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Costing Plan for the IDS - Neutrino Factory

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Overview

- Towards a common cost evaluation procedure
  aims, project workflow
- Current work breakdown structure
  discussion on project breakdown levels
- Costing panel and attributions
- Study case: the 900 MeV muon accelerator
- Conclusions

Towards a common cost evaluation procedure

aims for this IDS Plennary meeting (urgent!,...not a joke)

- agree on the most suitable work breakdown structure which should be ready for cost evaluation in as much detail as possible;

- decide who is responsible for gathering and storing information for each project unit

- realize the development status on the natural workflow diagram, individually;

- decide which are the highest design/performance risk components and sort them according to their impact on downstream units;

- understand that it's time to pass from ideal design to proper technical design (no serious costing can be done without);

- for now leave apart discussions on site specific/user operation/maintenance costs but rather focus the machine anatomy from head to tail.

project workflow

- as with any project the Neutrino Factory evolves a few natural stages

1. physics requirements	← experimental/theoretical scientists
2. ideal machine design	← machine designers
3. realistic hardware design	← physicists/engineers
4. performance re-check	← machine designers
5. technical design	← engineers
6. costing	← managers

...

- good costing follows efficient design work which has been done to serve clear goals;
- there are many uncertainties and errors passing through all stages from GOAL to PRICE.

Current work breakdown structure

- a preliminary document has been prepared and is available on web in order to be commented, upgraded and used later;
- it is a four levels structure intended to be modular so that costs become also a function of beam path coordinate/energy within each level and for the whole project as well;

level 1	level 2	level 3	level 4
NEUTRINO SOURCE			
proton driver	large standalone systems initially envisaged by machine designers	well-defined structures engineered to perform number a limited number of functions	specific hardware items designed and operated independently
target			
muon front-end			
muon linac			
muon RLA1			
muon RLA2			
muon FFAG			
muon decay ring			
NEUTRINO DETECTOR			
...			

Costing panel and attributions

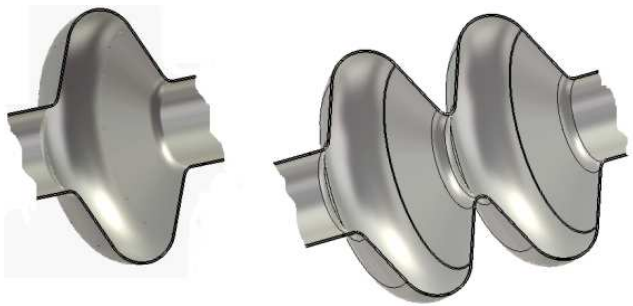
attributes:

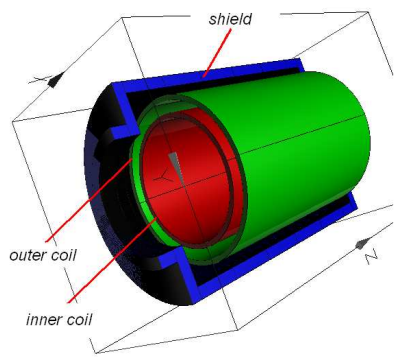
- asses the status of the physics and engineering design (it requires the experimental goals be clear);
- organize/urge people within the unit to approach their work in a technical way;
- figure out levels within the unit and categorize everything complying with the work breadown structure;
- evaluate possibilities to have a cheaper design;
- contact manufacturers and ask detailed price quotations (material, manufacture, consumption etc);
- consult experts(engineers) who have designed items (*level 4*) for other projects and make sure the our design doesen't miss important aspects;

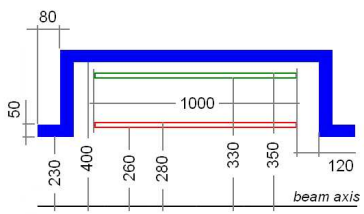
PROJECT UNITS	RESPONSIBLE PERSON
proton driver	
target	
muon front-end	
muon linac	Cristian Bonțoiu
muon RLA1	Cristian Bonțoiu
muon RLA2	Cristian Bonțoiu
muon FFAG	
muon decay ring	
neutrino detector	

- upload price quotations or scaled pice using the CERN costing tools and communicate with the those resposible for the costing of the other units;

Study case: the 900 MeV muon accelerator







- initial lattice consists of 25 SC (two-shell) solenoids and 66 SC RF cells;
- simulations based on ideal (simplified) elements shows that the target energy is reached and beam transmission is very good;
- realistic desing of cavities and solenoids apart from bringing technical issues showed that half of the superonductors in the solenoids can be spared and that the initial iron shield needs to be modified;
- realistic tracking based on fieldmap showed that 22 more RF cells are needed to reach 900 MeV

Conclusions

- it is important to rely mostly on technology available today in order to keep low risks;

- it is necessary to have a close connection with labs currently building/designing/costing facilities (for ex. with the SPL group at CERN)

- we must have one live-document database which can be modified by a limited number of people (project unit responsible persons) using the CERN costing tool;

- for each item on *level 4 or level 5* it is preferable to go for price quotations from manufacturers rather than for price scaling;

- cost variations in time, as well impact of ordering large-multiplicity items should be investigated later by a manager;

- edit a costing document together.