



**Where tradition  
meets technology**



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**INNOVATION  
CREATE THE FUTURE**



## Company Profile

SVCS opened its door for customers in June 2000, taking advantage of many year experience in Ultra High Purity (UHP) gas, liquid and vapor delivery systems together with deep knowledge of thermal process equipment.

Since that, SVCS build a large installation base worldwide, serving both industrial customers for mass production as well as R&D customers in laboratories or small pilot plants. Our customers could take advantage of high quality equipment still with fair price and professional support either from the headquarters in the Czech Republic or from local offices worldwide.

The company recognizes the importance of continuous improvement as a key factor in its ongoing success. SVCS teamed up with leading R&D laboratories, universities and institutes of academy of science to bring to its customers and partners new products and solutions.



## CERTIFICATES AND AUDITS





# ↓ Solutions

## PROCESS EQUIPMENT



Horizontal Furnace



Vertical Furnace



Tabletop Furnace



Customized Solutions

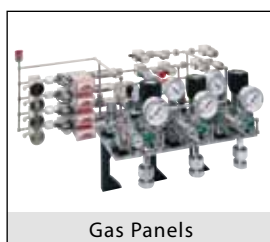
## SYSTEM COMPONENTS



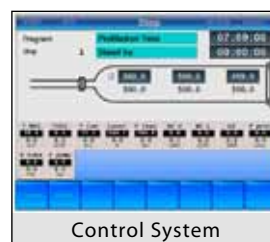
Bubbler



EBS



Gas Panels



Control System

## FACILITY SYSTEM



Gas Cabinets



Valve Manifold Box



Chemical Delivery



Total solution



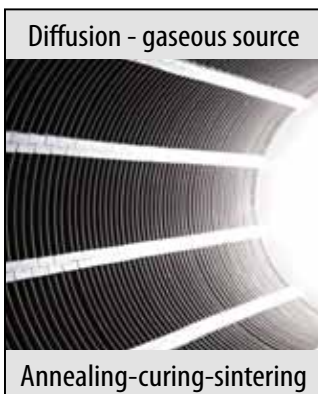


# Horizontal Diffusion Furnace

The design of the SVCS atmospheric diffusion furnaces combines the multiple-process capability with the needs of a maximum capacity for full-production system, as well as high flexibility for small-scale versions to be used for research and pilot production. It provides an easy-to-maintain, safe and reliable horizontal furnace platform. The SVCS design is outstanding for high efficiency, minimised footprint and low cost of ownership while offering high process flexibility.



## PROCESS APPLICATION



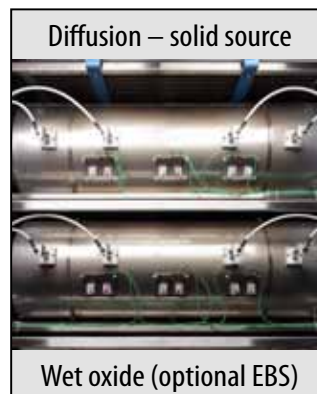
Diffusion - gaseous source

Annealing-curing-sintering



Diffusion - liquid source

Dry Oxide



Diffusion – solid source

Wet oxide (optional EBS)



Drive-in

High Pressure Oxide

## FEATURES

- Furnace construction based on long term experience in semiconductor industry
- Up to 4 stacked quartz tube reactor chambers for various processes
- Full Production models for large scale semiconductor, MEMS or PV manufacturing
- Customized small size models for research&development or small scale pilot fabs
- State of the art modular control system, in-house designed, highly tailored and in-house manufactured
- Top notch components always selected for excellent results and trouble free long life of the furnace equipment
- Up to 5 stacked quartz or SiC tube reactor chambers for various processes
- Advanced water cooling system at tube level: no thermal interference between adjacent tubes
- Contactless fully automated boat-in-tube loading both cantilever or softloading configurations
- Maintenance-friendly mechanical design

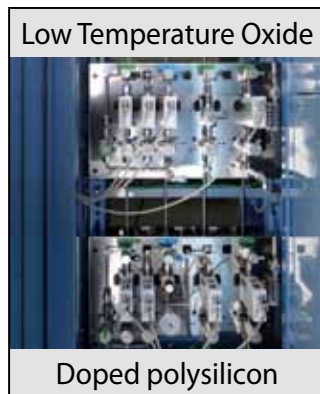


# LPCVD/PECVD

The design of the SVCS Low Pressure and Plasma Enhanced Chemical Vapor Deposition furnaces (LPCVD / PECVD) is based on own design of vacuum system in cooperation with leading vacuum systems and pumps manufacturers. Multiple methods of vacuum control are available to meet the specific process requirements. All the vacuum system was optimized in cooperation with fab service engineers to achieve maintenance friendly mechanical design.



## PROCESS APPLICATION



## FEATURES

- Multiple methods of vacuum control, heated or unheated
  - Throttling Butterfly Valve – TBV
  - N<sub>2</sub> ballast
  - Vacuum pump control with frequency converter
- Integration of vacuum pump system in cooperation with leading vacuum pump manufacturers
- Proprietary designed water cooled flanges
- Proprietary designed in-house assembled graphite wafer carriers
- Contactless fully automated boat-in-tube loading cantilever with proprietary ceramic encapsulated twin rod system
- Proprietary in-house manufactured RF generators
- On request integration of RF generators in cooperation with leading manufacturers
- Contactless fully automated boat-in-tube loading SiC paddle cantilever with softlanding



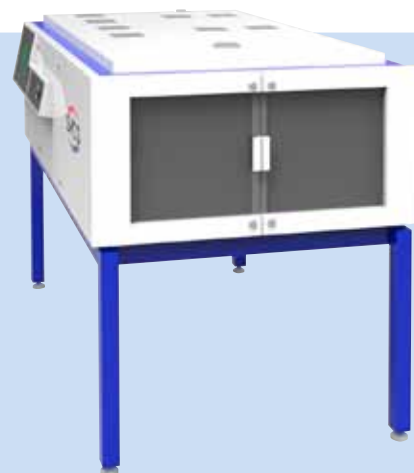
# Table Top Furnace

The SVCSTabletop Furnace system provides a semiconductor-grade quality tool for universities, R&D laboratories and pilot fabs. The system can be used for wide range of processes due to outstanding flexibility and many optional modules available to meet special and often unique requirements of every customer.

The core element of the system is combination of resistive-type heater made of Kanthal® wire with vacuum ceramic thermal insulation and proprietary in-house designed control system which ensure precise and stable temperature control resulting in continual repeatability of processes. Easy interaction with control system is achieved by using a graphical touchscreen interface paired with PC for advanced service, remote control, updates and troubleshooting. Easy maintenance procedures, like quartz parts replacement or chemical vessels refill, are achieved by elaborate mechanical design.

We apply a longstanding experience in design and fabrication of gas delivery systems for Tabletop Furnace. All gas lines and components are made of stainless steel with electropolished inner surfaces to achieve a high quality processes with minimal contamination level. Using orbital welding and metal gasket face seal connections allows safe handling of various types of gases and vapors, including corrosive, flammable and toxic.

SVCS also provide a complete solution to our customers by offering facility tools such as gas panels, automatic gas cabinets and scrubbers.



## PROCESS APPLICATION

- Gas, liquid or solid source diffusion
- Dry/Wet oxidation + Trans-LC
- Annealing - forming gas or hydrogen
- Sintering
- APCVD, LPCVD, MOCVD
- Silicon nitride
- Poly-Si,  $\alpha$ -Si
- TEOS, HTO, LTO



## FEATURES

- Atmospheric or vacuum design
- Small footprint (standard configuration: 1900 x 1100 x 680 mm, 95 kg)
- Low power consumption
- Easy operation and maintenance
- Heating element with 1 or 3 temperature zones and max. temperature up to 1300 °C
- Modern modular proprietary control system
- Up to 8 gas lines and 2 liquid sources
- Independent hardware safety interlocks
- Integration of vacuum pump systems in cooperation with leading pump manufacturers

## LOADING AUTOMATION

Increasing size of semiconductor silicon wafers in horizontal furnaces (100 mm → 150 mm → 200 mm ...) brings the necessity of wafer handling automation due to the increased height of the furnace frame, in particular in 4 or 5 tubes configuration. As an optional feature to SVCS horizontal furnaces, several systems have been developed to provide partial or fully automatic wafer handling.

First option is just a simple cassette to boat wafer transfer system, either used as stand-alone, or more frequently integrated to more complex automation – either into a boat elevator, that enables transportation of loaded quartz or SiC boats from base position to all furnace's tubes, or fully automated stocker with built-in elevator and wafer transfer system.

In case of loading system with a boat elevator, the boats with wafers are loaded and unloaded into a rack at a base position of the furnace, in an ergonomic height for the operator. This eliminates the possibility of both personal and material accidents. Then the loading system automatically moves the rack with boats and place the boats on a designated paddle. The typical configuration is either 5 boats each with 50 slots each in case of 200 mm wafers and 6 boats in case of 150 mm wafers.

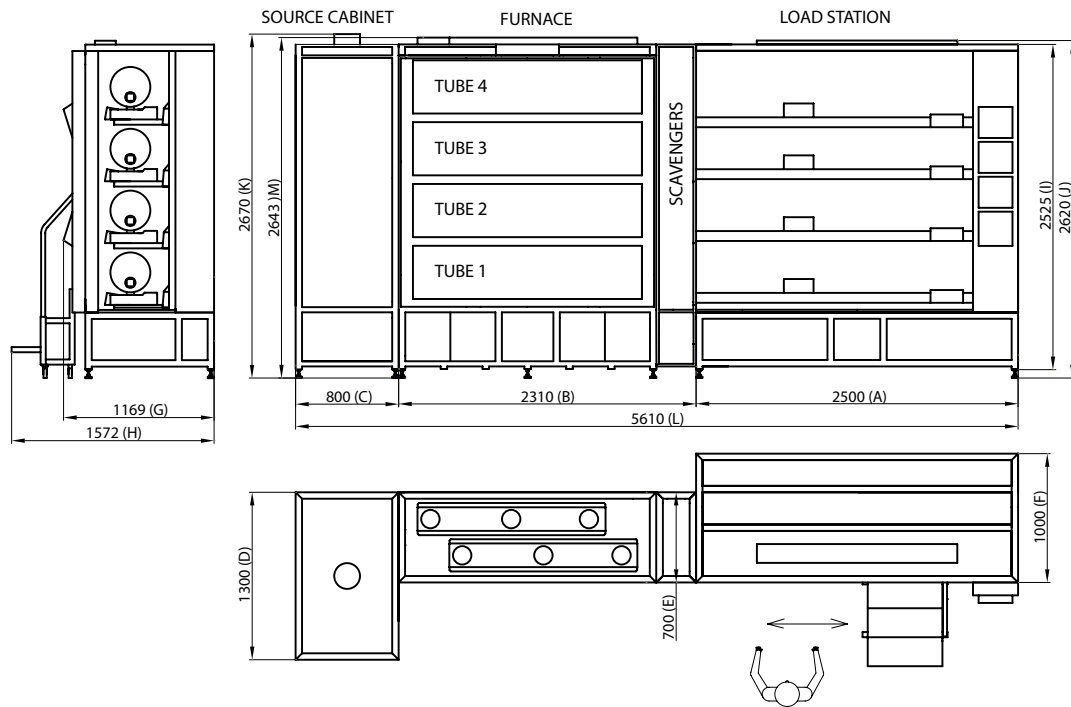
In case of stocker, the system includes built-in wafer handling robot and the boat elevator. The stocker is integrated into the horizontal furnace and stores loaded and unloaded cassettes for a smooth continuous and fully automatic furnace operation.



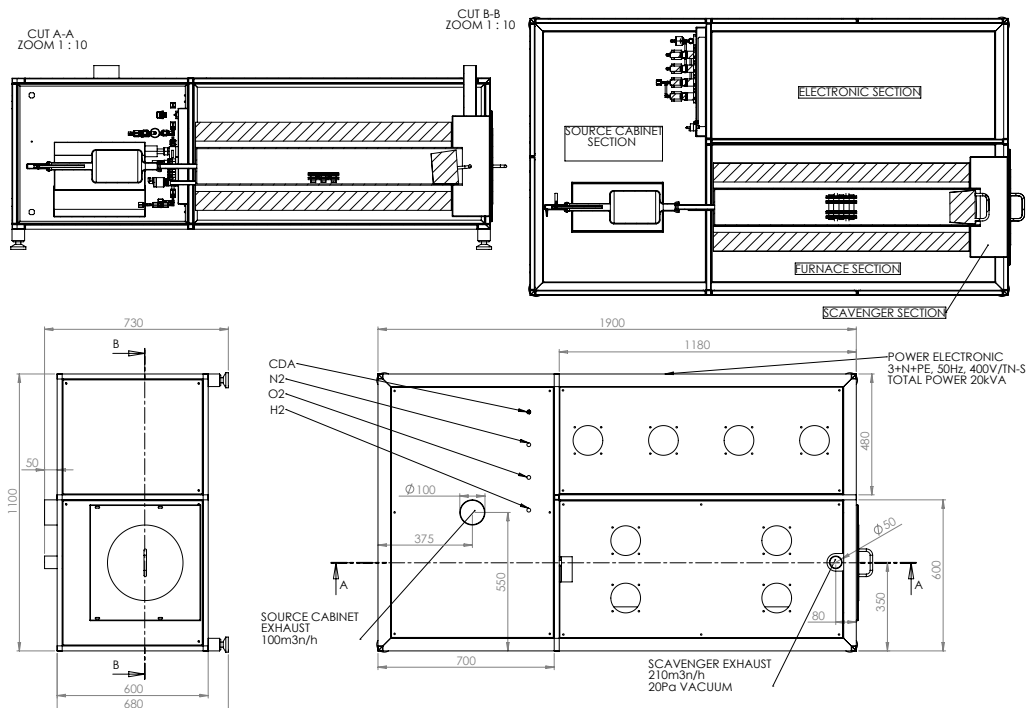
## TECHNICAL PARAMETERS

	Full Production	Table Top (R & D)
Wafer size	150 mm, 200 mm, 300 mm or any custom size	150 mm, 200 mm
Wafer load	100++ (photovoltaic applications up to 1000/tube)	25 – 150 wafers
Heating system	3 or 5 zones	1 or 3 zones
Flat zone	up to 1067 mm (42") ± 0,5 °C across flat zone	up to 600 mm; ± 0,5 °C across flat zone
Process temperature	200 °C to 1300 °C	200 °C to 1230 °C
Power consumption	95 kW – 165 kW depending on tube configuration	50 kW
Power supply	150 mm: 3-phase, 400 or 480 VAC, 140 A, 50 or 60 Hz 200 mm: 3-phase, 400 or 480 VAC, 160 A, 50 or 60 Hz	3-phase, 400 or 480 VAC, 40 - 100 A, 50 or 60 Hz
	(system is always adapted to country - specific power supply network)	
Clean dry air	70 – 110 psig (4,8 to 7,6 bar)	
Cooling water	40 - 60 LPM	10 - 15 LPM
Exhaust	210 m³/h per tube	
Options	Boat elevator and wafer handling automation	

## SAMPLE DIMENSIONS (Horizontal furnace)



## SAMPLE DIMENSIONS (Table Top furnace)



Dimensions are varying with configuration, please consult factory.

R&D models are always custom designed.





## BUBBLER

### Precursor Temperature Controller

Many modern reaction constituents for semiconductor and PV processes are available only in liquid phase. Suitable delivery systems have been adopted to make them usable for technology. One of the methods is based on liquid vapor pick up by flowing gaseous media through the liquid.



#### FEATURES

The system can furnish all popular and widely used chemical containers from various suppliers. Even adjustments for occasional rare versions are possible.

#### TECHNICAL PARAMETERS

Dimensions (width x height x depth)	320 x 240 x 320 mm
Diameter of the liquid container	145-155 mm
Weight	15 kg
Max. power consumption	150 W
Max. heating/ cooling, relative to ambient	+50 °C/-20 °C
Temperature control stability	+/-0.1 °C
Cooling power	30 W



## EBS

### External Burn System

The EBS (AKA Ex-Torch) is a diffusion furnace accessory used for pyrogenic oxidation processes. It generates high-purity water vapor by burning Hydrogen in Oxygen. Burning process takes place in an external quartz chamber, so that the source zone of process tube is not affected by hydrogen flame.



#### FEATURES

Heating to Hydrogen self-ignition temperature is provided by electrical resistance heater.

#### TECHNICAL PARAMETERS

Dimensions (width x height x depth)	135 x 130 x 270 mm
Mass	3,5 kg
Supply Voltage	230 V/50 Hz, 4,5 A
Service Temperature Range	0 – 50 °C



# Vertical Furnace

SVCS VTR is available with several lengths of flat zone for both mass production and R&D application. The single tube set-up with dual boat logistics is optimized for minimum down time as well as low maintenance costs.

Besides nowadays prevailing loading off large diameter wafers from SMIF and FOUP closed wafer pods, SVCS also offers a traditional loading from open cassettes. Innovative solution with a number of open cassettes completely enclosed within contamination controlled loading space provides especially for a high wafer load in a full production machine an exceptionally small footprint. The wafer handling system is completely installed inside furnace loading area and allow transfer from a set of 6 wafer 200 mm diameter transportation cassettes into vertical boats. VTR can use quartz, SiC and/or monocrystalline silicon boats.



The robotic transfer system automatically select the wafer size (6" or 8") and automatically verify correct wafer positioning. There is an independent wafer transfer control computer that communicates and shares information with main tube controller. This solution maximize use of internal space in the furnace and minimize possible error of operator.



## PROCESS APPLICATION

SVCS Vertical Thermal Reactor (VTR) is designed for all standard atmospheric and low pressure CVD processes. The typical processes are (but not limited to):

- Annealing
- Diffusion
- LPCVD
- Oxidation

## FEATURES

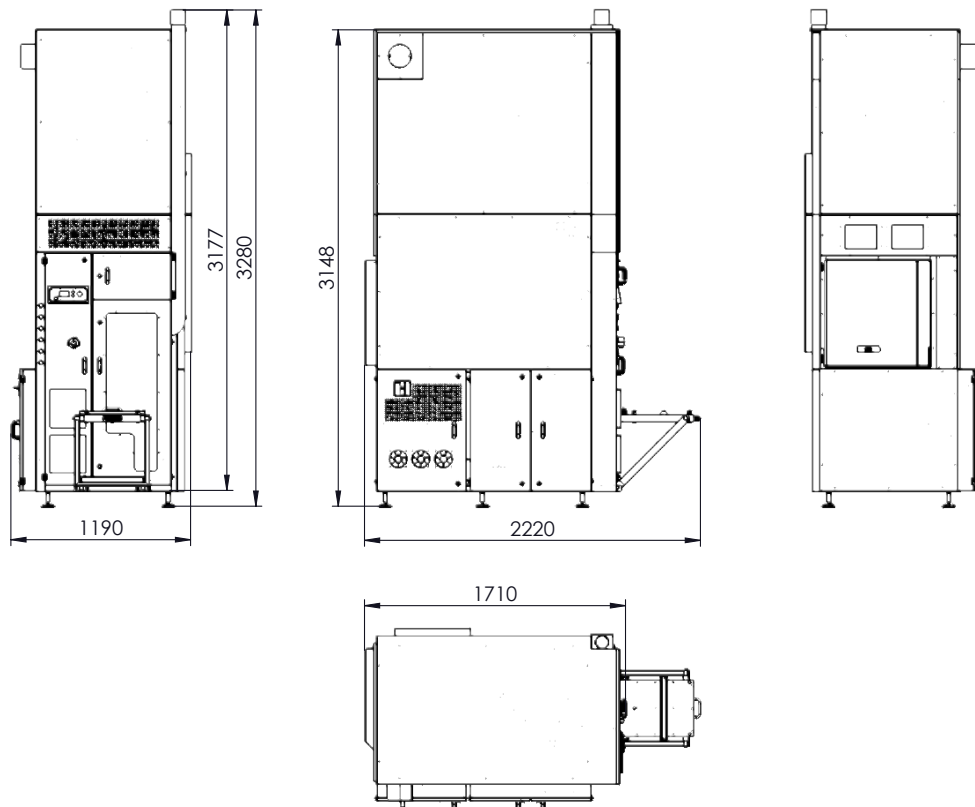
- Automatic transfer system from cassette to boat wafer handling
- Optional SMIF interface
- Optional FOUP interface
- Optional dual vertical wafer boats design – increase wafers throughput per reactor
- Optional ULPA particle filters in loading station – class 1
- SVCon control system with SECSII/GEM interface
- Independent control of thermal process in tube and robotic wafer handling
- Safety interlocks – operators and furnace protection



## TECHNICAL PARAMETERS

Wafer size	150 mm, 200 mm
Wafer load	25 – 150 wafers
Heating system	3 or 5 zone
Flat zone	up to 600 mm; $\pm 0,5^{\circ}\text{C}$ across flat zone
Process temperature	200 $^{\circ}\text{C}$ to 1 230 $^{\circ}\text{C}$
Power consumption	50 kW
Power supply	3-phase, 400 or 480 VAC, 40 - 100 A, 50 or 60 Hz (system is always adapted to country - specific power supply network)
Clean dry air	70 – 110 psig (4,8 to 7,6 bar)
Cooling water	10 - 15 LPM
Exhaust	210 m <sup>3</sup> /h

## SAMPLE DIMENSIONS



*Dimensions are varying with configuration, please consult factory.*

*R&D models are always custom designed.*



# GAS CABINETS

SVCS takes advantage of many years of experience in manufacturing tailored gas panels and gas systems for various wafer production technologies, as well as various R&D customized panels. High level of technical design, components from the world leaders and a fully automatic in house developed control system with independent safety functions makes SVCS gas systems one of the best in the market. All panels are manufactured in Class 10/100 Clean room and are helium leak tested after welding and assembly. Specialized mini weld heads of the orbital welding system together with professional design allow very low internal volume of the panels.



## PRODUCT SERIES



Single Cylinder GC



Dual Cylinder GC



3-Cylinder Gas Cabinet



Valve Manifold Box

## FEATURES

### Control system features

- Fully automated control system with TouchScreen display
- Automatic cycle purging
- Cylinder pressure or cylinder weight monitoring
- Pressure transducer for output pressure monitoring
- Excess flow switch
- Programmable cylinder pressure or weight limits for automatic changeover
- External digital inputs and outputs
- Multiple-level password protection for various operation modes
- Ethernet interface for LAN connection

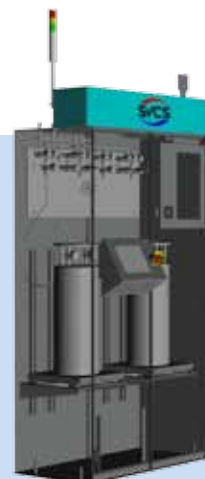
## OPTIONAL ITEMS

- Monitoring of dangerous gas presence
- Pressure monitoring inside the outer containment of coaxial tubing

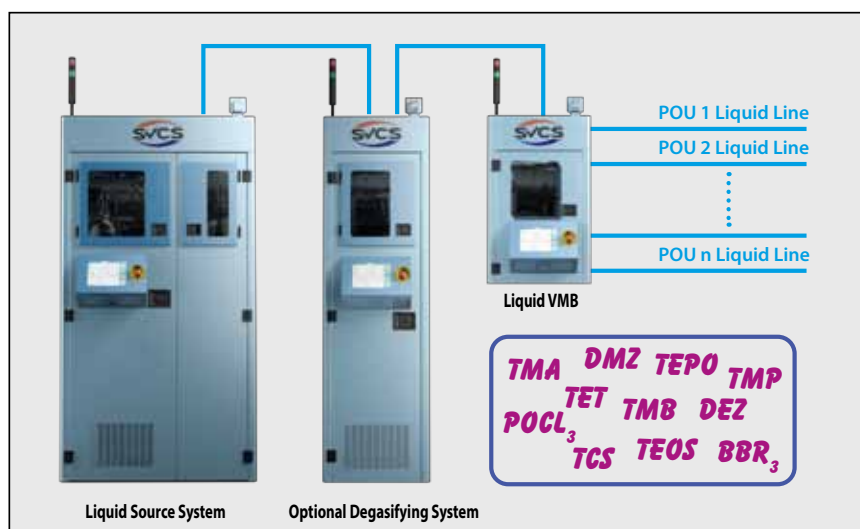


# LIQUID DELIVERY

SVCS has developed advanced sourcing and distribution systems for a safe and fully automated supply of processes with UHP liquid chemicals. Liquid sourcing systems are available in many configurations, typically as either a single or dual container cabinets customized for any proprietary canister type used by any vendor of liquid chemicals. Sourcing systems provide liquid pressurized with suitable push gas charged to the head space above a liquid in container. Depending on application, optional degassification may be required to remove diluted push gas from the liquid. Buffer tanks and Liquid VMBs can be deployed to distribute the liquid according to manufacturing needs.



## APPLICATIONS



## CHEMICAL CONTROL PANEL

Specialized all-plastic liquid and vapor handling delivery systems were developed for safe and clean fluid handling, as an interface between process reactor and media source.

Important function of the panel is monitoring the pressure inside the container, and automatic vent in case of overpressure.

Point-of-use vessels are refilled from economic bulk chemical sources. Such bulk liquid delivery systems provide safe, automatic, continuous chemical media availability without the need of dealing with numerous low volume containers.



## SCOPE OF MODERNIZATION



# CONTROL SYSTEM

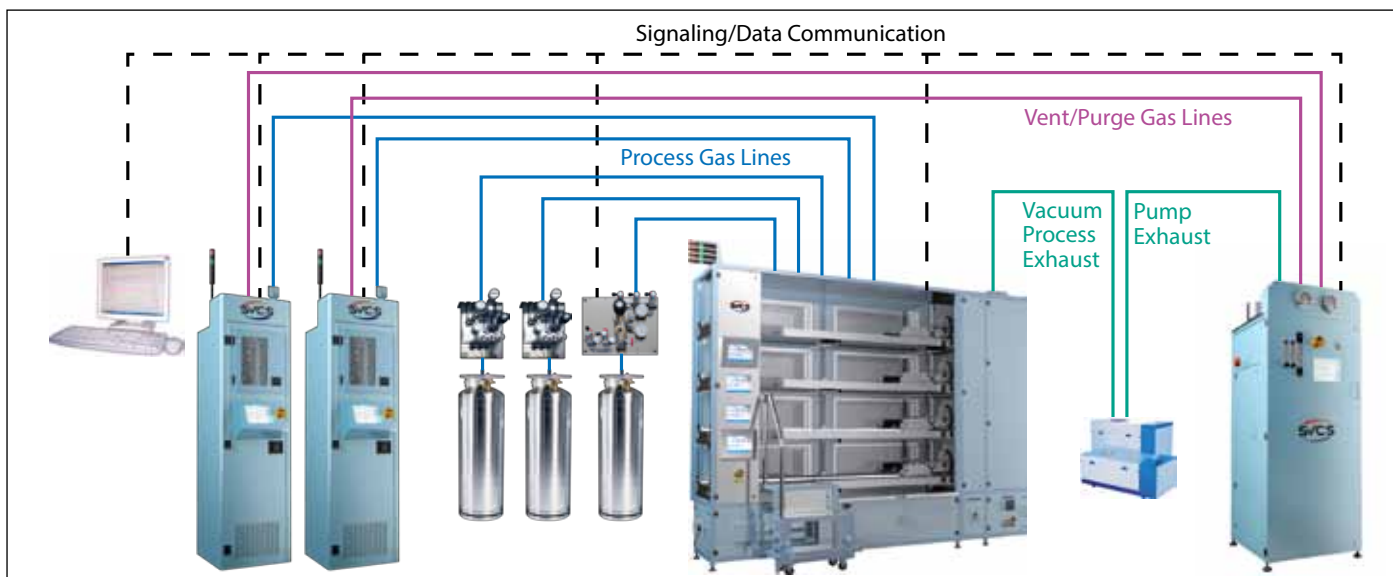
software package was developed to provide a powerful tool for fab management and process engineers to perform various tasks like recipe development and process data handling. Communication with the system is based on TCP/IP network, so the users have many possibilities of how to use the program, including remote access. One of the top features is its ability to be integrated to various high level manufacturing management systems including communication through SECS protocol.



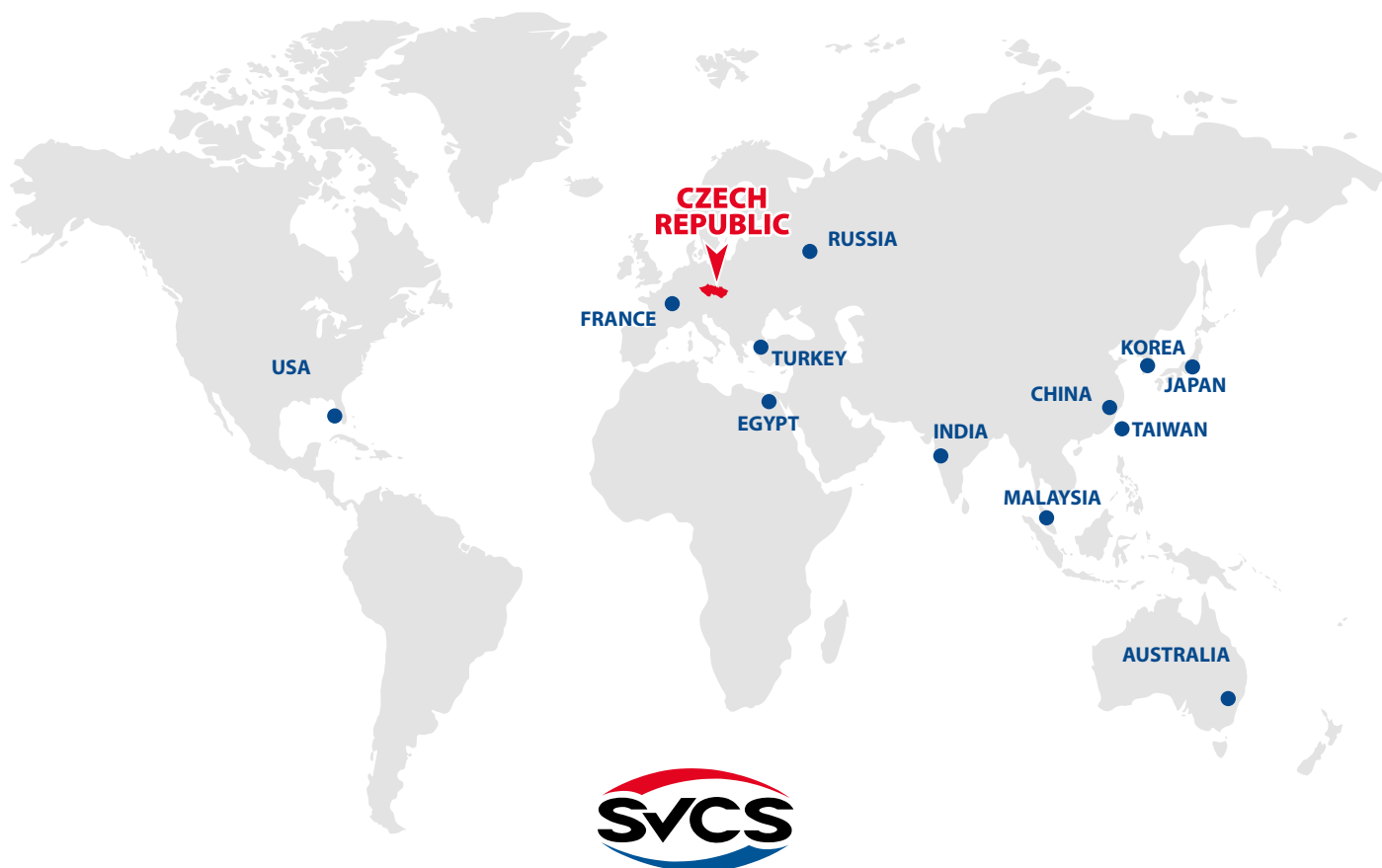


# TOTAL SOLUTIONS

SVCS is not only manufacturer of thermal reactors and Ultra High Purity distribution systems. The team of experienced service engineers provides installations and hookup services worldwide. In partnership with the best in class manufacturers of UHP components – tubing, fittings, valves, pressure regulators, filters and purifiers, MFCs and others, the true total solution is offered to SVCS customers. Besides high purity gas and liquids plumbing, SVCS also provides an integration of all equipment under one single supervisor software. Gas cabinets, liquid deliver systems, process equipment and scrubbers are monitored in one software package to provide to users complex status information. Last, but not least, SVCS offer accredited calibration together with repair service for most Mass Flow Controllers (MFCs) available on the market.







**Process Innovation**

瑟思

**Инновационные Процессы**



**SVCS Process Innovation s.r.o.**

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