



**Wrocław Technology Park  
Ul. Muchoborska 18  
54-424 Wrocław, POLAND**

## **Expression of Interest in providing design and manufacturing of detectors for the construction of the European X-ray Free Electron Laser Facility**

### **Introduction**

This EoI describes the resources of Wrocław Technology Park (WTP), which plays a coordinator's role for several companies cooperating in this particular project (Elfin, Fiber Led, Kriosystem, Qsor, Techtra, Zec Service).

WTP as a company established by both science and commercial institutions is aimed at supporting and promoting companies based on advanced technologies, laboratories, scientific and research and development centers. There are over 50 innovative companies located within the Park area with the total number of employees over 800. Wrocław Technology Park offers its residents a possibility of using laboratories, located in the Park. The laboratories are equipped with technical equipment which is rendered available to interested companies.

Wrocław Technology Park houses following laboratories:

- Low Temperature Laboratory,
- Vacuum Technology Laboratory,
- Electronic Processing Laboratory,
- Diagnostic Laboratory for Material Properties,
- Laboratory for Production and Diagnostics of Boards and Electronic Circuits.

### **A. Brief description of the components to be delivered or tasks to be taken over.**

#### **ELFIN**

1) Full design and production of compact and modular X-ray detector based on commercially available scientific grade CCD technology. It would work as a single or freely arranged mosaic (tiled) detector, so every spatial configuration would be possible (especially 2x2, 3x3 or 4x4 mosaic). Each "brick" detector would be independent to others.

Detector should fulfil requirements described in CallEoI-03 document "(...) Develop and Deliver Large Area Pixellated X-ray Detector". The proposal regards detectors for Pump-Probe experiments on Crystalline samples and Single particle imaging. Building other device types could be considered, because of proposed system's modularity.

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### **FIBERLED:**

- 1) Carrying out a complex indoor lighting system using the newest high power LEDs.

The advantages of such lighting solution are:

- lifetime up to 50 000 h,
- creating any color from RGB modules,
- high candle power,
- low operating voltage eliminating possibility of electric shock,
- lower temperature comparing to incandescent bulbs,
- lower power usage - high efficiency

The company is capable of designing and realizing lighting system using this technology fitted to any requirements of laboratory or office space.

### **KRIOSYSTEM**

- 1) Delivery of vacuum insulated transfer lines for cryogenic system.
- 2) Stainless steel treatment of parts of cryogenic system.
- 3) Participation in delivery of complex cryogenic systems as a subcontractor.

### **QSOR**

- 1) Data Analysis Software
- 2) User Interfaces

### **TECHTRA**

- 1) Calculating and production of High Temperature Superconducting silver and silver-alloys shields.  
Pure silver, silver-magnesium, silver-gold and other alloy tubes.

The silver processing was built in purpose of electrorefining of silver. In the following years Techtra introduced electrorefining of gold, platinum and palladium and also started continuous casting of silver bars and flat silver which they use for producing wires, plates and strips. In 1998 Techtra started building generators for induction furnaces and now they have 30 induction furnaces for continuous casting and furnaces for annealing plates, wires and tubes (part of them can operate in a protective atmosphere or in vacuum). Techtra has also a possibility for continuous casting in a protective atmosphere for casting silver-magnesium tubes or any other specialized products for HTS purposes (as long as they don't require extreme temperatures or pressures). Their facility is now prepared to process several tonnes Ag/y but this capability can be easily increased if need arises. Techtra offers non-welded tubes with the outer dimensions up-to 40 mm. The tubes with different dimensions can be offered upon request.

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## 2) Production of Gas Electron Multiplier (GEM) detectors.

GEMs (Gas Electron Multipliers) consist of a thin sheet of insulating material metallised on both sides and perforated with small holes in a regular pattern. A high voltage is applied between the top and bottom surfaces so that the electric field inside the holes exceeds 15kV/cm. Free electrons produced in the gas space above the GEM holes as a result of photo-induced ionization processes are channelled into the holes, accelerated and produce additional electrons in an avalanche process. Each hole in the GEM plate therefore acts as an individual, independent electron multiplier structure. GEMs achieve near noiseless, linear amplification of photon-induced electrons which allows accurate resolution of the incident photon energy. At the same time, the spatial origins of incident photons can be determined by using a suitable pattern of read-out electrodes beneath the GEM structure.

## 3) Printed Circuit Boards production.

TTA Techtra produces one layer, double sided PCB for prototypes and small series.

### **ZEC SERVICE**

- 1) Designing and production of transfer cooling systems together with the delivery of materials (pipelines and pipe fittings) and equipment (fittings, pumps and heat exchangers) made of stainless and carbon steel grades.
- 2) Designing and production of gas distribution systems made of copper pipelines.
- 3) Designing as well as prefabrication and assembly of chill centers.
- 4) Prefabrication and assembly of steel constructions made of stainless and carbon steel grades.

### **B. List of laboratories or groups involved in the work:**

This EoI describes the joint resources of following companies cooperating with Wrocław Technology Park:

- 1) Elfin
- 2) Fiber Led
- 3) Kriosystem
- 4) Qsor
- 5) Techtra
- 6) Zec-Service



## **C. Evidence of competence of the team to deliver the specified components**

**Wrocław Technology Park** takes part in several national and international projects aimed at supporting companies located within its area or innovative companies cooperating with its residents. Wrocław Technology Park provides the companies with organizational support, helps in improving technology offer, provides legal advice when necessary and is able to represent group of companies involved in certain project playing a manager's role. WPT cooperates with several international institutions. Some of the companies listed in this EoI cooperate with European Organization for Nuclear Research (CERN) either by delivering products/services or using technology invented in CERN.

### ***Experience of the companies:***

#### **ELFIN**

Elfin provides design, prototyping and production of sophisticated electronics especially for scientific instruments. It possesses 12 years' experience and specialization in X-ray detectors based on scientific grade CCDs. Elfin is a strategic supplier of detector electronics for Oxford Diffraction Ltd., they have its products present in many European university laboratories and synchrotron facilities (like Diamond Light Source synchrotron, SOLEIL and ESRF) as well.

#### **FIBERLED**

FiberLED specializes in providing high power LED solutions, mainly efficient and highly durable power supplying of modern lighting systems.

Its products:

- constant current (350mA) high power LED power supply featuring 50 000 h lifetime (the same as newest LEDs),
- advertisement billboard lighting system using 10W total power supplied only from solar cells,
- designing and building a prototype of medium intensity obstacle light mounted on tall buildings and factory chimneys.

#### **KRIOSYSTEM**

Kriosystem is a manufacturer of low-temperature apparatuses for research and measurements. The apparatuses manufactured by Kriosystem serve in dozens research institutes and universities all over the country. Kriosystem specializes in production cryostats (flow, helium, nitrogen, optical) and transfer lines for liquefied gases. Their devices are well known in many countries abroad. In recent years they delivered following devices, e.g.:

- a cryostat for carrying out new research on new generation of electrical insulation of superconductive magnets in the environment of compressed superfluid helium He IIp. Technical parameters:
  - the temperature of compressed superfluid helium He IIp is 1.5 - 2.1 K at the pressure of 1 bar,

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- dispersed power at set temperature: 7 W,
- temperature stabilization in the measurement vessel: 0.001 K,
- capacity of measurement vessel: 8 litres,
- overall height of cryostat: 2 m,
- overall diameter of cryostat: 0.5 m.

Delivered in 2006 for SACLE in France within the confines of CARE/NED, CERN (Coordinate Accelerator Research in Europe programme, Next European Dipole).

- a cryostat for research an efficiency of cryogenic thermal insulations.

Technical parameters:

- overall height of cryostat: 1750 mm,
- overall diameter of cryostat: 340 mm,
- capacity of the research vessel: 6 litres,
- measurement of temperature at eight points, possibility to carry out tests in the range of temperature: 300 K - 77 K, 300 K - 4.2 K, 77 K - 4.2 K,
- the possibility to control the temperature of nitrogen shield surface.

Delivered in 2006 for Wrocław University of Technology.

- a cryostat for characterization of material properties as a function of temperature.

Technical parameters:

- overall height of cryostat: 0.5 m,
- overall diameter of cryostat: 0.10 m,
- minimum temperature: 4.2 K.

Delivered in 2002 for MMr Technologies, Inc. USA.

- a cryostat for research an electric and dielectric conduction in He III environment

Technical parameters:

- overall height of cryostat: 1.7 m,
- overall diameter of cryostat: 0.3 m,
- minimum temperature: 0.28 K.

Delivered in 1998 for Institute of Molecular Physics Polish Academy of Sciences.

Technological capabilities:

- 1) machines for metal treatment (milling and turning machines),
- 2) stands for electrical and electronics assembly,
- 3) high vacuum pumps (components and special technologies stands),
- 4) stainless steel welding,
- 5) high qualified engineers and workers with long experience in cryogenic, mechanical and electronics equipment fields.



## **QSOR**

QSOR has been founded by IT specialists with over ten years of experience combined. They've been cooperating with a number of customers, including companies in the United States of America.

They specialize in creating version-controlling, automated document management systems with elements of artificial intelligence and delivering specialized software products aimed at supporting calculation and configuration needs of the customer.

The company has been involved in several projects related to high-skill design process, including an application for configuring and testing industrial mixing equipment. They've also implemented a tool for an American elevator manufacturer.

Moreover, they've created a number of interface-related products, such as libraries for creating intranets, websites and data management systems. An early implementation of task managing software has been in service for several years now.

Auxiliarily, Qsor can provide remote technical support for the project, including, but not limited to, database maintenance, help-desk and training, as well as to cover major areas of the network administration.

## **TECHTRA**

TTA Techtra takes part in EU "Highest magnetic field insert coil made from high temperature superconductors for a 25 Tesla breakthrough" project.

TTA Techtra has calculated and manufactured Ag-Cu, Ag-Bi, Ag-Li, Ag-Na, Ag-Si, Ag-Sn, Ag-Zr and others alloys tubes for the high temperature superconductors used in main coils.

Since 1998 TTA Techtra has collaborated with the biggest High Energy laboratory that is European Organization For Nuclear Research in Geneva. In framework of long-term agreement TTA Techtra got the right to use innovative Micro-Chemical-Vias technology in order to produce CERN patented high energy particles detectors- GEMs.

## **ZEC SERVICE**

Since 2003 Zec Service has been performing a similar work to the order of the European Organisation for Nuclear Research (CERN) in Switzerland:

Since 2003 Zec Service has been conducting the design and assembly works in the area of assembly of cooling systems made of stainless steel grades and gas distribution systems on the CMS detector; the value of the work performed till now is CHF 2,000,000.

In the years 2003- 2004 Zec Service was conducting works related to the delivery and installation of pipelines made of stainless steel in transfer tunnels TI2 and TI8 amounting to the total value of € 1,350,000.

In the years 2004-2005 they were executing a contract consisting in the delivery and assembly of cooling systems for the underground CNGS constructions of the total value of CHF 2,800,000.

In the years 2005 – 2006 Zec Service was executing a contract for the delivery and installation of underground cooling systems for the CMS detector at point 5 LHC of the total value of CHF 3,850,000.

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**D. An indication on whether the competent governmental agency is aware (or supports) the submitted Expression of Interest**

The Ministry of Science and Higher Education supports the EoI submitted by Wrocław Technology Park

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