

- The proposed services are based on **Consultancy on Power Converters for Big Science facilities**

The power converters team at ESS has a cumulated experience of more than 100 years in development, testing and commissioning of extremely complex and high demanding power converters for several Big Science facilities, including CERN and ESS. This includes but is not limited to:

- High Current power supplies (\sim tens kA) for particle detector magnets, based on conventional thyristor technology;
- High Current and High Power power supplies (\sim several kA) for synchrotron accelerator magnets, based on switch mode technology;
- Fast pulsed power supplies for correction magnets, based on switch mode technology;
- High Voltage and High Power power supplies, both DC and pulsed, for RF amplifiers;
- Grid power compensators for pulsed loads;
- High Voltage and High Current power supplies for Fusion Energy applications
- Etc.



- The knowledge and expertise was developed by several members of the team:
 - At CERN, on the development of more than 5 projects related to upgrade of existing particle accelerators;
 - At CERN, on the development of more than 6 projects related to the construction of new power converters based on modern switch mode topologies for several particle accelerators (in total more than 100 power supplies of more than 10 different types have been entirely developed, tested and commissioned at CERN);
 - At ESS, on the development and testing of 12 High Voltage and High Power klystron modulators for the Linac;
 - At several universities, on projects related to optimal design of magnetic components and power electronic topologies for physics applications;
 - In the industry in electromechanical design of power converters for motor drives (3D mechanical CAD design, thermal design, testing, safety and EMC compliancy);

- The expertise could have the following fields of application:

Consultancy services in **ALL** matters related to electrical power supplies and electrical engineering for Big Science projects:

- Feasibility studies;
- Design of High Voltage/High Current/High Power power converters, including simulation, detailed CAD dimensioning of components and sub-systems;
- Construction and validation of prototypes;
- Writing technical specifications and SOW's in view of tendering;
- Market surveys and suggestion/evaluation of possible industrial partners;
- Follow up of contracts;
- Support in Factory/Site Acceptance Tests;
- Support in Commissioning;
- Troubleshooting and upgrades of existing systems;
- EMC and electrical safety compliancy advise;

Strengths

- Multidisciplinary team, very strong in electrical engineering and power converters for many different Big Science applications;
- Can handle complete projects throughout all phases encompassing design, construction, tendering, testing, commissioning, etc;
- Success oriented approach, which has been demonstrated in several occasions. Not a single project failed;

Opportunities

- New Big Science projects, like:
 - ESSnuSB at ESS;
 - FCC and existing accelerator upgrades at CERN;
 - Tokamak, heating system power supplies at ITER;
 - Grid power quality and compensators at ITER;
 - Klystron modulators at ILC;
 - Electrical power distribution and EMC at IFMIF-DONES;
 - Etc.

Weaknesses

- None;

Threats

- Uncertainty on future Big Science projects;
- Lack of frameworks, allowing the team to engage in future projects;
- Difficulty in understanding the needs and the timing of future Big Science projects;

- The IPR status of the technology is ...
 - No IPR related issues nor limitations;

- For further information, the contact point is:

Carlos A. Martins

Power Converters section leader, ESS, Lund, Sweden

E-mail: carlos.martins@ess.se

- The company/research institution basic information is...

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