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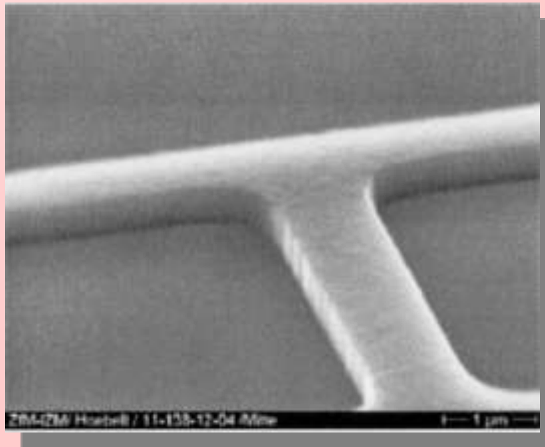
Presentation FHR RIE 200

HKUST Tender TN 073(05/06)

A versatile RIE system with manual loading for R&D and production with process guarantee !



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Features:

- substrate electrode on rf potential, 1 wafer 200 mm, 1 wafer 150 mm, 7 wafers 2“ diameter
- shielded electrode with thermostat system
- optimised gas shower head
- 13,56 MHz RF with automatic matching
- ICP source MaPE ICPC 200
- modular gas cabinet
- automatic control by PLC
- remote diagnostics
- open & modular design for upgrades

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Options:

- ICP source MAPE ICPR 200 (patented)
- Helium thermal coupling of substrate
- load lock system for automatically loading
- optical emission spectrometer (OES) for process control
- pulsed/ switched rf system
- exhaust gas treatment
- adjustable electrode distance

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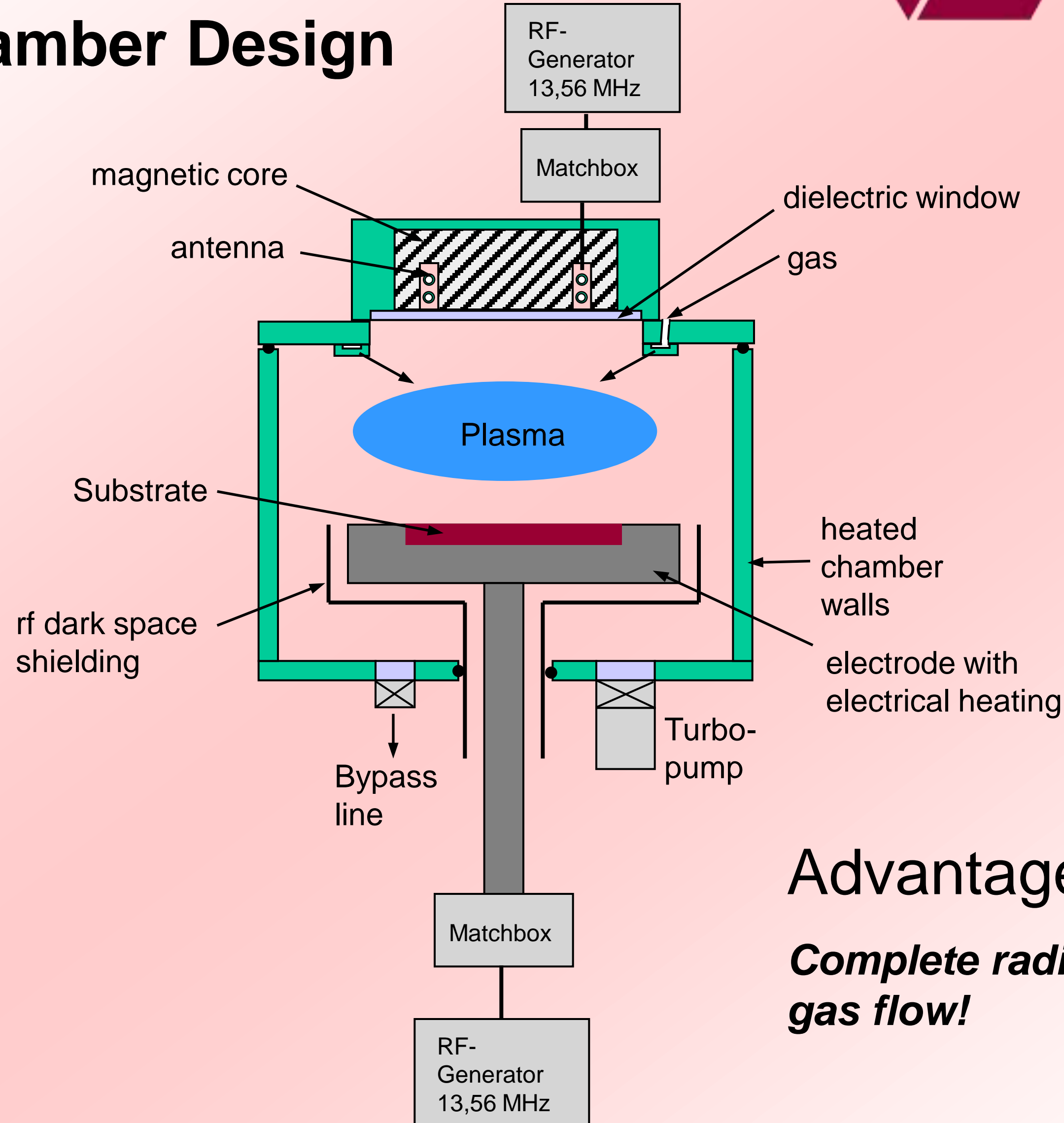
Basic Chamber Design



Advantage:

Complete radial symmetrical gas flow!

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RIE - ICP Reactor

MAPE-ICPR 200
(licensed by EC)

magnetic enhanced inductive coupled plasma

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RIE - ICP 200 Reactor

advantages compared to standard RIE:
- higher etching rates achieveable
- independent control of chemical and physical component

→ better controlabitlity of process in regard to:
- etching profile,
- etching rate
- selectivity to resit and underlaying materials

advantage of MAPE-ICP to competitors:
- discoupling of ICP antenna from process chamber
- higher uniformity and efficiency due to magnetic core assembly

disadvantage: higher investment costs

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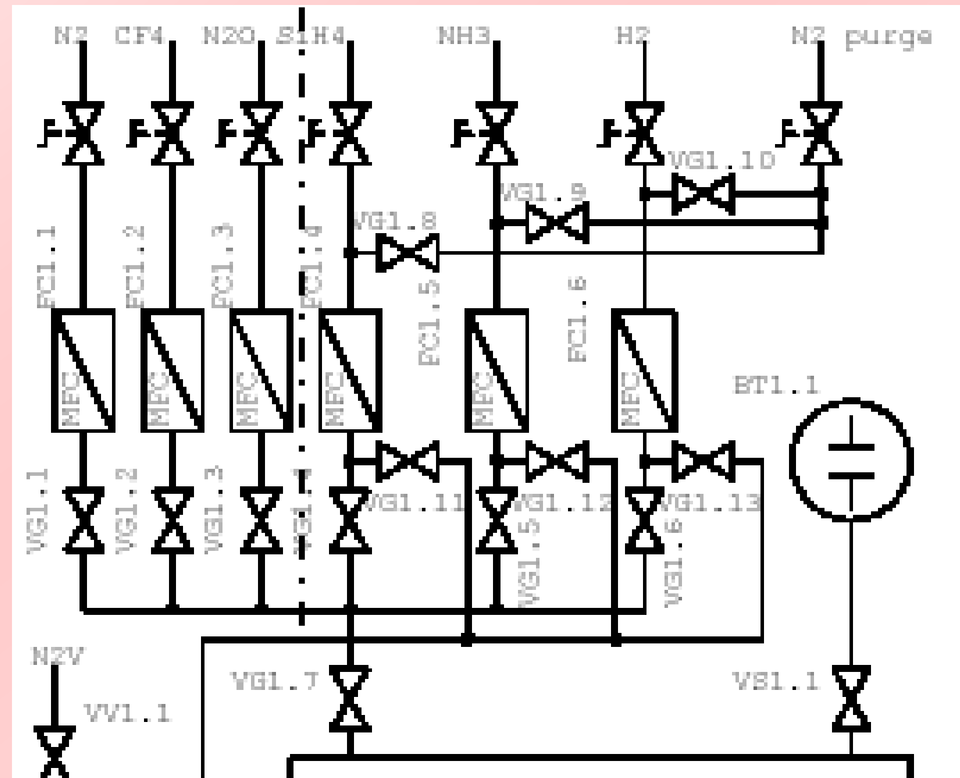
Gas Cabinet Design

a) normal gases

b) corrosive, flammable, toxic gases include purge line !



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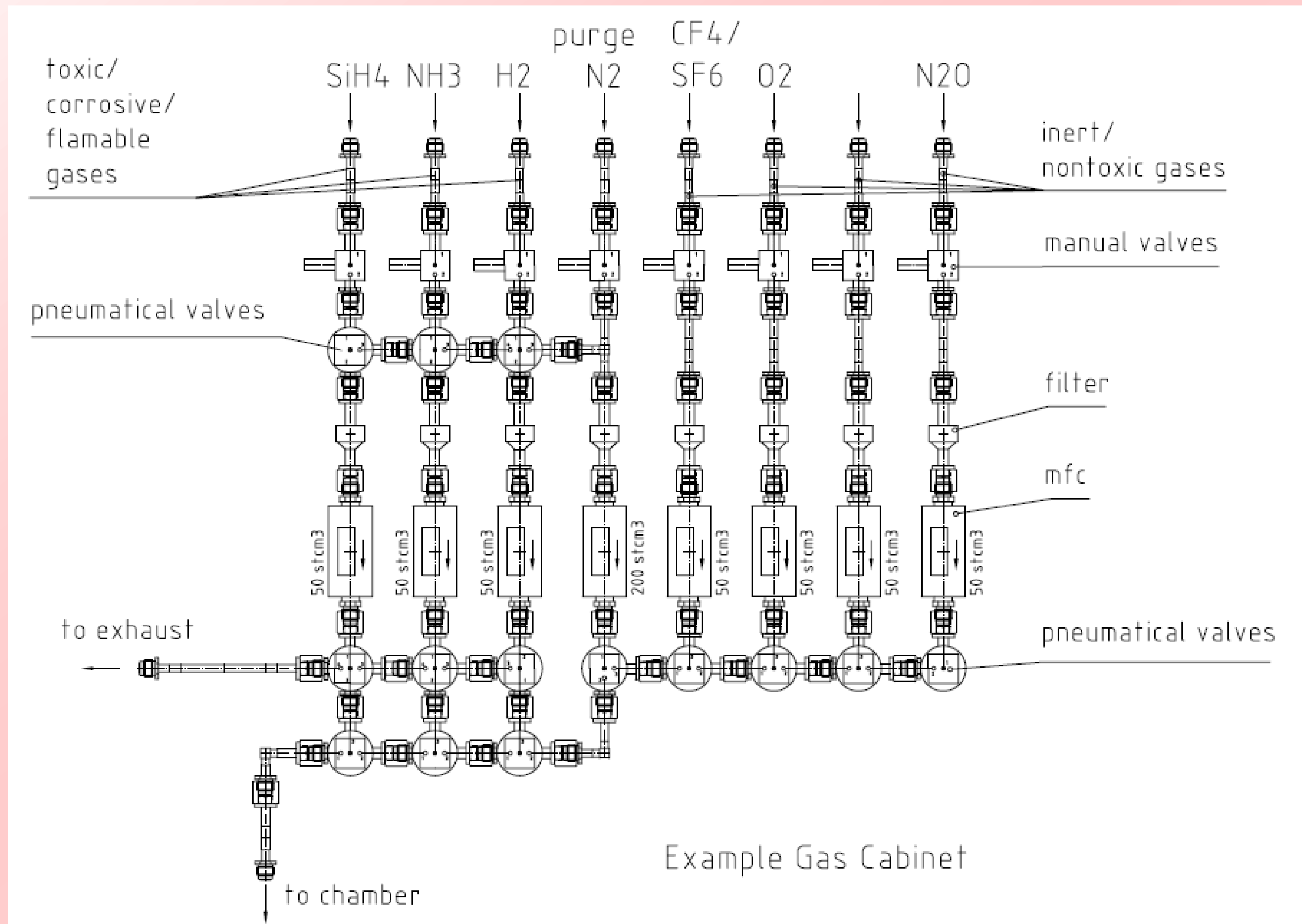
Gas Lines Layout



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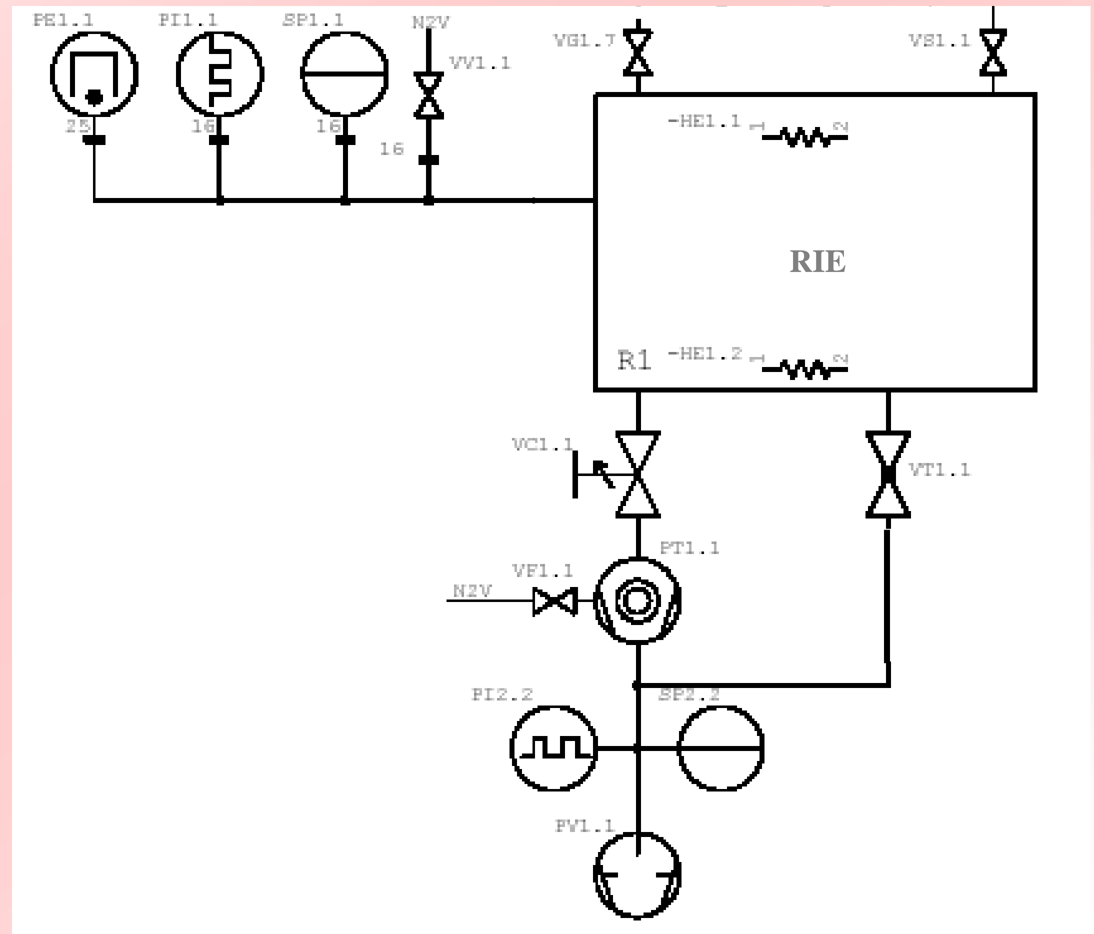
Pump System

- powerful vacuum system by Roots/rotary pump combination; turbo pump also included! (UNAXIS group)
- full range gauges
- process gauge by capacitance manometer
- (MKS)



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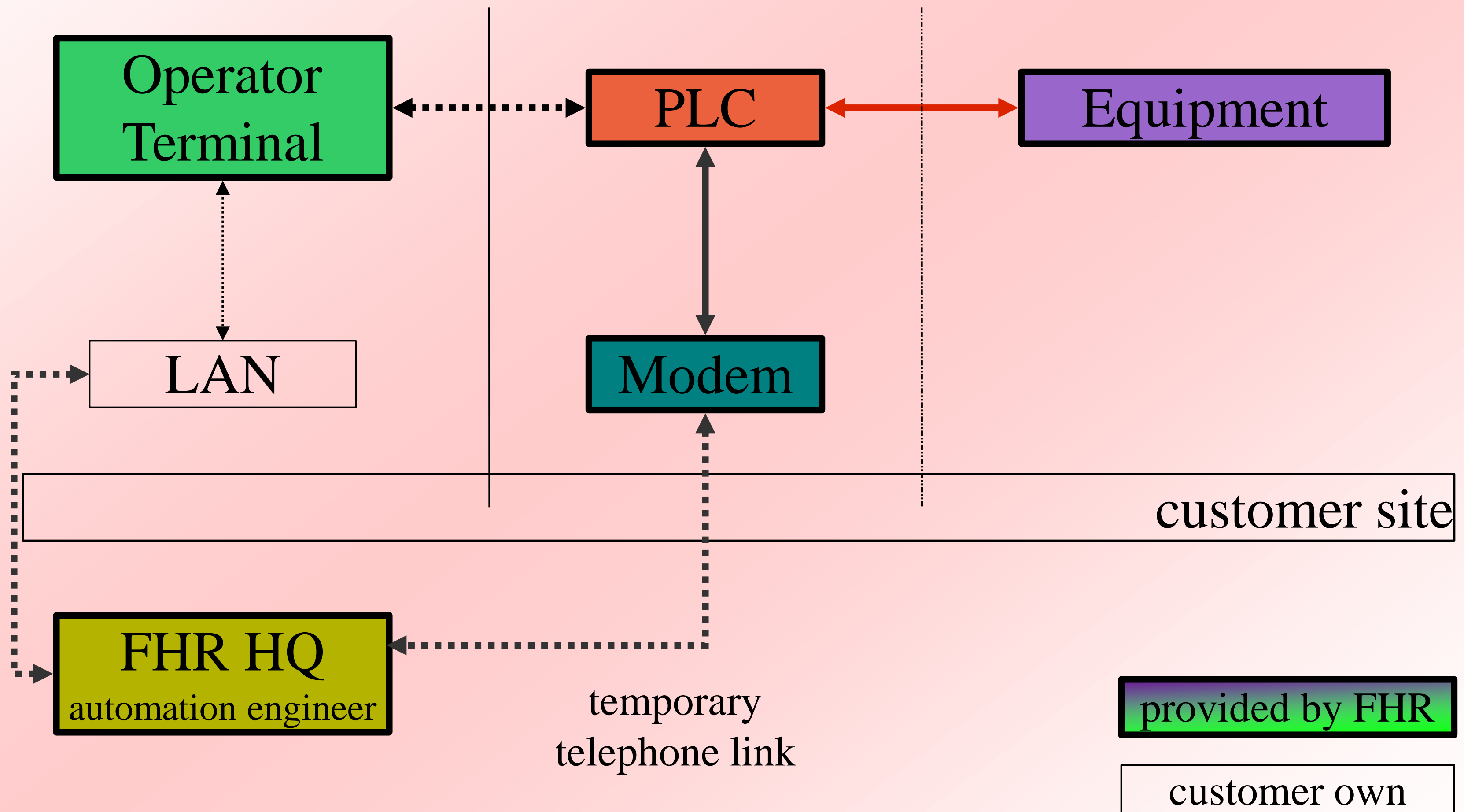
Control System

Hardware: SIEMENS Simatic S7 PLC (world wide PLC standard!)



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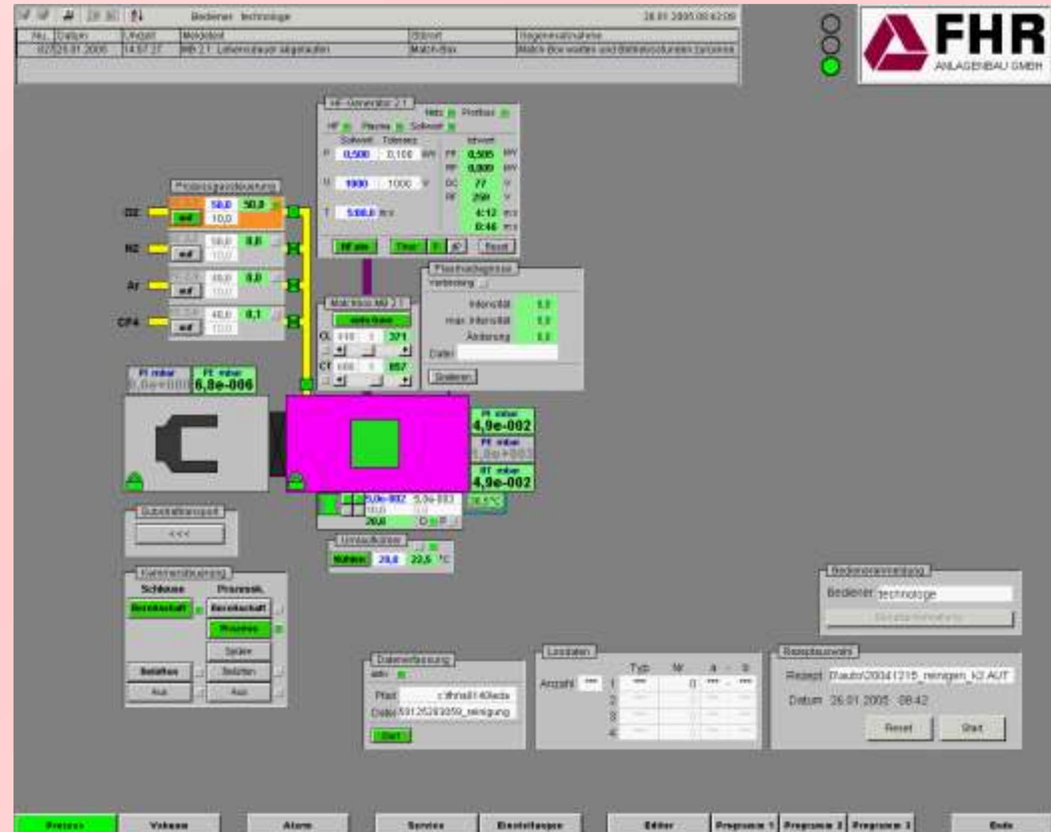
Operator Terminal

- Windows XP/NT based operation system
- complete visualisation by SIEMENS WINCC
- different operating levels for maintenance, r&d, production
- easy programming/editing of programs
- „unlimited“ number of recipes
- data logging
- selecting automatic or manual mode at any recipe point !



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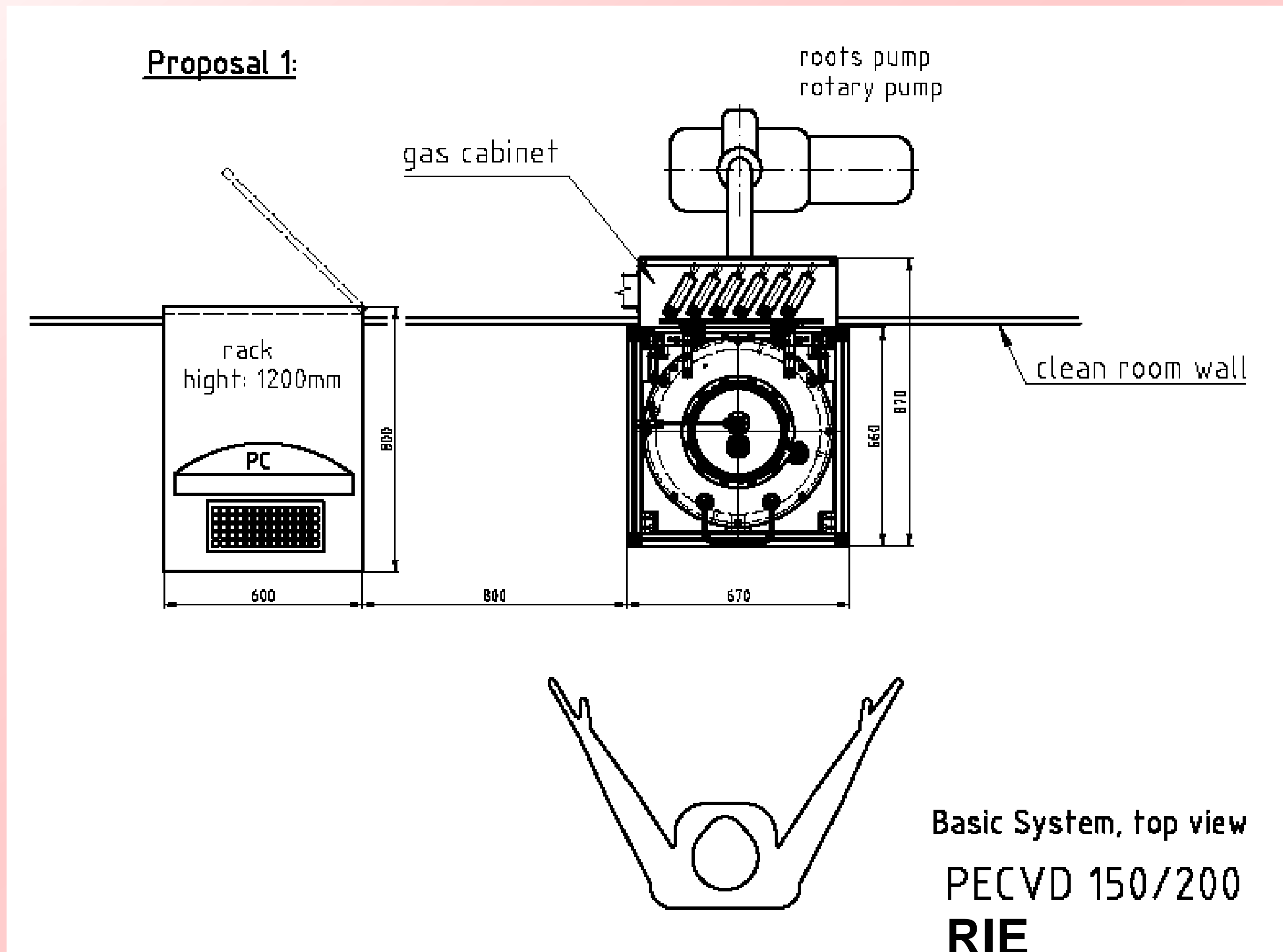
Installation

- customised layout for clean room installation



RIE 150/200

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Installation – Facility Conditions

- El. Power:	3x 400V, max. 6kVa
- Water:	10 l/min, 4...6bar
- Compressed Air:	ca. 6 bar, static
- Exhaust:	NW 100, gas cabinet,
-	NW 40, pumps (Exhaust gas treatment not included, optional available)
- Thermal load:	ca. 2 kW

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Process Guaranty

- etching rate:	> 35 nm nm/min for SiO_2
	> 50 nm nm/min for SiO_x
- Uniformity:	< +/- 5% on 6“ wafer, wafer to wafer
- Repeatability:	< +/- 3% on 6“ wafer
- CD change :	< 0,1 µm
- Film profile:	> 88° (anisotropic)
- Min. feature:	< 1 µm (lines & space)
- Selectivity:	3 to 5:1 to photo resist for SiO_2
	1,5 to 3:1 to photo resist for SiO_x

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Supported Processes by FHR

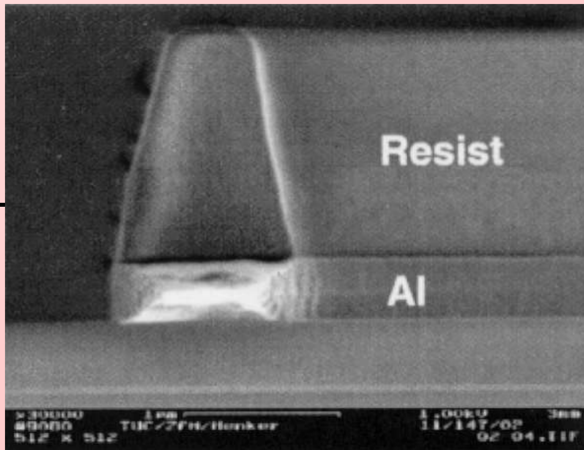
RIE of metals: Al, Cr,

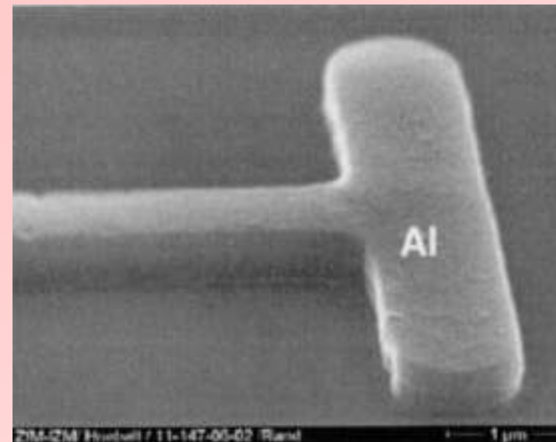
RIE/PE of semiconductors: Si, GaAs, a-Si

RIE/PE of dielectrics: SiO_2, SiO_x, Si_3N_4 , SiO_xN_y

Resist - Stripping

Actual project: deep RIE of SiO_x for MEMS applications





1 µm Al structure etched with

50 nm/min and BCl_3/Cl_2

FHR RIE 200 by ZfM,
TU Chemnitz Germany

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Reference Projects

Technical University Chemnitz, ZfM, Dr. Bertz

RIE/PECVD 200 Cluster ICP !

<u>Application:</u>

MEMS, SiO2, SiNx dep. DLC

SiO2, SiNx, Al, Cr etching

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Reference Projects

IFW Dresden, Leibnitz Institutes of Germany, Dr. Mönch

RIE/PECVD 100 Cluster

(2 process chambers, 1x ICP

Application: Sensors, MEMS

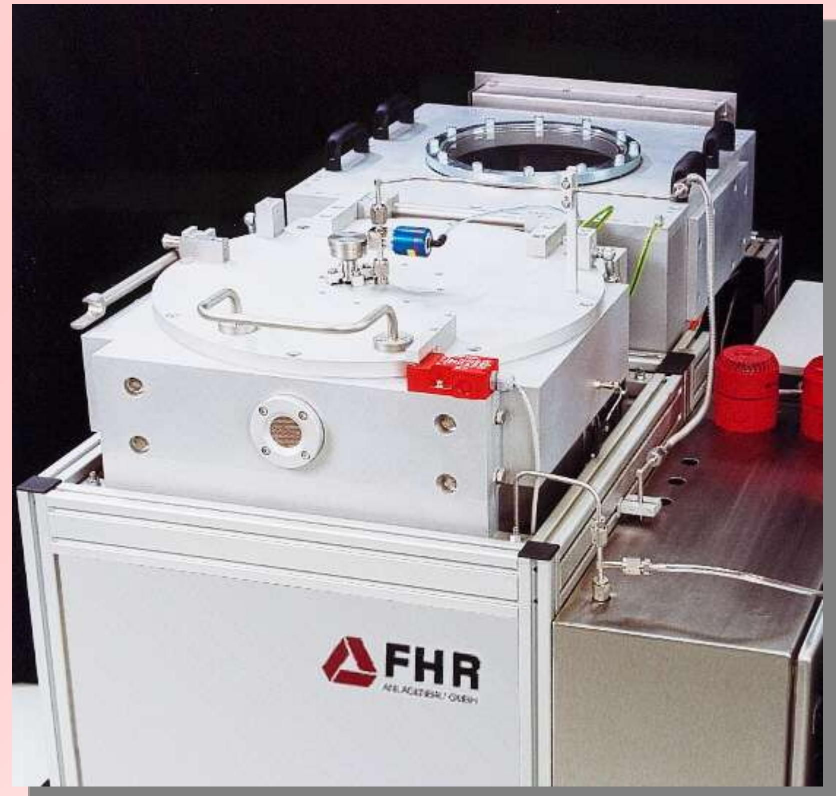
Deposition:

SiO2, SiNx dep. DLC

Eposition:

SiO2, SiNx,

Pt etching



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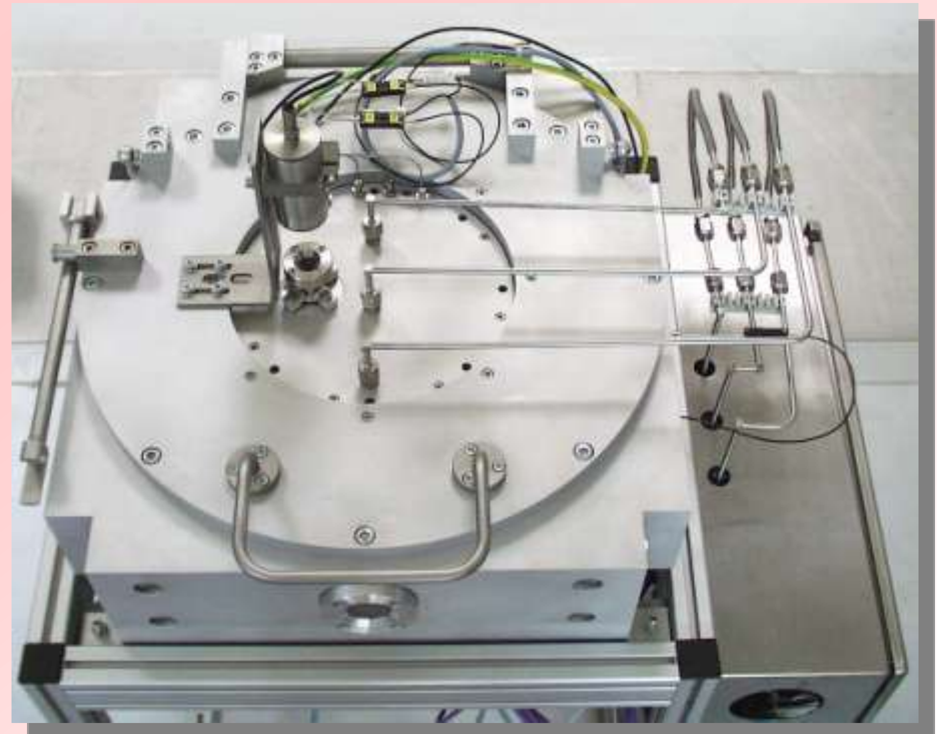
Reference Projects

FAP Dresden, Dr. Schade

PECVD 200

Application: **Sensors, Solar Cell**

SiO_2, SiN_x dep. DLC, Poly-Si



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Reference Projects

E+E Elektronik, Hilbersdorf, Austria, Dr. Hilber

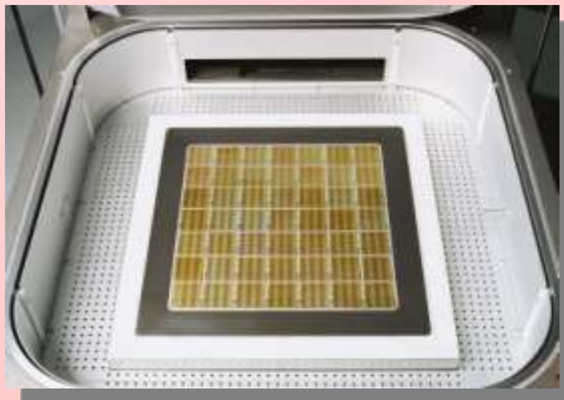
RIE 400 SQ

<u>Application:</u> Sensors,

SiNx Etching

Project for SiNx PECVD

In process



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Reference Projects

7 more systems stand alone & combined cluster in different configurations : PECVD ; RIE, Sputtering

100 …200 mm wafer

In Germany, Italy, Sweden, Israel (no detail information allowed)

Application: **Sensors, MEMS,**

Compound Semiconductors

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