JÜLICH
FORSCHUNGSZENTRUM

MCA Costing Exercise - SKADI

14.09.2016 | Harald Kleines

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Boundary Conditions for the Calculation

- Mechanical Construction incomplete =>
  - Number of Axes not clearly defined
  - Actuators and Sensors not properly defined
  - Mechanical construction is continuously changing
- Motion Control list of allowed devices is under development
- No final decision on the allowed electronics components
- Some open issues in the interface between ESS and in kind partners => consequences for labor costs

=> Only rough estimation is possible

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General Approach

- Starting Point: MCA Table defined by the Motion Control Group
- Extend it by two additional columns for
  - Sensors (switches, encoders, …) and actuators (motors, pneumatic elements,…)
  - Electronics (PLCs, motor controllers, frequency converters, SSI-modules, connectors, cables
- Assume costs according to axis type (pneumatic, stepper motors with or without encoders, AC drives,….)
- Fixed costs (racks, PLCs,…) are linearly distributed
- Define the labor costs according to work packages and assume an average price per FTE

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MCA Table

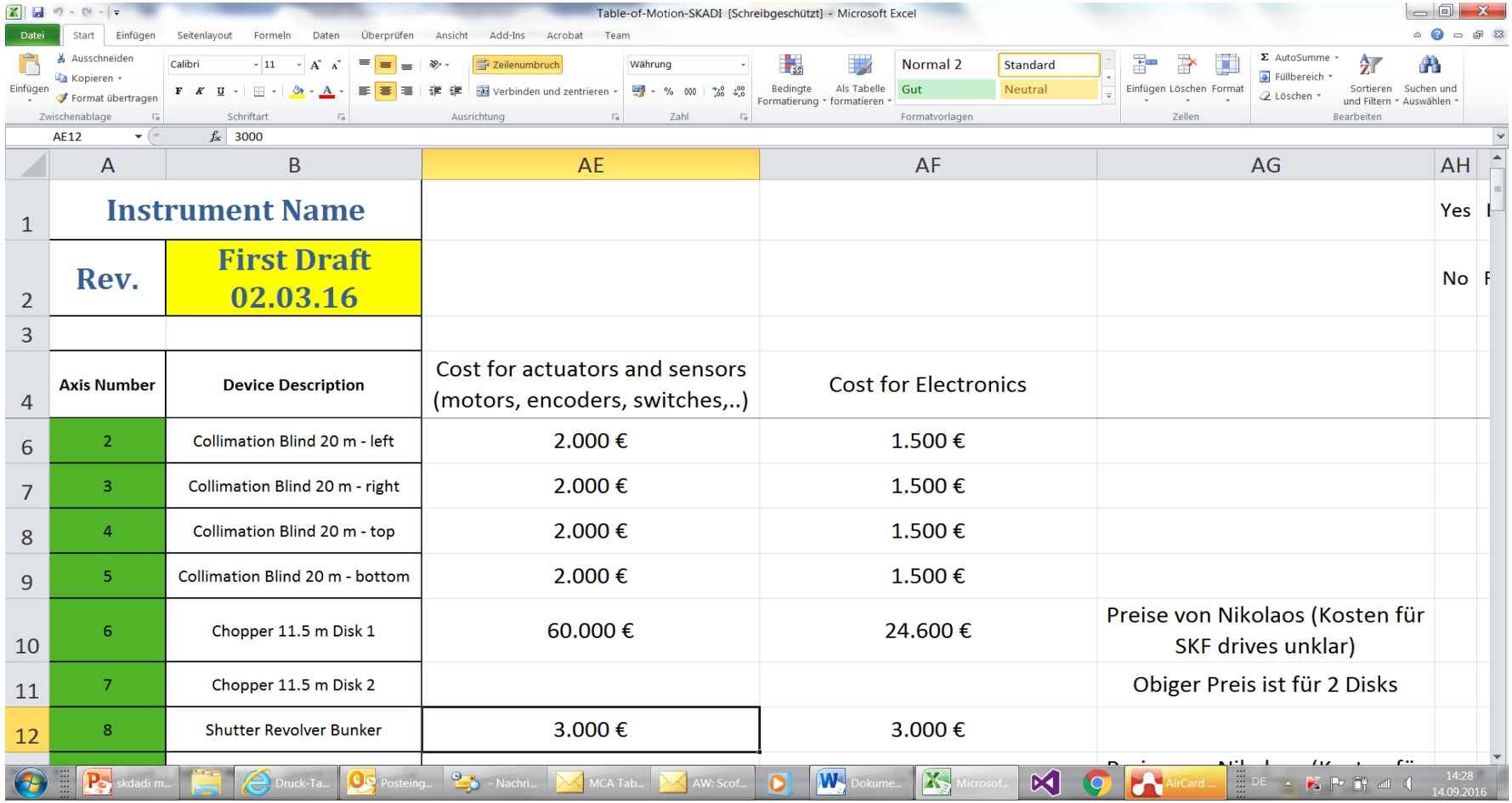

Table-of-Motion-SKADI [Schreibgeschützt] - Microsoft Excel

AE12 | 3000

	A	B	AE	AF	AG	AH
1	Instrument Name					Yes
2	Rev.	First Draft 02.03.16				No
3						
4	Axis Number	Device Description	Cost for actuators and sensors (motors, encoders, switches,..)	Cost for Electronics		
6	2	Collimation Blind 20 m - left	2.000 €	1.500 €		
7	3	Collimation Blind 20 m - right	2.000 €	1.500 €		
8	4	Collimation Blind 20 m - top	2.000 €	1.500 €		
9	5	Collimation Blind 20 m - bottom	2.000 €	1.500 €		
10	6	Chopper 11.5 m Disk 1	60.000 €	24.600 €	Preise von Nikolaos (Kosten für SKF drives unklar)	
11	7	Chopper 11.5 m Disk 2			Obiger Preis ist für 2 Disks	
12	8	Shutter Revolver Bunker	3.000 €	3.000 €		

- Hint from MCA Group:
  - Do not include chopper axes
  - Do include safety axes (shutters,…)
- Overall sum: ~245.000 € (25 Axes, ~75.000 €, without chopper)

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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: ~300.000 €
  - Assumption: Average FTE cost is ~110.000 € per year

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Time Line

- Mapping to the timeline is quite open
- => possible approach: linear distribution (see below)

	01 Phase 1	02 Project Management & Integration	03 Design	04 Procurement & Fabrication	05 Installation	06 Cold Commissioning	Total
07 Motion Control and Automation	€ 0	€ 77 100	€ 77 100	€ 313 700	€ 77 100	€ 0	**€ 545 000**

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