FO 350 SP
FO 550 SP
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**FO 350 SP**

Transformation of axis speed and spark control into a productivity increase.
With the «FO X50 SP» range from GF AgieCharmilles, EDM has a new standard in competitiveness.

**Productivity and performance**

**Take pole position**

With the new «FO X50 SP» range, GF AgieCharmilles puts all its expertise into your hands, to help you to be outstanding in the most competitive capital equipment markets. The FO 350 SP and FO 550 SP machines break new ground, allowing you to gain valuable time in «blade» applications, pre-roughed 3D cavities and «surface» appearance. Aim: to gain in productivity while guaranteeing consistent polished surface finishes.

**GF AgieCharmilles accelerates and you take pole position**

A veritable concentration of innovation and technology, the «Speed Edition» range indeed merits its name. By giving you the opportunity to greatly increase your useful machining time, the new FO 350 SP/550 SP machines allow you to take pole position in your markets.

- Z-axis motion speed up to 15 m/min * [49.2 ft/min]*
- Acceleration up to 5 m/s² * [16.4 ft/s²]*
- Faster, more economical finishing settings
- New management algorithm for translation orbits [TRANS-EXPERT]
- Autonomous cell management, combining reliability and productivity [SCM: Self-Cell Management]
- New on-board documentation for accelerated operator training

*FO 350 SP*
High machining speed

EDM has a new standard in competitiveness

A profitable choice
This technological choice from GF AgieCharmilles, in comparison to linear motors, facilitates evacuation of particles in cavities, thanks to the pulsation speed, without flushing and without deformation of the cavity.

A distinct plus for applications such as connector technology, ribs or micro-machining. For machining deep ribs, high pulsation rates for better particle evacuation are required.

Unprecedented performance
The increase in Z-axis motion speed, and its extremely high acceleration, bring a performance increase of approximately 30% for medium to deep rib machining.

Comparative test with/without HSEDM 2

Technical specifications
Z-axis speed up to 15 m/min (49.2 ft/min)
Acceleration up to 5.0 m/s² (16.4 ft/s²)
Supremely consistent fast surface finishing

For finishing settings, FO 350 SP/550 SP machines score critical points. Detailed precision is observed, thanks to reduced wear rate, preserving electrode geometry. «Fast finishing» allows fine, even polished, surface finishes to be obtained (Ra < 0.3 μm), with unequalled consistency on large and small surfaces. In the majority of cases, costly and delicate manual polishing operations are reduced, or eliminated.
DPControl

Faster control, in complete security

Dynamic manufacturing process

The development of this new DPControl (Dynamic Process Control) interface is based on a study carried out with numerous mold makers in order to streamline the mold-making technique. The organization and layout of screens are a direct development of the information taken from this study. This user-friendliness, which has made GF AgieCharmilles interfaces so successful, has not only been maintained but has been developed even further to benefit the mold maker’s task.

Maximise productive time
Due to the necessity of maximizing productive time, the DPControl brings new solutions:
- Part Express: allows interruption of an operation so that an urgent job can be slotted in.
- Job List: organizes the order of jobs according to manufacturing priorities.

Measurement of essential offsets and positions during work preparation: the measurements made on a pre-measurement terminal can be used directly by DPControl. (Dynamic Process Control)

Flexible work organization
Whether on a PC or on the FO 350 SP/550 SP machines, DPControl offers you job organization according to your priorities.
Interactive graphical assistance

All operations, such as measurement, machining or cavity-positioning cycles, are illustrated by graphics/icons, allowing the operator to understand intuitively and spontaneously.

Platform: Windows
- Integral PC
- Touch screen
- CD-ROM drive
- USB port
- Network connection

Control of work executed under DPControl automatically creates a report after each machining session. The operator can access it via the network or directly on the machine.

Machining under DPControl high surveillance, with «Systems EXPERT» automated protection, guarantees you results at the height of your requirements.

Measurement cycles

SMS notification

All information relating to machining can be transmitted directly to the operator via SMS.

Machining examples are produced as hard copy, presented in a succinct manner. They are called up by using the online help system, so that implementation of a machining process can be followed stage by stage. More than additional descriptive documentation, e-Doc allows a genuine knowledge transfer for the benefit of the operator, enabling him to improve his knowledge continuously, while reducing working days lost to training.

2D/3D machining cycles
Optimising all the parameters

**TRANS-EXPERT**

The new algorithm for calculation of planetary translations allows substantial gains in machining speed, from roughing to finishing.

**SPAC**

GF AgieCharmilles has exclusive rights to SPAC. It allows a possible short circuit (CC) to be broken instantaneously, by applying a specific discharge to it for a fraction of a second. Machining, which is no longer slowed down by CCs, continues at full speed, without interruption, thus improving productivity.

**PILOT-EXPERT 4**

Monitoring and optimization 24/7. Guarantees the best performance by continually taking account of machining conditions. This allows operation without operator intervention and assures full reproducibility of jobs.

**POWER CONTROL EXPERT**

Controls each spark to ensure perfect consistency of machined surfaces. It also allows real-time determination of machining discharges in accordance with the changing surface of the electrode.

**Programming per application**

To facilitate the operator’s work, job programming has been optimized so as to orient it, as simply as possible, around a good choice of strategy, with no requirement for any in-depth knowledge of the EDM process.
Consistent surface finish
Uniformity of texture in an injection-molded part is directly related to the quality of the surface finish in the mold. To obtain perfect surface finish, GF AgieCharmilles has developed a technology called «Surface». This technology allows the highest criteria for surface consistency to be met.

Contouring benefits
«Contouring» technology allows the use of cylindrical electrodes to implement complex geometries. The machining height/minimum radius ratio of the geometry can exceed 50. Contouring widens the possibilities for die-sinking EDM.

Machining the injection channel
GF AgieCharmilles technology, is specifically adapted for machining deep, small cavities and allows machining conditions to be maintained, whatever the depth of machining.

«Zero wear», wear reduced to its minimum
Observance of the smallest details is still a major asset of EDM machining. Thanks to the iQ (Innovative Quality) technology developed by GF AgieCharmilles, power adjustments are regulated so as to increase material removal while preserving the geometry of the electrode. Because the electrode shape remains unchanged as machining progresses, it allows minimum electrode use for maximum cavity erosion.
Mechanics

Building-in endurance, fit for any test

Sturdy mechanical design
Short C-axis construction and oversized cast iron guarantee mechanical stability and precision over the life of the machine. The weight of the part or volume of the dielectric has no effect. Furthermore, the robustness of the machine absorbs all machining forces, to maintain a precise gap between part and electrode.

Linear glass scales: is precision for life
To obtain lasting positional precision, only linear glass scales are effective. They eliminate the classical errors, such as play introduced by inversion, expansion and wear effects. The DLPS (Dual Loop Positioning System) perfected by GF AgieCharmilles is a closed-loop measuring system designed to give infallible precision, whatever the travel. It makes periodic maintenance and calibrating operations unnecessary.

Scale resolution: 50 nm
Customization

Choosing good options are a matter of strategy

More security with the Autoscan function
The Autoscan function automatically identifies the electrodes required for each machining phase. The electrodes can be randomly arranged. Their integral electronic chips allow them to be located for selection in the assigned order. Risk of error is eliminated and preparation time considerably reduced.

Increased autonomy without manual intervention
Manufacture of a mold often requires a large number of electrodes whose spark-erosion time can vary noticeably from one cavity to another. The FO 350 SP/550 SP machines have a new rotary changer which offer a large storage capacity for up to 160 electrodes. A double gripper-clamp, reduces unnecessary movements, notably speeding up the loading process.

Simplification of electrode management
Identification of electrodes by electronic chip allows them to be loaded into the changer magazine without any concern for machining phases. The only parameter that matters is good tool orientation. Autoscan automatically identifies and selects the tool corresponding to the programmed task.
Aim:
7000 hours of EDM/year

Autonomous cell-management maximizes machine time, which can now be increased from 2500 hours on average, to close to 7000 hours per year. Due to importing CAD/CAM data into the machine operator’s DPControl interface, taking references, as well as optimizing tool-changer cycles and flexible machining programming, results are backed up while allowing continuous production.

Record productivity

This cell-management system expands and supplements the practicality of DPControl. Quasi-total autonomy of each cell radically optimizes machine time while simultaneously increasing operator comfort and eliminating risk of errors. Workshop productivity beats all records.

Machining flexibility and reliability of work results

Thanks to DPControl’s integral automation of machining sequences, as well as the design and functionality of Part Express, productive time is maximized, while still allowing urgent work to be slotted in easily. End-to-end reliability of the process is assured.

Preparation in parallel

In parallel, while machining progresses of the current job, preparation of the next job (mounting of roughing electrodes on the electrode carriers, palletizing of parts, identification of chips) is carried out in a clean area and reference measurements are taken. Collected data is automatically integrated into DPControl.

Automatic CAD/CAM link

The different EDM machining sequences are automatically integrated into DPControl.
Thermostabilization
First in the world, the double thermostabilization system of the FO 350 SP allows the impact of the workshop temperature variations on part machining precision to be cancelled out. A major innovation when working close to micron dimensions is being carried out. This solution eliminates the waiting time for thermostabilization of the machining zone and guarantees flawless precision in positioning and geometry. The finished product quality is flawless.

Gamma technologies
The result of numerous GF AgieCharmilles studies show, Gamma technology represents complete mastery of additives intended to increase the erosive performance of the EDM process. The additive GammaMIX 50 is a concentrate of conductive dielectric particles, in the correct proportions, to create consistent EDM. Thanks to effective circulation in the worktank, the GammaMix 50 is perfectly distributed between the electrode and the part being machined. Depending on the conditions it is used under, a single dose of additive gives more than 400 machining hours, before complete filtration of the dielectric is necessary.

Accura-C, the best high-performance axis on the market
It is not unusual to be confronted by machining where the electrodes are incorrectly located, even by such a distance that maintaining their position or stability during machining becomes problematic. Pulsation-induced movements in a liquid (dielectric) medium generate lateral forces (flexural or rotational) on the electrode, which must be resisted by the C-axis. Thanks to its very robust design, the Accura-C allows very high moments of inertia to be absorbed, up to 5000 kgcm² (1708 lbsin²).

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Dielectric
1 Thermostat allowing dielectric temperature regulation.
2 Water/dielectric heat exchanger.
3 Dielectric circulation is an integral part of the table.

Air
4 Double temperature-probe thermostat allowing adjustment of air temperature to that of the dielectric.
5 Water/air heat exchanger.
6 Coolant liquid electrovalve.

Diagram showing the principle of double thermostabilization
Milling  High-Speed and High-Performance Milling Centers

In terms of cutting speed, HSM centers are 10 times faster than conventional milling machines. Greater accuracy and a better surface finish are also achieved. This means that even tempered materials can be machined to a condition where they are largely ready to use. One essential advantage of HSM is that with systematic integration, the process chain can be significantly shortened. HSM has developed alongside EDM into one of the key technologies in mold and tool making.

EDM  Electric Discharge Machines

EDM can be used to machine conductive materials of any hardness (for example steel or titanium) to an accuracy of up to one-thousandth of a millimeter with no mechanical action. By virtue of these properties, EDM is one of the key technologies in mold and tool making. There are two distinct processes – wire-cutting EDM and die-sinking EDM.

Automation  Tooling, Automation, Software

Tooling for fixing workpieces and tools; automation systems and system software for configuring machine tools and recording and exchanging data with the various system components.

Spindle  HSM Spindle Technology

Development, production and sale of the motor spindles that form the core components of modern HSM centers. The spindles rotate at speeds between 10 000 and 60 000 rpm.

Service  Services and Consumables

Service, maintenance, spare parts and consumables for EDM, milling and HSM systems as well as for other machine tools; consumables include filters, wire, graphite, copper electrodes and special resin.