

In-kind projects and standardized test environments for the MCA work package

In-kind project NIK5.3#5
Test Package for Linear Motion Technology

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Project Kick-Off Meeting, FZ Juelich,
21st November 2017

- Motion Control Challenges at ESS
- 13.5.3 MCA work package
- Planned in-kind contributions
- Concept for motion control test bench mechanics

Technical Challenges

Higher Neutron Flux

1

- Faster movements and sample handling
- Taking neutron data during movement
- Continuously time stamping of positions
- Higher precision of positioning

Harsh Environment

2

- Radiation proof components
- Magnetic field proof components

Flexibility & Complexity

- Simultaneous movement of axes
- Complex, nonlinear trajectories
- More complex motion systems (robotics)
- Integration into EPICS
- Integration of ACC and TAR requirements

Large-Area Facility Layout

3

- Remote diagnostics, preventive maintenance
- Components with increased reliability

Time Line of Project

4

- Thinking 10Y ahead in life cycles of 10 to 20 Y!
- Constantly integrate new requirements

Construction Phase (2014 to 2023)

- Develop / provide standardised motion technologies for ESS (Accelerator & Neutron Instrumentation)
- Support design and drawing
- Supervise installation and cabling
- Commissioning
- Set up appropriated labs and workshops for R&D and service



Operations Phase (2020 to 2065)

- Service / Maintenance
- Active obsolescence management
- Further develop technologies
- Support upgrades of instruments suite
- Support user experiments

13.5.3 Motion Control & Automation WBS / Cost Book

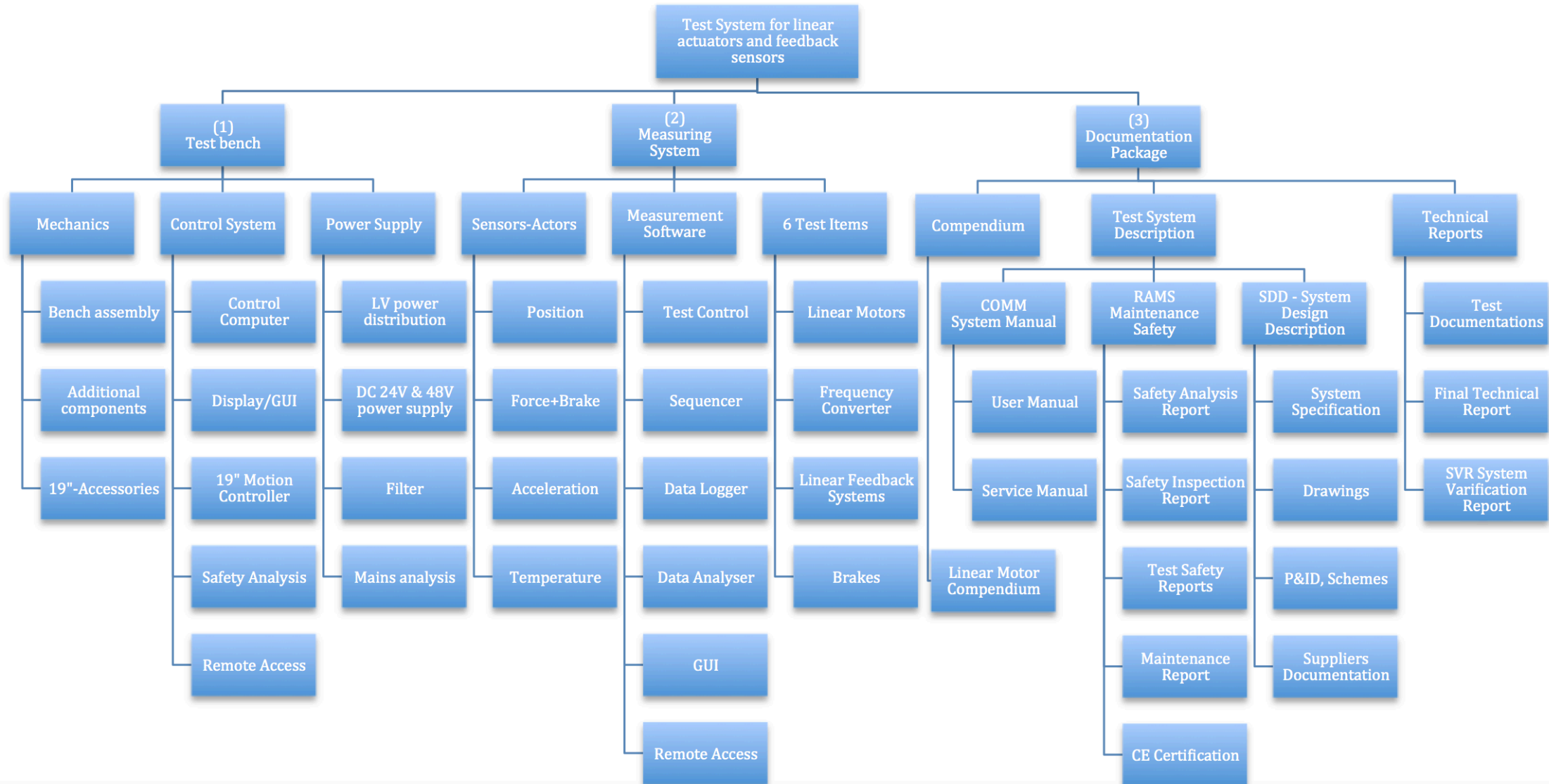


- 13.5.3.1 Management & Administration
- 13.5.3.2 Method & Technology Development
- 13.5.3.3 Motion Control Systems Development
 - 13.5.3.3.1 Generic Motion Control System
 - 13.5.3.3.2 Components for Harsh Environment
- 13.5.3.4 Pneumatic Systems Development
- 13.5.3.5 Robotics Systems Development
- 13.5.3.6 Embedded Software Engineering (EPICS support)
- 13.5.3.7 Cabling, Installation & Electr. Shielding Procedures
- 13.5.3.8 Motion Control Laboratory & Workshops

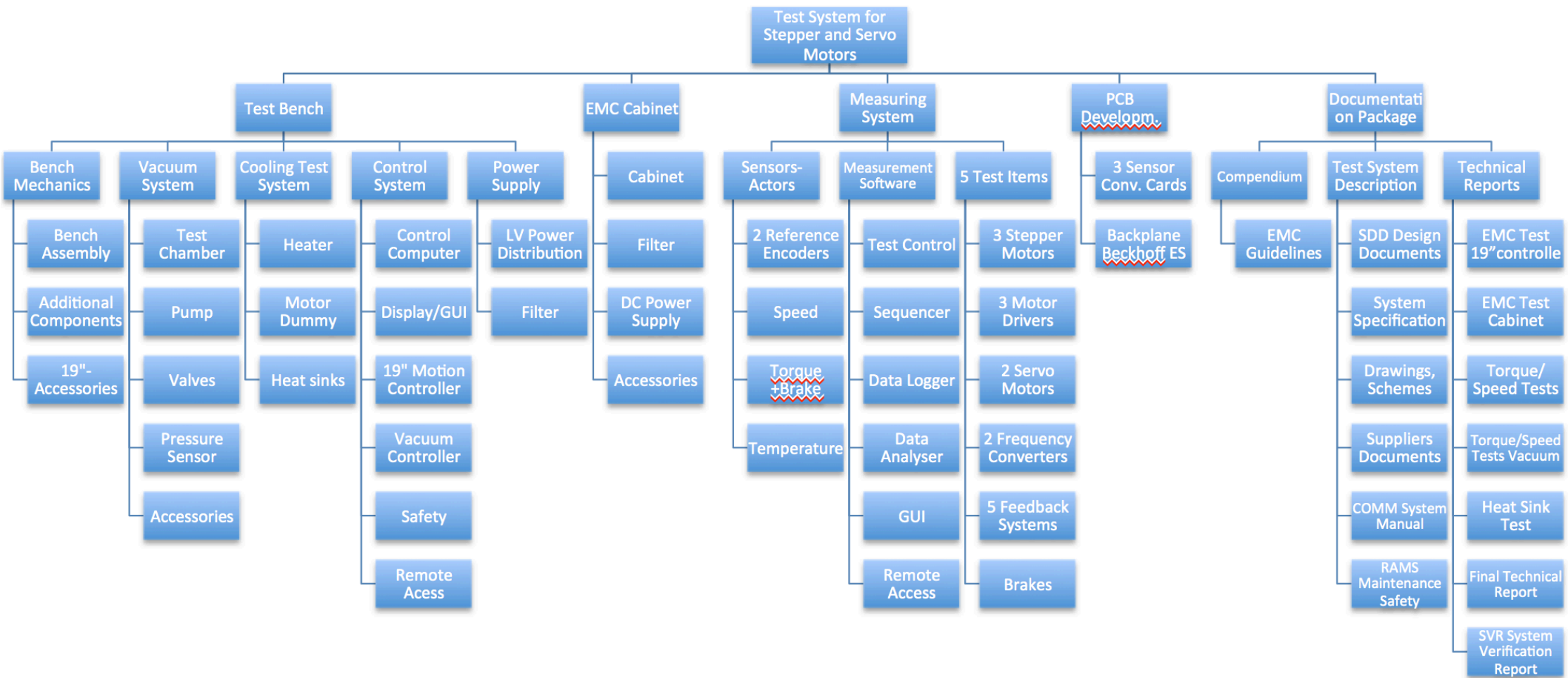
Planned in-kind contributions

No. NIK 5.3	Country	IKC Partner	Contact	WBS No.	WP description
#5	Germany	FZ Juelich	Klaus Bussmann	13.5.3.3.1.3	Test Package for Linear Motor Technology
#6	Germany	HZ Geesthacht	Jörg Burmester	13.5.3.3.1.4	Test Package for Rotary Motor Technology + EMC
#1	Switzer- land	PSI	Michel Kenzelmann	13.5.3.3.2.1	Test Series: MC Components in High Magnetic Fields
#10	Germany	FZ Juelich	Klaus Bussmann	13.5.3.5.1.1	Robotics Development I
#4	Germany	FZ Juelich	Klaus Bussmann	13.5.3.7.2.1	Electrical Cabinet: Standards Evaluation and Cabling Demonstrators

NIK5.3#5 Test Package for Linear Motor Technology – JCNS, FZ Juelich

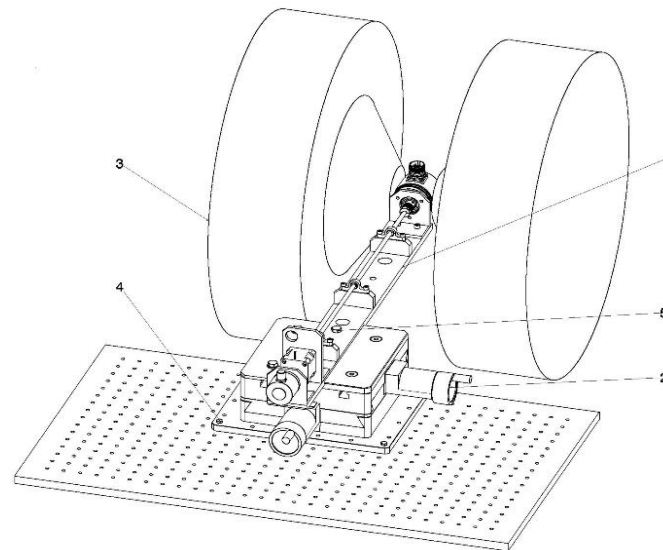
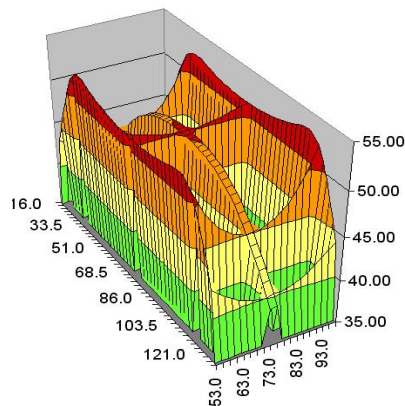


NIK5.3#6 Test Package for Rotary Motor Technology + EMC – HZ Geesthacht



NIK5.3#1 Test Series: MC Components in High Magnetic Fields - PSI

- Test Method & Environment
- Automated testing with:
 - Ramping magnetic field
 - Continuous feedback (motion and mag. field)
 - Performance (non-destructive)
- Data analysis
- **At which level of the magnetic field does the components fail?**



PROPOSAL FOR AN IN-KIND COLLABORATION

Project Title	Automation Components – Strong Magnetic Field Testing		
Proposer	Motion Control & Automation Group – ESS Lund (S)		
In-kind Partner	Laboratory for Development & Methods - Paul Scherrer Institut (CH)		

ESS project reference	13.5.3.3 Motion Control & Automation / Generic Motion Control System		
Duration	15 months	Man Power	2 FTE*
Start Date	Jan 1st 2016	Equipment	110 k€
PCC Code	130503301	Total value	326 k€

* 1 FTE = 1 MY = 1800 h

Motivation & Benefits

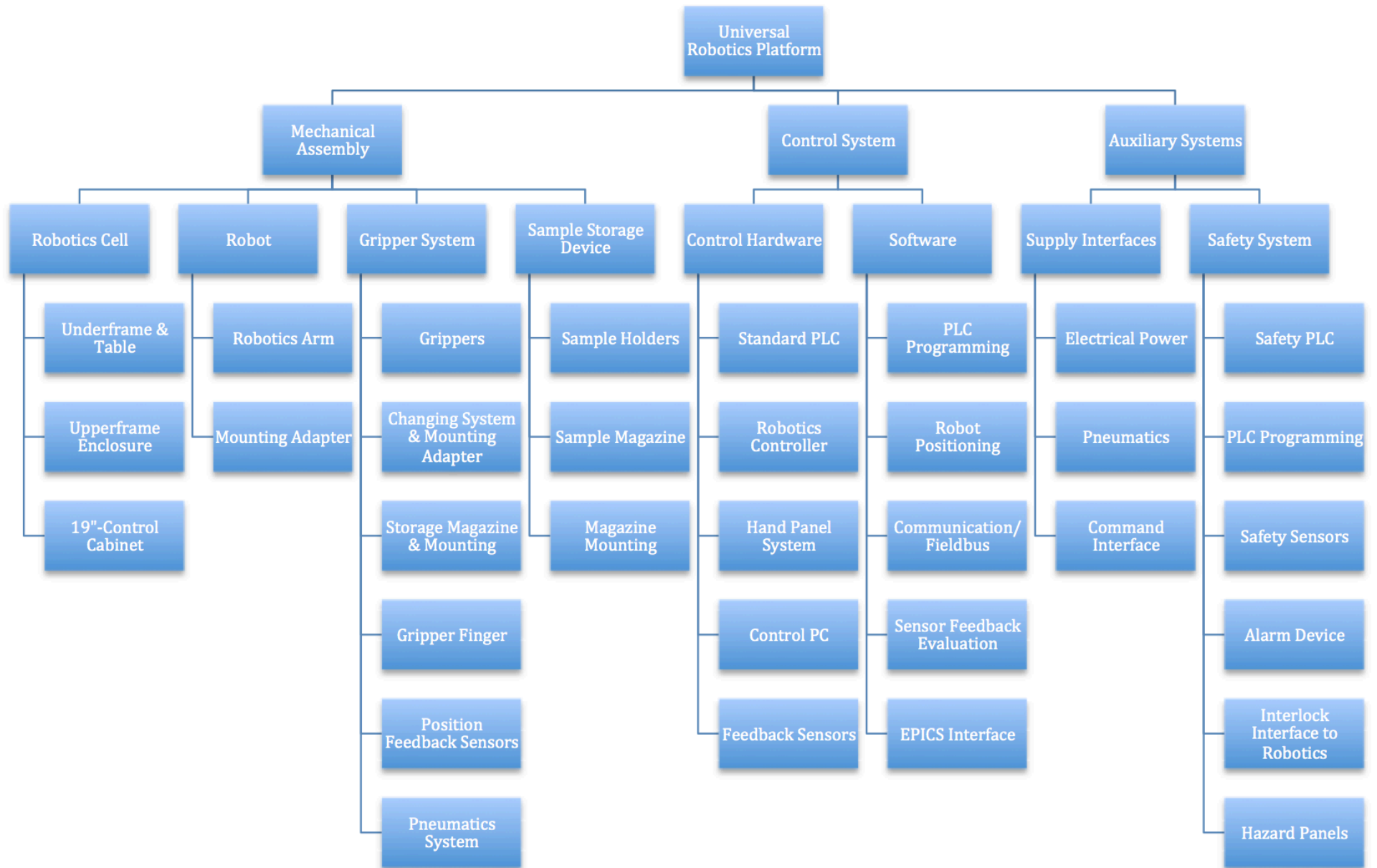
The motivation for this project is the requirement for the ESS Motion Control & Automation Group (MCAG) to evaluate the performance of a wide range of motion control components in harsh environments. Given the vast amount of evaluation work that must be carried out in preparation for future project stages, a number of evaluation & development projects will be completed at partner facilities where the experience and expertise to complete these tasks already exists. This collaborative effort will involve hardware design followed by extensive component testing.

The project will provide a wealth of data that will be of great benefit to both facilities in future designs & equipment upgrades. The project will also provide an excellent opportunity to create a platform on which information exchange and relationship development can take place across both facilities.

PSI Test Setup

NIK5.3#10 Test Series: Robotics Development

– JCNS, FZ Juelich



NIK5.3#4 Test Series: Electrical cabinets + drawings – JCNS, FZ Juelich

- Complement general ESS standards to the needs of Neutron Instrumentation
 - Writing standards documents
 - Design + build motion control prototypes (19" crate)
 - Design + build motion control built blocks (DIN rail)
 - Design + build an instrument control demonstrator
 - Design templates for Instruments drawings in E-plan
 - Writing manual for E-plan templates



PROPOSAL FOR AN IN-KIND COLLABORATION

Project Title	Electrical Installations Standards Definition and Prototyping
Proposer	Motion Control & Automation Group - ESS Lund (S)
In-kind Partner	JCNS-2 - FZ Jülich (D)

ESS project reference	13.5.3.7 Motion Control & Automation/Cabling + Installation Procedures		
Duration	15 months	Man Power	FTE*
Start Date	Jan1st 2016	Equipment	k€
PCC Code	130503701	Total value	4dk€

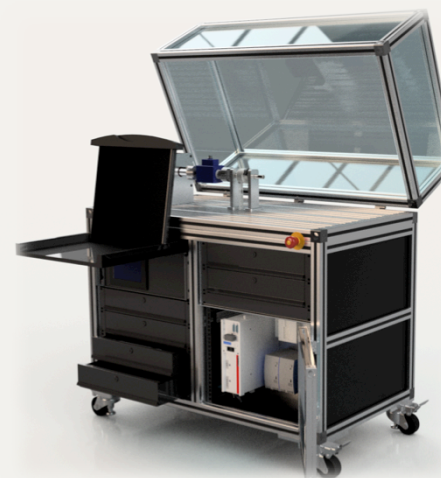
* 1 FTE = 1 MY = 1800 h

Motivation & Benefits

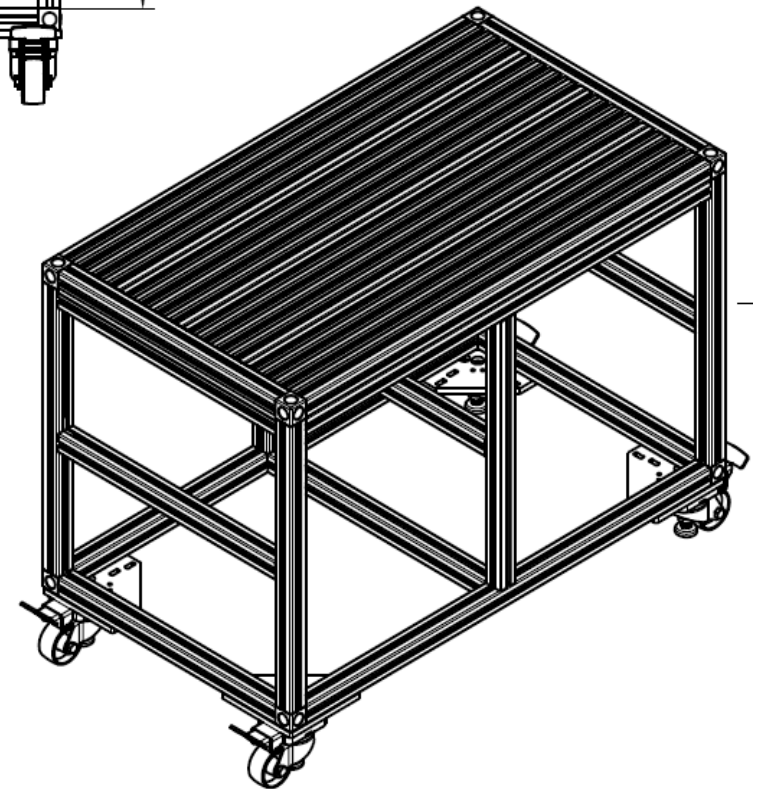
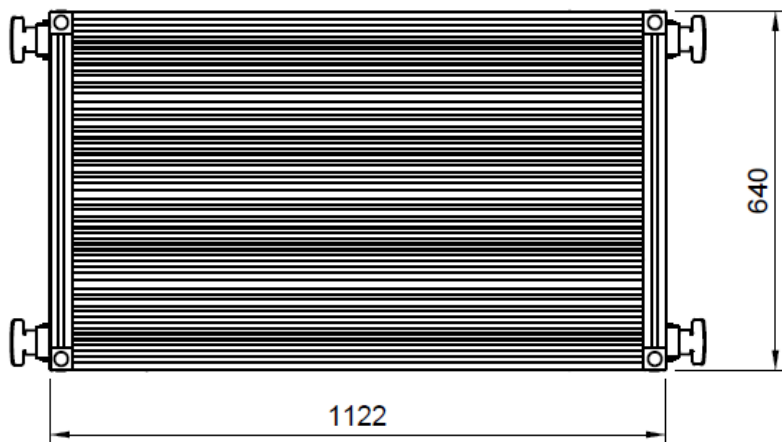
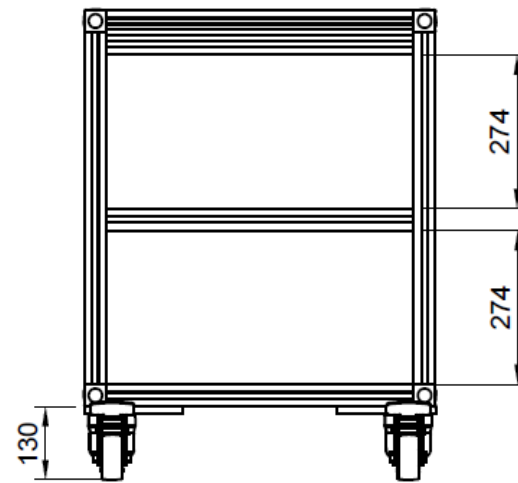
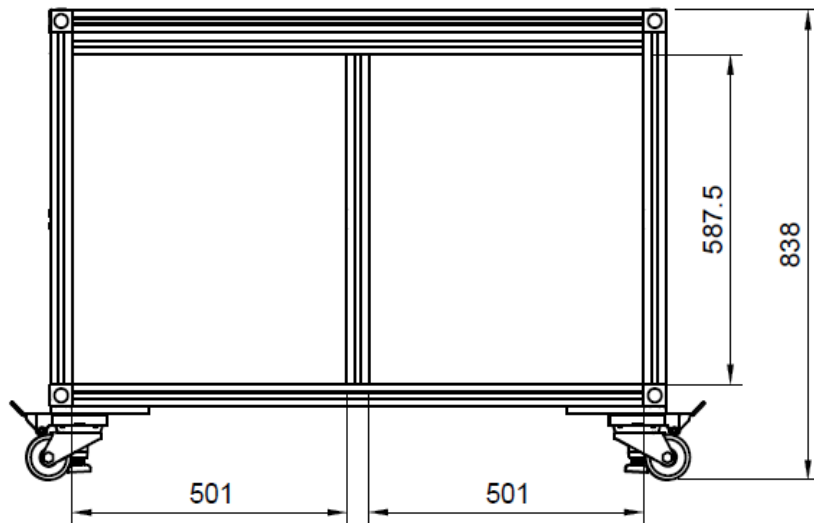
The motivation for this project is the requirement for the ESS Motion Control & Automation Group to prepare an ESS standard for Electrical Engineering installations at Neutron Scattering Instruments and deploy it to all instruments projects. Given the vast amount of evaluation work that must be carried out in preparation for future project stages, a number of evaluation & development projects will be completed at partner facilities where the experience and expertise to complete these tasks already exists. This collaborative effort will compile electrical standards and best practise in to a consistent ESS document as well as build technology demonstrators as technical implementations.

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CONCEPT



Frame Dimensions



Frame Parts List

The following are defined in terms of manufacturer/model/dimension in this drawing.

- Aluminium profiles
- 19" Rack supports
- Casters
- Brackets



PARTSLIST				
Manufacturer	Description	PartNumber	Length(mm)	Quantity
BoschRexroth	AluProfile-40x80x80	3842993193	560	2
BoschRexroth	AluProfile-40x40	3842993120	627	4
BoschRexroth	AluProfile-40x40	3842993120	587	2
BoschRexroth	AluProfile-40x40	3842993120	1042	4
BoschRexroth	AluProfile-40x40	3842993120	560	7
BoschRexroth	AluProfile-40x160	3842993143	1042	4
BoschRexroth	CornerBracket	3842529397		8
BoschRexroth	Caster/LiftingWheel	3842547890		4
BoschRexroth	CasterMountPlate	3842536902		4
BoschRexroth	40x40AngleBracket	3842529383		16
BoschRexroth	HiddenAngleBracket(10/10)	3842535571		20