INTRODUCTION

The HV-50 is a stand-alone single process, mass flow controlled (MFC) HVOF coating system. The HV-50 is designed to be both reliable and functional, built with state-of-the-art components and technology, and can be used in every type of HVOF application ranging from R&D, single piece production to high volume production.

The HV-50 represents FST’s concept of “Advanced Simplicity”. The combination of sophisticated software with first-class hardware results in an exceptionally easy-to-use and reliable system ensuring a consistently high-quality coating application without constant operator intervention.

The system is supported by an intuitively operated touch 22” screen panel, which can be wall mounted onto an adjustable arm or floor mounted on an operator stand. The high definition touch screen makes all process controls and monitoring available at the operator’s fingertips. The HV-50 can store up to 1000 recipes. The process is fully “closed loop”, assuring a consistent coating quality time after time.

The HV-50 is engineered, designed and built to be the safest HVOF system available on the market today. Achieved by using the latest safety standards, modular construction separating gasses and fuels from the electrical parts, the use of only first-class materials and integrating PLC controls and monitoring and regulating of all parameters such as gas pressures and flows, water temperatures, and combustible gas monitoring. Safety interlock integration and e-stops with external equipment such as cooler, part- and gun manipulation units come standard with the system.

A multi-level monitoring and alarm system notifies the operator of out-of-range conditions and safely shuts down the system in critical situations.

The built-in Remote Access (eWon) allows for FST engineers to remotely analyse and troubleshoot the customer’s controller via a secure internet connection, thus reducing costly service interventions and downtime.
The HV-50 can operate and control most commercially available HVOF Guns including:

- **Liquid Fuel Guns:**
  - eGun™
  - JP-5220(*)
  - Other liquid fuel guns
- **Gas Fuel Guns**
  - Jet-Kote Hydrogen (**),
  - Diamond Jet Hydrogen (***)

**Note:** Other fuel gasses are available upon request

(*) JP-5220 is trademark of Praxair
(**) Jet Kote is a trademark of Stellite
(***) Diamond Jet is a trademark of Oerlikon Mecto

**OPERATOR INTERFACE**

The operator interface consists of a Siemens 22” touchscreen display with sophisticated and intuitive software. Its ease and speed of use allow the operator to scroll through the software to the needed screens smoothly.

Entering parameter values is quick and easy. In case of using multiple HVOF Guns (like combining eGun and JP-5220) selection of the HVOF gun to be used, sets the operating limits for the gun, thereby enhancing the safe operation of the system.

A multi-level alarm system provides a visual notification to the operator of any out of tolerance parameters and critical issues /situations.

Multiple Language selection including English, German and French are standard selectable languages. Other languages can be provided upon request.

Operating Values shown on the touch screen can be read and set in Metric or Imperial Units.

**TRENDING, LOGGING & REPORTING**

The Data Trending, Data Logging and the Optional Data Reporting package are available.

**Data Trending**

Data Trending records and displays the most important parameters that can be set and monitored from the operator panel. The data can be recalled on-screen. Each parameter is assigned a different graph colour.

**Data Logging**

In addition to data trending, the software provides data logging. Data logging records all important process data directly onto an external USB device, which then can be processed using a standard PC. This process is fully automatic, and no operator input is needed. The USB device is connected via a USB slot on the side of the TSP (Touch Screen Panel)
Data Reporting (optional)
Data Reporting is an optional feature and allows for off-line data analyses and reporting. Data is automatically downloaded onto a PC, This allows for personalised reporting and analysis, and the storing of data on an available network.

Typically, the Data Trending, Logging and reporting (optional) is used for:
- Application and Spray parameter development
- Quality and Process control
- Reporting required for the coating of critical components
- Spray gun and system maintenance
- General system troubleshooting
- Operator training and qualification

REMOTE ACCESS
Remote Access is a standard feature of the HV-50. Through the use of eWon™, a secure Ethernet-based connection will connect the HV-50 directly to an FST Service Engineer (3G connection available optionally). Remote access allows the FST engineer to troubleshoot and diagnose system issues without being on-site.

The Advantages include:
- Faster response times to system issues reduces downtime of the system
- Reduction in costly service calls and technical interventions
- Safe and secure, as the encrypted connection must be initiated by the customer

OTHER FEATURES
Recipe Management
The system allows for easy recipe selection, modification and creation from the operations menu. All recipes can be backed up to a USB device. Reloading of recipes is simple and fast.

User Levels
The system allows users to log in at predefined levels for which they have been cleared, giving people different access levels to the system. The predefined Login Levels include:
- Operator
- Quality
- Supervisor
- Service (FST Only).

Alarm Menu
The alarm page provides easy to understand and well-documented alarm registration, including alarm history. Each alarm has a remedy suggestion attached resulting in improved service capabilities and reduced downtime.

Stop Watches Display
This feature provides the operator with a function to display the current and last cycle times. This is useful when running a series production.
Counter Menu
The system provides a listing of gasses and fuel used. This provides a better understanding of total consumption and the cost involved per part and/or job.

Cooling Information
The system displays the actual cooling capacity and heat loss to the cooling water. This information helps the operator understand the real-time power level of the system.

Overview Menu
The system provides data on valves, sensors, and safeties, giving the service engineer a detailed overview of the system status. This feature helps the service engineer to quickly locate any issue, thus reducing costly downtime.

Master/Slave Integration (optional)
The HV-50 can be master/slave integrated with robot (ABB), part handling system. The system can be operated in 2 different modes:

- **Manual mode**, where the HV-50 and robot are operated independently. During spraying, the operator can change the spraying parameters manually and operate the robot manually.

- **Remote mode**, where the robot is the master and the HV-50 system is fully controlled via the robot program (HVOF start/stop, recipe selection or switch to a different recipe, powder feed start/stop, etc.)
HV-50 Touch Screen Panel (TSP)

The HV-50 TSP 22” provides access to all programming features and displays all set and actual spraying parameters. The displays are easy to follow and operate. Different displays can be selected to enable the operator to overview the entire process data. The TSP is compact and can be wall mounted, movable floor stand mounted, or directly mounted on the HV-50 unit itself (HV-50 Mobile Version 15”).

HV-50 Electrical Control Module (ECM)

The HV-50 ECM contains the PLC unit with the software used to control the system and all related processes. Most process parameters are closed-loop controlled for maximum coating quality, reliability, repeatability and safety. Up to 1000 spraying recipes can be stored in the PLC. The PLC controller continuously monitors system status, alarm and safety features. The ECM is equipped with extra I/O terminals to allow easy integration of peripheral equipment such as powder feeders, dust collectors, and turntables.

HV-50 Gas Control Module (GCM)

The HV-50 Gas Control Module contains the Mass Flow Controllers for all the process gases and fuels including carrier gas. All required pressure, flow sensors and valves, are located in the Gas Module. For safety reasons the gas module is continuously vented, preventing the build-up of gases and/or fumes inside the gas module. To assure the highest possible quality, all gas lines and fittings are manufactured from stainless steel. The Gas Module also holds a compressed air line for component cooling. Cooling air can be switched on/off via the Touch Screen Controller. The gases are controlled by the latest generation of mass flow controllers ensuring reliable and continuous controlled operation.
**HV-50 Jam Box Module**

A separate Jam Box Module is supplied with the system and is used for cooling water and fuel/gas integration. The gun cables and hoses are connected to the Jam Box.

The Jam Box Module is usually mounted inside the spray booth. Note that, with an HV-50 Mobile system, the Jam Box is mounted on the unit itself.

Next to water and fuel/gas integration, a High-Voltage discharge unit is installed inside the Jam Box. This High-Voltage unit is used for the safe gun ignition. High Voltage Discharge is the latest technology used to ignite a thermal spray torch. FST does not use the “older type” of high-frequency ignition unit because of the possible interference with surrounding equipment such as robot controllers, computers, etc.

The cooling water flow and water temperatures are also measured in the Jam Box (with an HV-50 Mobile system, this is done in the Gas Module). In case one of the measured process parameters operates outside of the set tolerances, an alarm is raised. This alarm can trigger a warning or a System Stop.

**Note:** In the case of the HV-50 Mobile, the cooling water, and the gas/fuel measurement is integrated into the Gas Module.

**PF-50 Powder Feeder**

The FST Powder Feeder model PF-50 is an open loop pressurised unit specifically designed for thermal spray applications. Based on the proven volumetric-feed technology, the PF-50 is an economical powder feeder for all powder-based thermal spray processes (A high-pressure version is available for high-pressure processes such as Diamond Jet and Jet Kote).

Its proven design has become a standard in the thermal spray industry and offers proven powder feeding accuracy and repeatability.

The PF-50 is an inexpensive accurate and reliable feeder. The centre of the electrical controls is the digital closed-loop controller, offering precise and consistent wheel speed.

The PF-50 works on a volumetric principle that directly controls the powder feed rate through the speed of the pick-up powder wheel. When in operation, the holes in the pick-up wheel will be filled with powder. Gravity, carrier gas and RPM work together to deliver the powder to the HVOF Gun. The powder feeder is controlled via the HV-50 touch screen controller.

**Note:** FST 20 Powder Feeder can also be used with the HV-50
HV-50 Mobile
Mobile HVOF Thermal Spray System

The HV-50 is also available as a mobile version. The Electric Module, Gas Module and Jam Box are manufactured and joined together to form one strong mobile system. Ridged wheels are mounted under the system and by using a handle, mounted on the front, the system can easily be moved around any shop to any location.

The operator touch screen is mounted on top of the unit and can be turned to the optimum position for the operator. A high-pressure water pump is mounted on the back of the unit for convenience.

SUMMARY
- Easy to use, touchscreen with full-colour graphical operator interface
- Storing up to 1000 recipes
- Metric or Imperial unit display
- Multiple languages
- Multiple voltages for worldwide usage
- Built-in remote access (eWon) allowing for off-site troubleshooting, and software updates.
- Small footprint space-saving cabinets
- Fast and easy process controls
- Closed-loop monitoring and control of all parameters including gases and fuels
- Monitoring and safeguarding of water flow and temperature.
- Monitoring and safeguarding of gun combustion chamber (JP-5220) pressure and back pressures.
- Automatic high-voltage, spark ignition
- Full powder feeder integration with the PF-50 or FST-10C/FT powder feeder
- Interfaces for exhaust unit, chiller, spray booth, powder feeder and gun/part manipulation system
- Master/Slave Integration (Optional)
- Compressed air control for gun air jets.

SAFETY
- Password Login with variable user levels
- Multi-level warning/alarm system with safe shutdown in critical situations
- E-stop system designed for integration with peripheral equipment.
- Sensor for Combustible gasses such as Hydrogen.
- Flow Sensor in exhaust ducting
- Modular construction separating combustible media from electronics
- CE conformity
- The use of First Class components and high-quality build
HV-50 HVOF System

The HV-50 System consists of the following main components:

1. HV-50 System Touch Screen Panel (TSP)
2. HV-50 System Electric Control Module (ECM)
3. HV-50 System Gas/Fuel Control Module (GFCM)
4. Cooler (optional)
5. FST Powder Feeder (optional)
6. HV-50 System Jam Box (JB)
7. HV-50 Gun Hose and Cable Package
8. HVOF gun
9. E-Stop and Exhaust Flow sensor

Hose & cables

a. Electrical power AC supply
b. Oxygen
c. Carrier gas (N2)
d. Cooling air
e. Fuel supply
f. Fuel return
g. Water supply (from chiller)
h. Water return (to chiller)
i. Electrical cable EM to PF
j. Electrical cable EM to GM
k. Electrical cable EM to TS
l. Electrical cable EM to JB

Note: for more technical details about our systems, please do contact your local FST sales representative or the FST head office.
## Technical Data

<table>
<thead>
<tr>
<th>Description</th>
<th>eGun</th>
<th>JP-5000</th>
<th>DJ Hydrogen</th>
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<tbody>
<tr>
<td><strong>Power</strong></td>
<td></td>
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<td>Voltage</td>
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<td>380 - 400 VAC</td>
<td>380 - 400 VAC</td>
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<td>480 VAC</td>
<td>480 VAC</td>
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<td>5 Amp</td>
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<td>12.5 Amp (Mobile)</td>
<td>12.5 Amp (Mobile)</td>
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<td>22-1100 NLPM</td>
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<td>20 Bar</td>
<td>20 bar</td>
<td>20 bar</td>
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<td>Ethanol</td>
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<td>Hydrogen</td>
<td>22-800 NLPH</td>
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<td>20 Bar</td>
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<tr>
<td>Air</td>
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<td>6 Bar Dry &amp; Oil Free</td>
<td>800 NLPM, 10 Bar Dry &amp; Oil Free</td>
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<td>Nitrogen (carrier gas)</td>
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<td>1-20 NLPM</td>
<td>1-20 NLPM</td>
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<td>10 Bar</td>
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<td>10 to 25 °C</td>
<td>10 to 25 °C</td>
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<td>Inlet Pressure</td>
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<td>Max 15 KW</td>
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<td><strong>Other</strong></td>
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<tr>
<td>Air Flow Exhaust</td>
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<td>&gt;15.000 m3/hr</td>
<td>&gt;15.000 m3/hr</td>
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<td>10 to 40 °C</td>
<td>10 to 40 °C</td>
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<td>&lt;75%, non-condensing</td>
<td>&lt;75%, non-condensing</td>
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<td><strong>Powder Feeder</strong></td>
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<td>PF-50</td>
<td>Full Integration, Recipe</td>
<td>Full Integration, Recipe</td>
<td>Full Integration, Recipe</td>
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<tr>
<td>FST 10C/FT &amp; 20C/FT</td>
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<td>Full Integration, Recipe</td>
<td>Full Integration, Recipe</td>
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<tr>
<td>Other</td>
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## Dimensions and Weight

<table>
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<tr>
<th>Description</th>
<th>Dimension (LxHxW)</th>
<th>Weight</th>
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<tbody>
<tr>
<td>HV-50 Touch Screen</td>
<td>600 x 300 x 100 mm</td>
<td>approx. 15 kg (excl. toolpost)</td>
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<tr>
<td>HV-50 Electric Module</td>
<td>1100 x 760 x 300 mm</td>
<td>approx. 100 kg</td>
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<tr>
<td>HV-50 Gas Module</td>
<td>1100 x 760 x 300 mm</td>
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<tr>
<td>HV-50 Jam Box</td>
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<tr>
<td>HV-50M</td>
<td>1450 x 1750 x 600 mm</td>
<td>approx. 330 kg</td>
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<tr>
<td>PF-50 Powder Feeder</td>
<td>775 x 820 x 325 mm</td>
<td>40 kg</td>
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