High stability, rampable power supplies for keV ion beams

Jaroslav Moravec

FOTON, s.r.o.

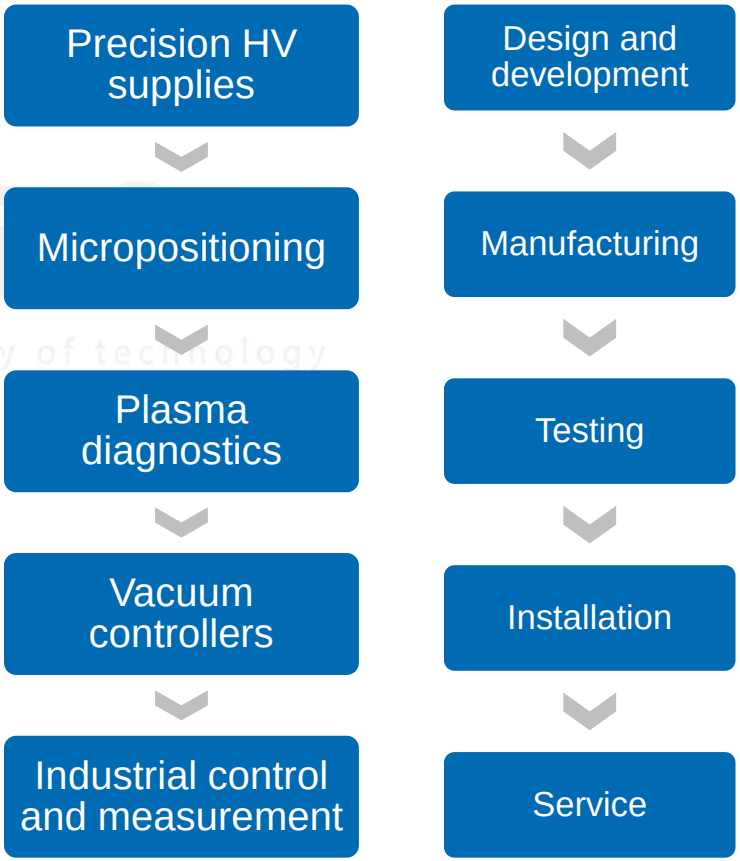
FOTON, s.r.o.

- ***founded 2000***
- ***Czech private company (LTD)***
- ***Development and manufacturing of special electronic devices***

- Studénka 1
  509 01 Nová Paka
  Czech Republic **www.fotons.cz**

„From system design to k delivery of final product …"

- ***Founded 2000***
- ***SME***
- ***PIC (FP7) : 968991880***
- ***Special innovative firm***
- ***R&D + manufacturing***



Complex services for R&D

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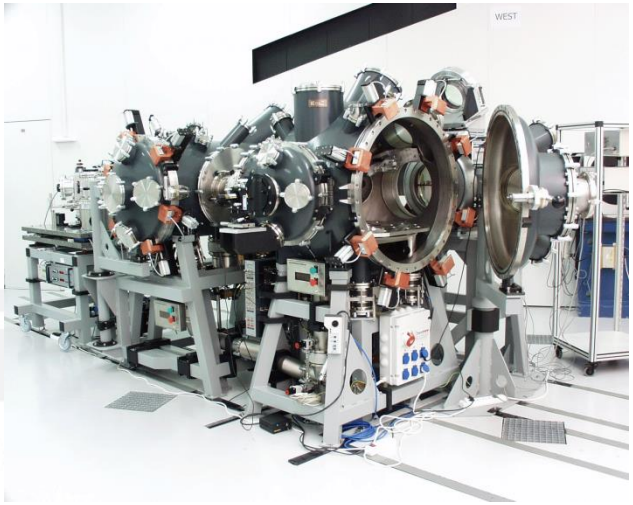
Company history

- ***2000*** *FOTON founded, instrumentation for PALS*
- ***2001*** *X-ray laser instrumentation*
- ***2002*** *diagnostics for tokamaks*
- *first high voltage supplies*
- *Multidrive16*
- *first exports*



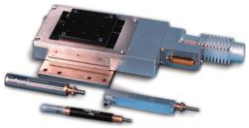
- ***2007*** *Škoda Auto a.s.*
- ***2008*** *Joint Institute of Nuclear Research, Dubna, RF*
- ***2010*** *ELI – vacuum system*
- ***2011*** *LA3NET (Liverpool)*

Products overview

More than 140 prototypes during 15 years

nA-100s A *uV-10s kV*
uW-kW *UV-IR*

High voltage supplies



Micropositioning

Optoelectronics

High temperature plasma diagnostics

Special systems

Vacuum controllers

Current and voltage power supplies

Industrial control systems

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High voltage power supplies

Low – middle – high power, voltage up to 20kV (60kV)

HVS 04

HV 8002

HVG 2000

HV 5000+

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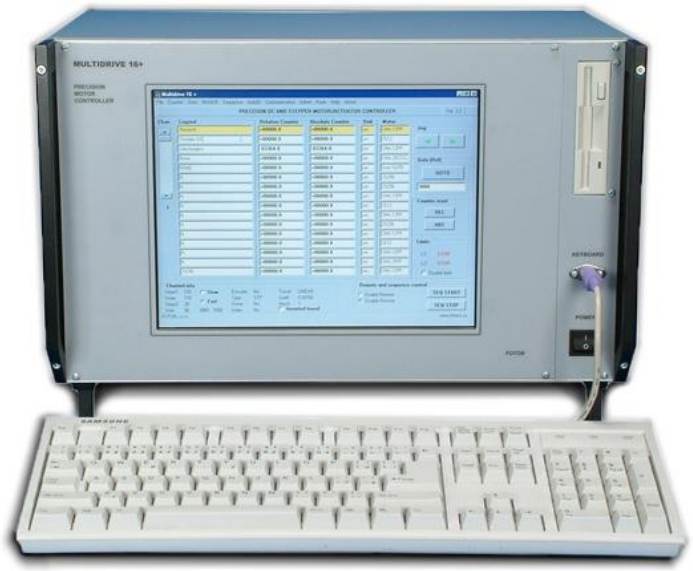
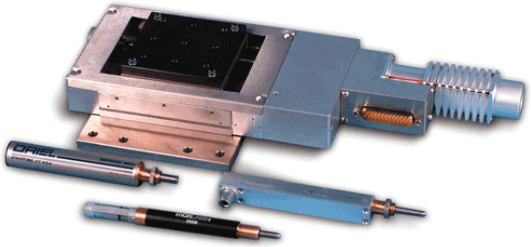
Micropositioning

System Multidrive 16+



Multidrive 16+



High temperature plasma diagnostics

Signal processing, generators and controllers for experiments

DLS 08

HPD 4.1

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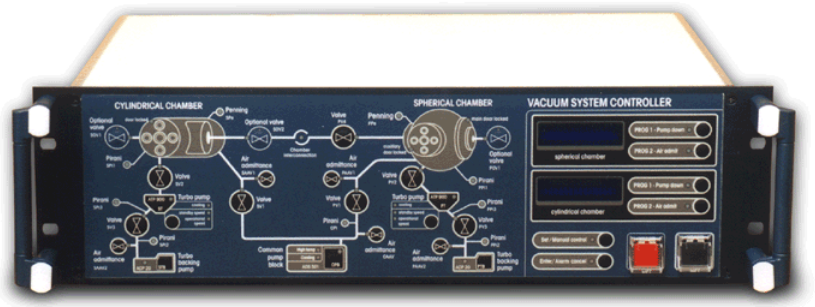
Vacuum control systems

High reliability control systems (HW, SW) for vacuum pumping



VCU 2000

ASU 2009

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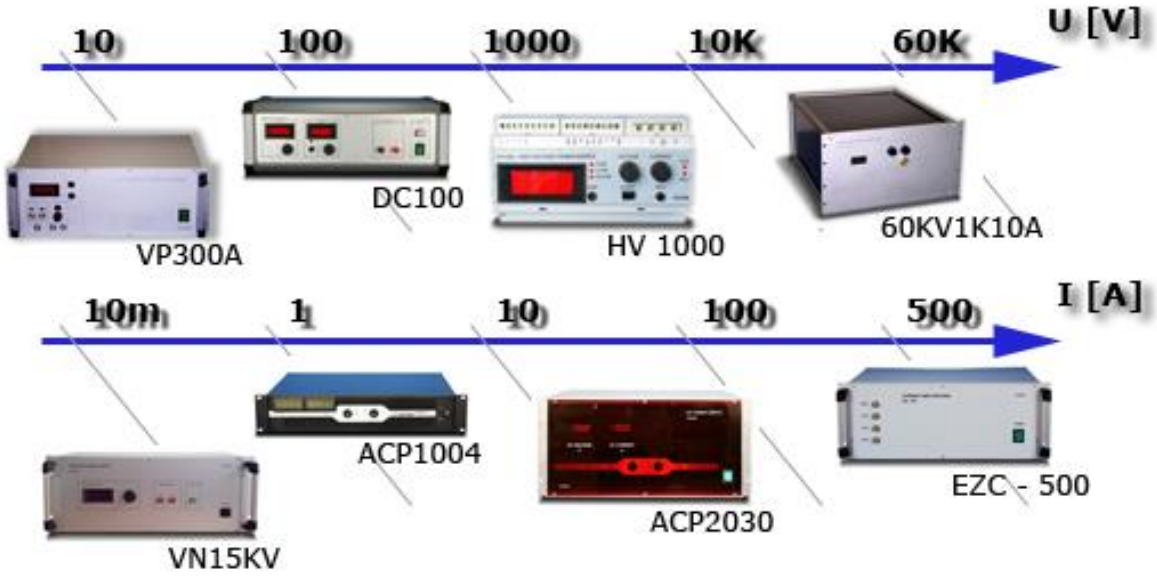
Voltage and current power supplies

DC – AC – waveform – programmable, up to 500 A, peak power 40 kW



Galva 2001

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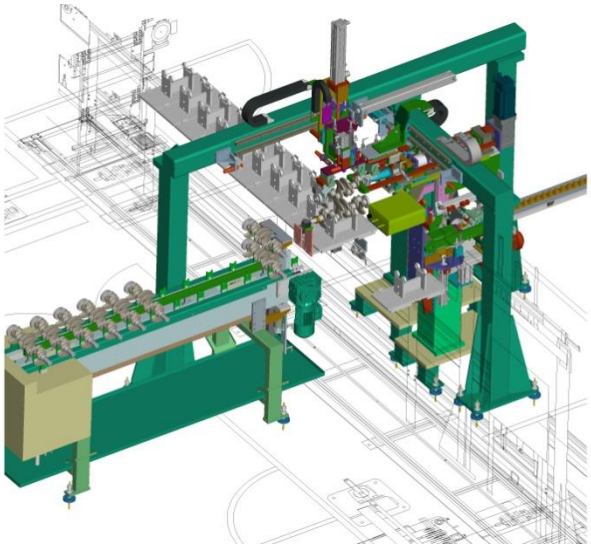
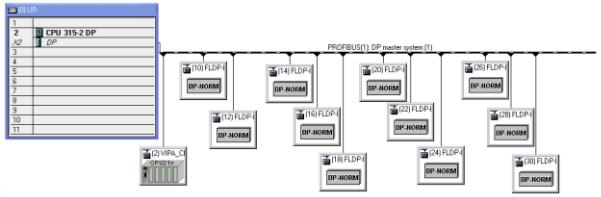
Automation and industrial process control

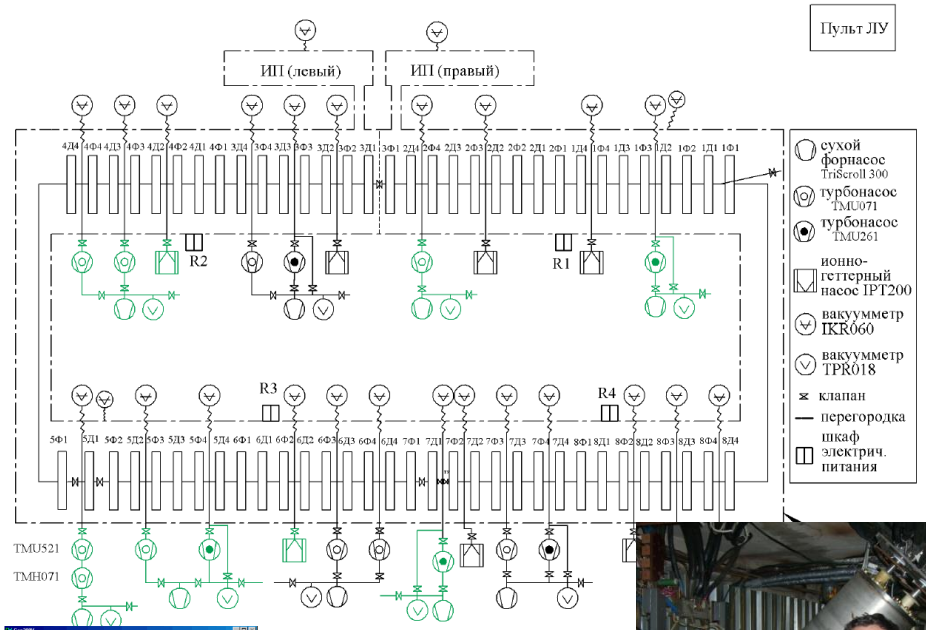
Industrial projects:

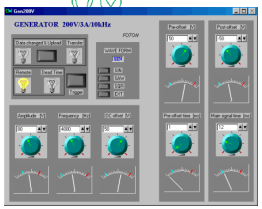


Automatic pressure station



Large experiments:





Particle accelerator

Do you need a solution ?

You know, WHAT, but you don't know HOW?

Have you not power / capacity?

…contact FOTON

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High stability, rampable power supplies for keV ion beams (ESR4)

WP2: Facility Design and Optimization

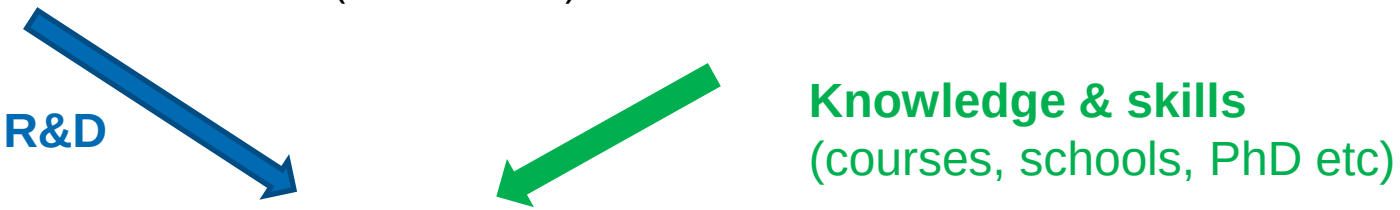
Motivation:

Critical for beam storage, energy ramping and beam transport are power supplies:

- stability 10-4 (or better)
- rampable (> 1 order / s)
- compatibility / integration with ACS

Main goal:

Development of the prototypes of PS with parameters specified above
Testing at lab facilities (ELENA …) in collaboration with other fellows in AVA



Fellow → expert in design of HSRPS for accelerators

PLAN OF WORK:

R&D and Tech

- DB of parameters
- Design and prototyping
- Facility tests
- Upgr./modif.
- Final presentation

t

PhD

CTU Prague

Faculty of Nucl. Sci. And Phys. Eng.

Network + FOTON aux.

FOTON training

Power Supply Design Workshop (RE)

AVA schools & WS, conferences, exhib.

Res. Man. (eg.project proposals)

Secondments

Reporting

Short – term objectives (CDP)

1. Research results

- Presentation of intermediate results at group seminars, topical workshops and international conferences.
- Regular contributions of research results and activities to project web page and newsletter.
- Contributions to project reports, upon request from the work package leaders.
- Production of a video blog on the project as part of the project's outreach activities.
  - **Anticipated conference, workshop attendance, courses, and /or seminar presentations:**
  - 1st AVA School
  - School on Complementary Skills
  - HPC training week
  - Power Supply Design Workshop (Ridley Engineering Europe Ltd., UK)
  - AVA Mid Term meeting
  - Detector and diagnostics hands-on training days
  - 2nd AVA School
  - AVA Topical Workshops that relate to Fellows' work package
  - Training week that includes Advanced Research Skills, Employability and IPR Workshops, as well as Outreach Symposium
  - AVA International Conference
  - Visit in specialized exhibition (1-3x min, e.g. Electronica (Munich) D, SPS IPC Drives (Nuremberg, D)
  - Permanent monitoring of Mentor Graphics webinars (PCB design)
  - Presentation in ELI / HiLase workshops/seminars (TBD)

Short – term objectives (CDP)

2. Research skills and techniques

- Power Supply Design Workshop (Ridley Engineering Europe Ltd., UK) – see above
- FOTON training – see above

3. Research management:

Proposals and grant applications throughout the project, typically TACR's projects (Technology Agency of the Czech Republic), MPO's projects (Ministry of Industry and Trade of the Czech Republic), EU projects Horizon 2020

Networking - trained in project management, definition of deliverables and milestones, and will be working within a large international team of AVA;

4. Communication skills:

- communication **within AVA** members (research teams, other fellows, mainly with ESR3 (WP2,COSYLAB) and ESR6 (WP2, CERN)
- attending **School on Complementary Skills**
- English language courses
- Presentation in "FOTON Days" (presentation for invited customers and partners)
- Participation in consortium reporting
- FOTON presentation on exhibitions, conferences (e.g. Symposium on Plasma Physics and Technology and/or SPIE Prague etc.)
-Attending Power Supply Design Workshop (Ridley Engineering Europe Ltd).

Short – term objectives (CDP)

5. Anticipated networking opportunities

- Development of database gathering requirements from ELENA/USR/experiments with ESR 3

- Design, build and test of power supplies matching CERN and GSI control system specification

- Planned Secondments:
  CERN (2 weeks)
  GSI (2 weeks)
  UNIMAN (1 week)
  OEAW (1 week)
  MPG (1 week)

Milestones and deliverables (CDP)

3 months after start:
Initial training at FOTON (no report)
6 months after start:
Gathering requirements from ELENA and other facilities with respect to power supplies requirements – development the database, reporting of the summary (internal report)
9 months after start :
First design of the required system/ power supply (internal report)
12 months after start :
updated database (internal report)
9-12 months after start :
Power Supply Design Workshop (UK)
18 months after start :
Design report of first realized modules (key parts) of new power supply/ies
24 months after start :
First completed power supply including factory tests (internal report)
30 months after start :
Power supply tests at experimental facilities (internal report)
33 months after start :
Design report of upgraded power supply/ies
36 months after start :
Final reporting

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