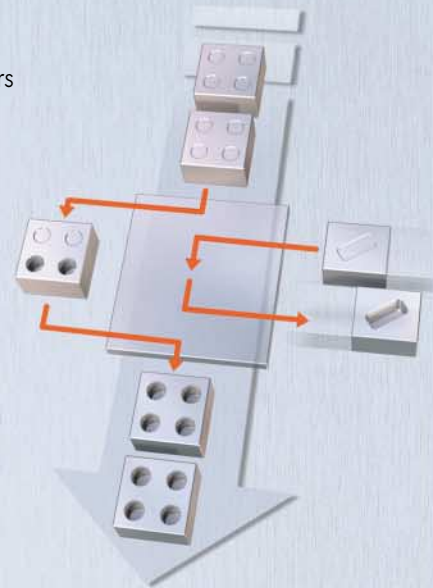


Machining monitoring

Maximize productive time

To address this need, DPControl delivers unique solutions:

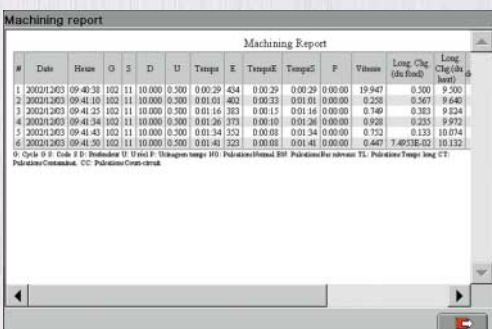
- Part Express: allows to interrupt the operation in progress in order to insert a more urgent job.
- Job List: organizes job sequence according to manufacturing priorities.



Part Express



Job List



Machining report

Complete machining report

When job is completed, all details are described in reports listing, machining strategy, spark time, interruption, etc.

- Check completed jobs.
- Archive data.
- Expand know-how.
- Calculate production costs.



Job archiving



ROBOFORM 550

CHARMILLES 



ROBOFORM 350

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CHARMILLES Expert Systems: quality and performance



PILOT-EXPERT 3

Around-the-clock monitoring and optimization

PILOT-EXPERT 3 guarantees top performance while taking into account machining conditions at all times. It provides for unattended machining and delivers perfect job reproducibility.



POWER CONTROL EXPERT

Mastering the spark

POWER CONTROL EXPERT checks each spark to ensure a perfect quality of surface finish. It also allows to determine in real time the intensity of machining discharge as the electrode's surface increases.



SPAC®

A CHARMILLES exclusive

SPAC® allows to eliminate any short circuit by applying a specific discharge during a fraction of a second. No longer slowed down due to short circuits, machining continues at full speed and without interruption, thus improving productivity.



The Performance



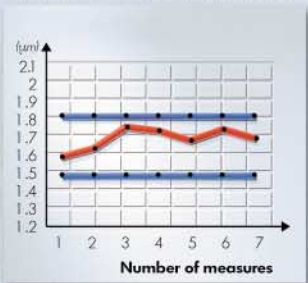
Machining deep ribs

Due to increased axis speed and acceleration linked to PILOT-EXPERT 3, the ROBOFORM 350/550 reach exceptional performance. Without flushing and therefore without lateral deformation of the cavity, workpieces comply with the most stringent tolerances of geometry.

Dovetail rib
Material: Graphite/Steel
Dimensions: 0.59 x 0.04 in
Machining time: 1 h 06 min
Technology: Rib



100 mm deep rib
Dimensions: 0.59 x 0.08 in
Without flushing
Material: fine Graphite and copper/Steel
Technology: Rib



Surface finish: CH 24/Ra 1.65 μm
Average: 1.68, distortion: 2.1%
Standard deviation: 3.4%
Max. tolerance: $\pm 10\%$
Measurement outside tolerance: 0



Surface finish quality

The uniformity of workpiece texture is directly linked to the quality of the mold surface. To obtain a perfect surface, CHARMILLES has developed Surface technology to satisfy the most stringent criteria of consistent surface finish.

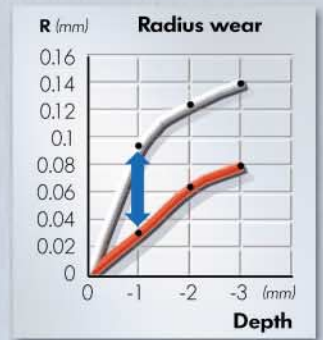
GPS mold
Material: Graphite/Steel
Dimensions: 19.4 in²
Surface finish: CH 22/Ra 1.26 μm
Technology: Surface



Mold for phone connector
 Material: Copper/Steel
 Surface finish: CH 22/Ra 1.26 μm
 Precision: ± 0.0002 in
 Technology: Micro-machining

Micro Machining

When electrode dimensions are reduced in micro-machining, speed and wear become critical factors. CHARMILLES has developed a spark circuit capable of reducing machining time, lowering electrode wear by a factor of 3 while machining the surface finish.



— New Micro-machining circuit
 — Conventional
 ↓ Factor of 3

Mold subgates

Each mold has at least one injection point. This type of machining requires a 3D cycle and a strategy adapted to evolving electrode surfaces. The calculated geometric data necessary to describe the electrode movement is automatic, based on workshop drawings.



Subgates
 Material: Copper/Steel
 Surface finish: CH 18/Ra 0.80 μm
 Machining cycle: ORBIT 3D
 Technology: Subgate

Contouring

Contouring technology allows the use of cylindrical electrodes to accommodate complex geometries. These simple electrodes are easy to produce and reduce the cost of electrode manufacturing and optimizes flushing conditions and part straightness. Contouring widens the potential of die-sinking EDM.



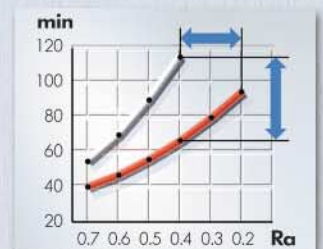
Fine blanking die
 Material: Copper/Steel
 Surface finish: CH 21/Ra 1.12 μm
 Technology: Contouring



Carbide die
 Material: Copper tungsten/Carbide
 Surface finish: CH 6/Ra 0.12 μm
 Precision: ± 0.0002 in
 Technology: Carbide

Quality and precision for carbide machining

In-depth research has allowed CHARMILLES to develop a new generator module (K-HM1). It has been developed to deliver unequalled performance in terms of surface finish and geometry. The results are simply spectacular: CH 6/Ra 0.2 μm , 40% of time savings and 50% less wear.



— New type of machining for carbide pieces
 — Conventional
 ↓ Time savings
 ← Improved surface finish

Precise, rugged and designed to last



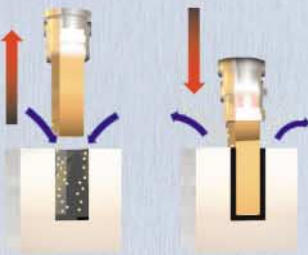
Short C frame

Rugged mechanical design

A short oversized cast-iron C frame delivers mechanical stability and precision for the life of the machine – regardless of workpiece weight or dielectric volume. In addition, a rugged design absorbs all machining forces in order to maintain a precise gap between workpiece and electrode.



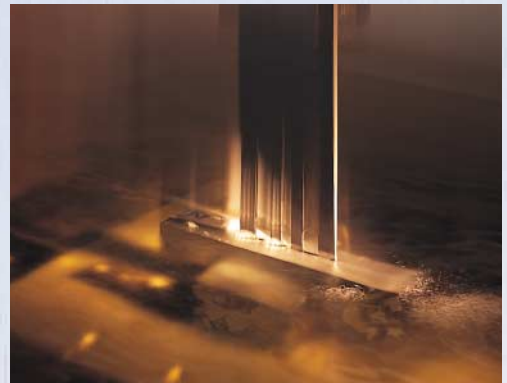
Large oversized ballscrews and linear guideways



High-speed pulse for complete particle removal

High speed and acceleration

Based on studies conducted to define optimum values, CHARMILLES has multiplied pulse and acceleration speeds of the Z axis in order to improve particle removal in the spark gap cavities. This technology allows deep down machining without flushing and therefore without cavity deformation. This ballscrew technology not only delivers precision but it also provides job repeatability.



High-speed pulse in machining



Fast, convenient workpiece set-up

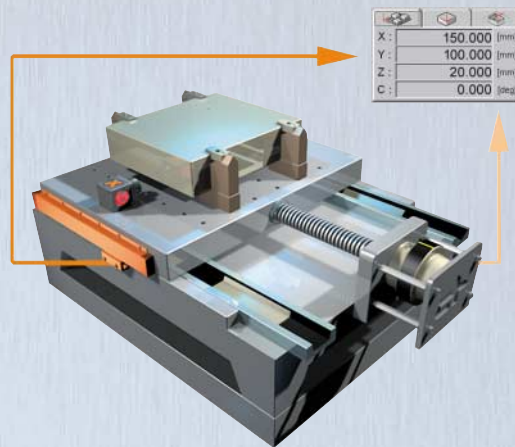
Drop tank for easy access on two sides of the work area. In addition, the operator is able to program work tank level to accommodate workpiece height and therefore to facilitate automation. The fixed table prevents any risk of damage to the guides when loading heavy workpieces.

Easy access

Guaranteed quality

Linear glass scales for lifetime precision

To obtain lasting precision, only linear glass scales are truly effective. They eliminate all common errors caused by backlash, expansion and ballscrew wear. The Dual Loop Positioning System (DLPS) developed by CHARMILLES is a true closed-loop feedback solution designed to deliver high precision regardless of travel. It does away with the need for regular maintenance and calibration.



Linear glass scales for repeatable precision

VDI axis positioning check

Before delivery, each machine is checked by laser to verify compliance of each axis movement with VDI 3441 standards (more than 150 positions checked per axis). These stringent standards include positional uncertainty, maximum positioning dispersion, positional deviation and maximum backlash.



Result of VDI tests

Ongoing quality assurance

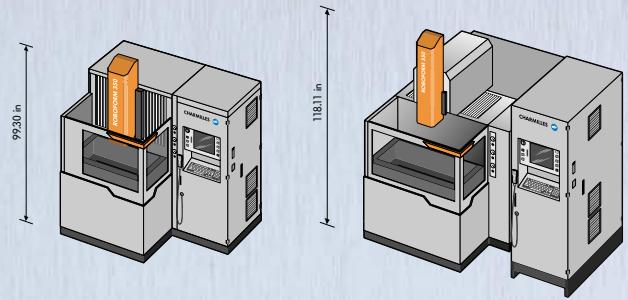
At each step of the manufacturing process, our products' stringent inspections are conducted by qualified technicians. Compliance protocols and signatures guarantee product quality and accountability.



Assembly line

Technical specifications

ROBOFORM 350 / 550



Machine

		ROBOFORM 350	ROBOFORM 550
Architecture		Compact machine with fixed table	Short C frame, fixed table
Dimensions (*)	in	74.80 x 66.54 x 99.29	108.27 x 124.02 x 118.11
Total weight (without dielectric)	lbs	6200	9700
Complies with "Machines, Safety and Health" directive		89/392/CEE	89/392/CEE
Complies with "Electromagnetic Compatibility" directive		89/336/CEE	89/336/CEE

X, Y, Z axes

X, Y, Z travel	in	13.78 x 9.84 x 11.81	23.62 x 15.75 x 17.72
Movement measurement system		Linear glass scales	Linear glass scales
X, Y, Z measurement resolution	in	0.000004	0.000004

Work area

Tank type		Drop tank	Drop tank
Tank dimensions (*)	in	31.50 x 21.65 x 14.57	48.08 x 34.25 x 18.50
Min./max. dielectric level	in	3.94/12.80 programmable	5.71/17.32 programmable
Table dimensions (**)	in	19.69 x 15.75	29.53 x 23.62
T-Slot dimensions (number)	in	0.47 (3)	0.47 (5)

Electrode and workpiece

Max. electrode weight	lbs	110	220
Max. workpiece weight	lbs	1100	3530
Max. workpiece dimensions (*)	in	30.71 x 20.87 x 11.81	47.24 x 33.46 x 15.75
Min./max. distance between table and chuck	in	5.91/17.72	5.91/23.62

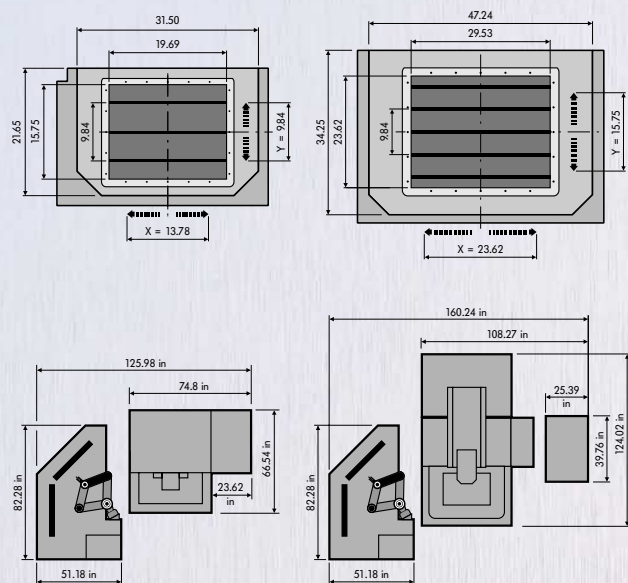
Dielectric system

Filter type		4 built-in paper cartridges	8 paper cartridges
Reservoir volume	gal	108	216

* Width x depth x height

** Width x depth

*** Optional



ROBOFORM 350QCRi.2 ROBOFORM 550QCRi.2

Technical specifications

ROBOFORM 350 / 550

Modules

		ROBOFORM 350	ROBOFORM 550
C axis (***)	Max. electrode inertia	lbs x in ²	683
	Measurement resolution	°	0.001
	Electrode weight	lbs	55
Spindle chuck (***)	System 3R		Macro / Combi
	Mecatool		GPS70
	Erowa		ITS / ITS-Compact
	Hirschmann		H8.11.7
Tool changer (***)	Linear (standard tooling)	4 pos./2.95 x 16.73 in	6 pos./2.76 x 16.73 in
	Linear (Combi tooling)	5 pos./2.36 x 16.73 in	6 pos./2.36 x 16.73 in
	Rotary (standard tooling)		16 pos./2.95 x 9.84 in
	Rotary (Combi tooling)		32 pos./1.42 x 9.84 in
Multicavity flushing (***)			6 outputs
Additional power module (***)	A	-	64
Adapter kit for external robot			Optional
K-HM			Optional
e-Connect			Optional
Programming system on PC			Standard
Autorestart			Standard
HS-EDM			Standard

Power supply

Three-phase input voltage	V	400
Main network frequency	Hz	50 or 60

Generator

Type		ISOPULSE
Standard machining current	A	64
PILOT-EXPERT 2 and 3:	Optimization and automatic monitoring of machining parameters	Standard
POWER CONTROL EXPERT:	Machining current, self-adapting according to electrode geometry	Standard
MICRO-MACHINING:	Monitors electrode wear in applications of small dimensions	Standard
SPAC®:	Protection against short circuits (CT patent)	Standard

Numerical control

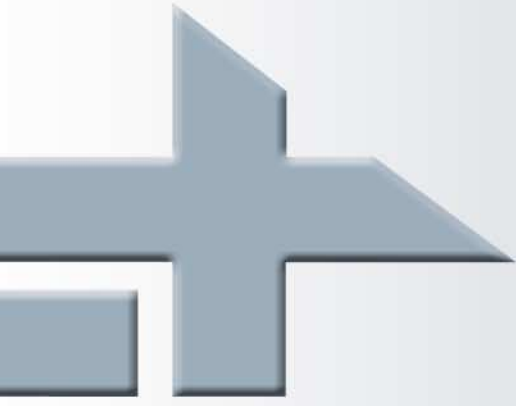
Architecture		PC multiprocessors
Operating system		Windows
Processor		Pentium®
Screen		LCD 12" TFT
Data input		Touch screen – keyboard
Keyboard		PC-style alphanumeric standard
Remote control		Standard
Hard drive		10 GB
Floppy disk		1.44 MB
CD-ROM drive		Standard
PCMCIA Port, Ethernet RJ45, Parallel, RS 232C Series (with Windows standards)		Standard

DPControl functions

D-JOB (Direct-Job) for machining simple jobs
Interactive graphics assistant for simpler data input
Automatic measurement cycles for workpieces and electrodes
Importation of measurement results from preset station
3D machining cycles with geometrical pattern
Machining strategy for all combinations of materials
Dedicated technologies for each type of application
Aid to define undersize and number of electrodes
Machining sequencing assistant according to manufacturing priorities
Graphic machining simulation
Machining report for each job execution
Job List – Management of pending jobs by order of priority
Part Express – Instant insertion of urgent jobs
Contextual aid with graphics explanations
Embedded documentation (e-doc) on the use of the machine

QCRi.2 Option

Robot dimensions (*)	in	51.18 x 82.28 x 97.64
Robot weight	lbs	2050
Max. electrode weight	lbs	44
Max. pallet weight	lbs	110
Magazine configuration (electrode/pallet)		54/4; 54/8; 90/4
Choice of tooling		System 3R/Mecatool/Erowa



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