EUROPEAN SPALLATION SOURCE

Motion Control & Automation

- Ph1 Costing Exercise for Instruments -

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Motion Control & Automation (MCA)

- overview -

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1. Update of MCAG activities since last IKON
    1. Generic motion controller
    2. Motion Control Workshop and Seminars
    3. New contact partners
2. MCA Checklist for TG2
3. Costing exercises
    1. SKADI
    2. DREAM
    3. NMX
    4. (BIFROST)

Motion Control & Automation (MCA)

- Steps -

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1 What do you want to Do? Define moving parts of the instruments

- Fill table of motion (raw version)
- Mark what's included in and what's excluded of MCA work package
- Move chopper axes (if any) to the chopper work package (WP)

2 How do you want to Do? Define technical solutions for axes inside the MCA work package

- Identify axes that are covered by the Generic Motion Control. Finalise the Table of Motion restricted to these axes.
- Identify axes that are covered by Motion Control with high volume of axes. Sketch the technical solution to be able to budget. Include potential development work.
- Identify motions that are covered by Special Purpose Motion Control. Sketch technical solution and define what part is in the MCA WP.

3 How much does it cost? Budget preparation

- Equipment
- Manpower

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- included, excluded -

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1 Included

- Pneumatic axes
- Fixed installations of sample environment
- Equipment: Motion Control Electronics, Racks etc.

2 Excluded

- Chopper axes >> Chopper Group
- Vacuum valves like gate valves >> Vacuum Group
- Mobile sample environment equipment >> SE Group

3 To be decided where to budget

- Equipment: Cables, connectors, motors, sensors etc.
- Installation

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- How to calculate equipment?-

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	A	B	C	D	E	F	G	H	I	J	K
1	Instrument										
2	Rev.	1									
3	Axis	Device Description	Motion Type	Actuator Type	Accuracy (mm/°)	Vacuum	Location	Distance from moderator (m)	Notes / Comments	Cost for motors, encoders, switches,	Cost for Electronics
4	1	Bispectral switch	Translation	Electrical	0,1	Atmosphere	Bunker	6		2000	1500
5	2	Bispectral switch	Rotation	Electrical	0,01	Atmosphere	Bunker	6		9000	2500
6	3	Heavy shutter 1	Translation or Rotation	Pneumatic	0,01	Rough Vacuum	Bunker	22	Slope for horizontal, Safety iussue?	2000	1000
7	4	Slit 1	Translation	Electrical	0,1	High Vacuum	Cave	75,5	in / out, Piezo	4000	2500
8	5		Translation	Electrical	0,1	High Vacuum	Cave	75,5	in / out, Piezo	4000	2500
9	6		Translation	Electrical	0,1	High Vacuum	Cave	75,5	in / out, Piezo	4000	2500
10	7		Translation	Electrical	0,1	High Vacuum	Cave	75,5	in / out, Piezo	4000	2500

1. Table of Motion is the key document (example DREAM)
    1. Use an average number for equipment for each axis
    2. This number varies according to the requirements (Accuracy, radiation, technology)
    3. Don’t forget cabinets, cables etc.
    4. MCA Group supports you in finding these numbers

Motion Control & Automation (MCA)

- How to calculate manpower?-

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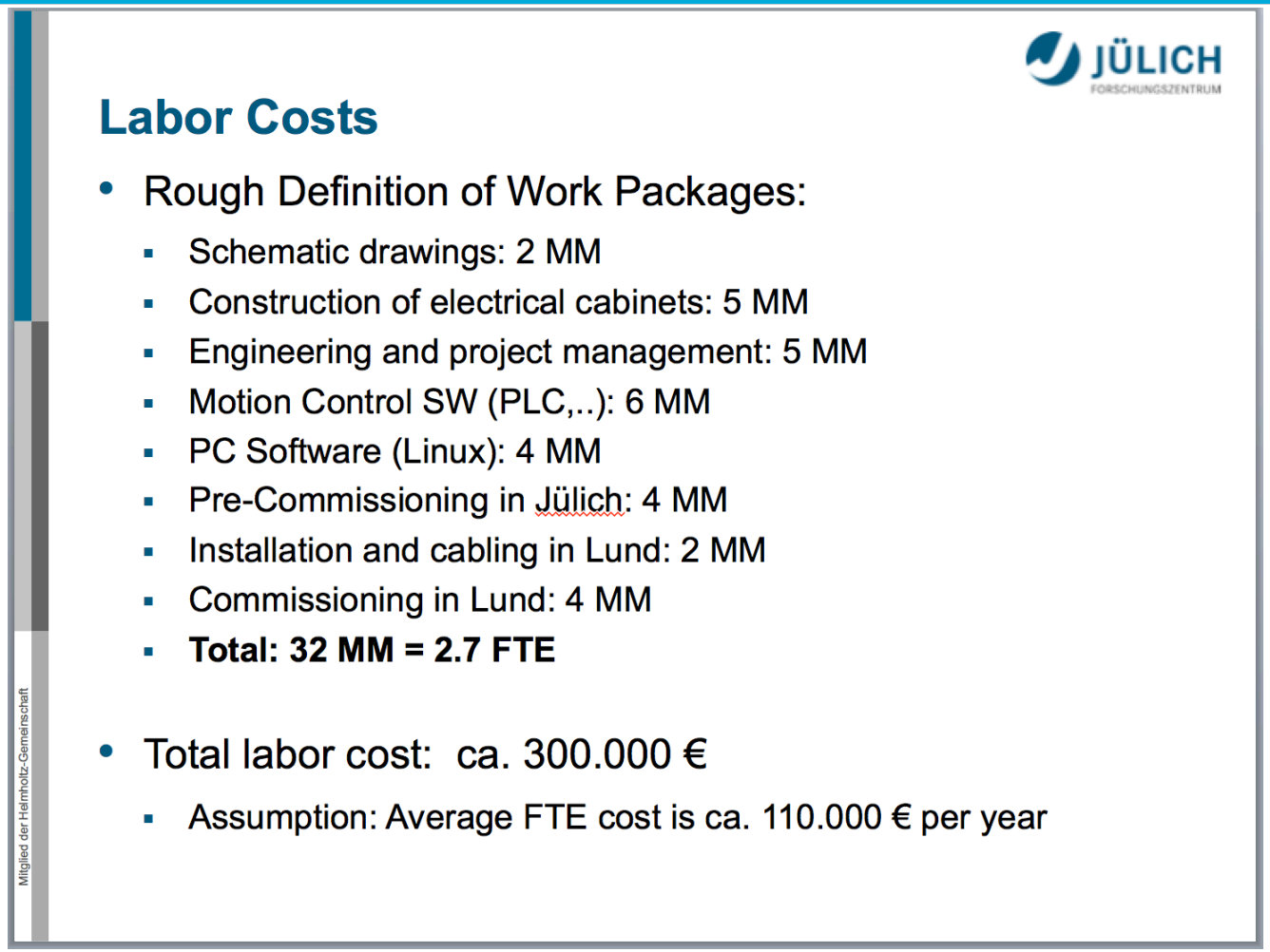


JÜLICH FORSCHUNGSZENTRUM

Labor Costs

- Rough Definition of Work Packages:
  - Schematic drawings: 2 MM
  - Construction of electrical cabinets: 5 MM
  - Engineering and project management: 5 MM
  - Motion Control SW (PLC,..): 6 MM
  - PC Software (Linux): 4 MM
  - Pre-Commissioning in Jülich: 4 MM
  - Installation and cabling in Lund: 2 MM
  - Commissioning in Lund: 4 MM
  - **Total: 32 MM = 2.7 FTE**
- Total labor cost: ca. 300.000 €
  - Assumption: Average FTE cost is ca. 110.000 € per year

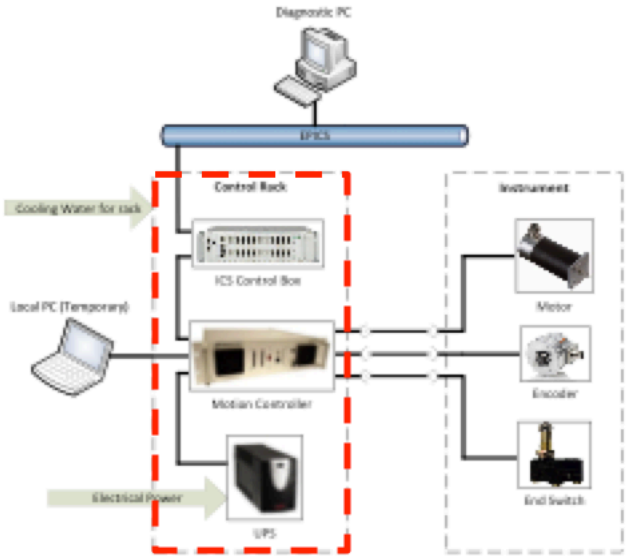
Mitglied der Helmholtz-Gemeinschaft

1 Example SKADI

- Taking numbers from previous instruments projects and adapt them

Motion Control & Automation (MCA)

- How to calculate manpower?-



Generic Motion Control 13.6.3.12.1.1	Activity	Hours	Euro
	Project management / meetings	161	9 660
	Support and review of mechanical design *) **)	43	2 580
	Support of procurement ***)	43	2 580
	Factory Acceptance Test	112	6 720
	Site Installation Test	84	5 040
	Electrical design/Custom programming	70	4 200
	Schematic drawings (E-Plan)	70	4 200
	Programming/Commissioning	224	13 440
	EPICS integration	112	6 720
	Documentation	42	2 520

Calculations base on per axis estimates scaled up with 17 axes

02 Management	03 Design	04 Procurement	05 Installation	06 Cold commissioning	**Total (Euro)**
9660	17700	9300	13 440	5040	**57600**

1 Example NMX

- Design + Work breakdown and estimations on that level
- MCA Group supports you in this tasks

Workflow

- Provide guidelines and templates to instrument team
- Receive completed Table of Motion (ToM)
- Feedback and questions – agree in final version of ToM
- Receive documentation for scope setting meeting
- Assess documentation according to appendix A of ESS-0049514
- Meeting (Skype), discussion and final agreement of assessment list (TG2 minus 4 weeks)
- Forward assessment list to ESS management as input to the TG2 review (TG2 minus 2 weeks)

Questions?