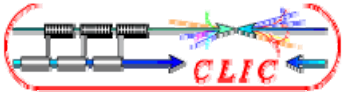


CLIC workshop
" Technical Issues, Integration & Cost "
working group
Supporting System

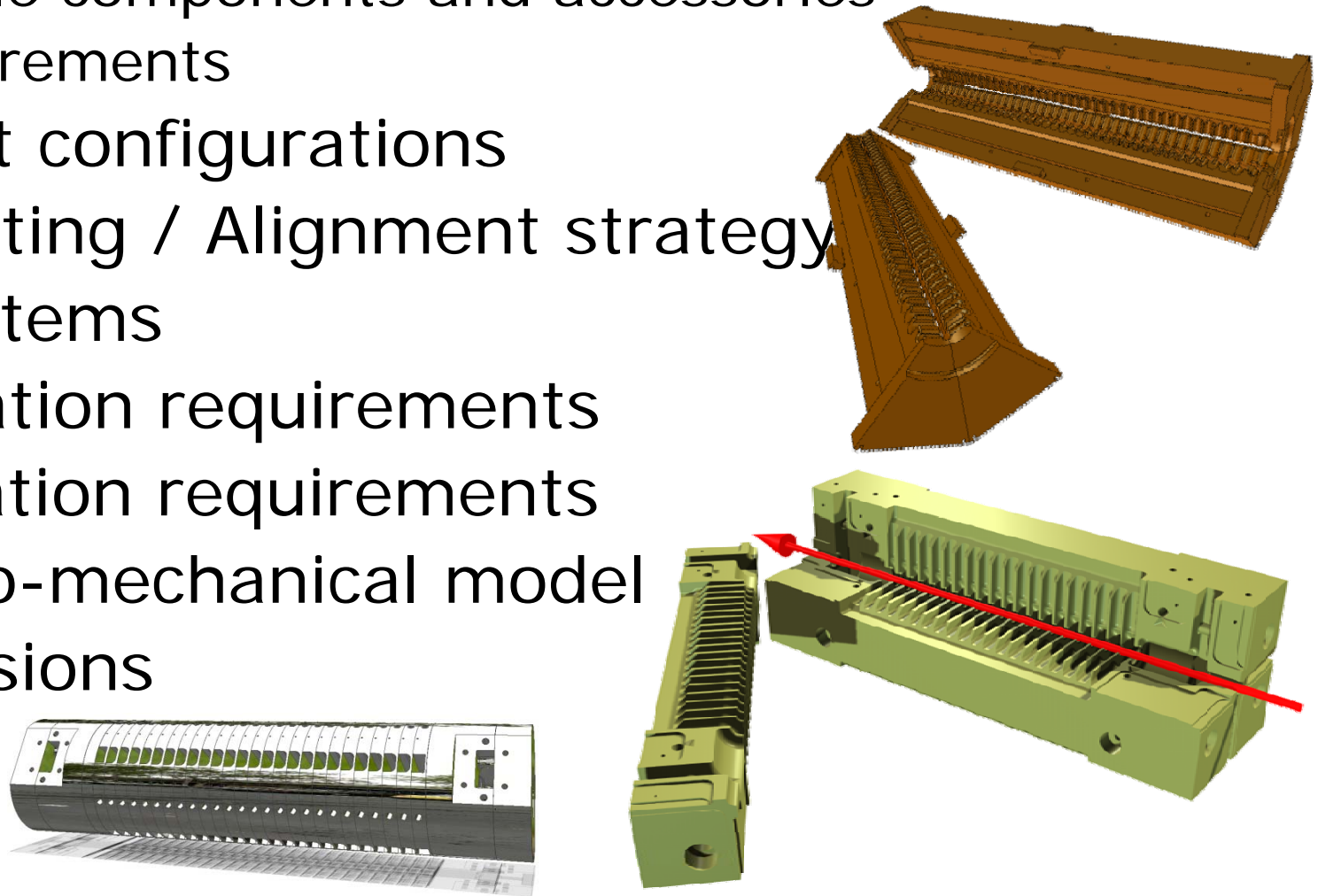
Risto Nousiainen

16.10.2008



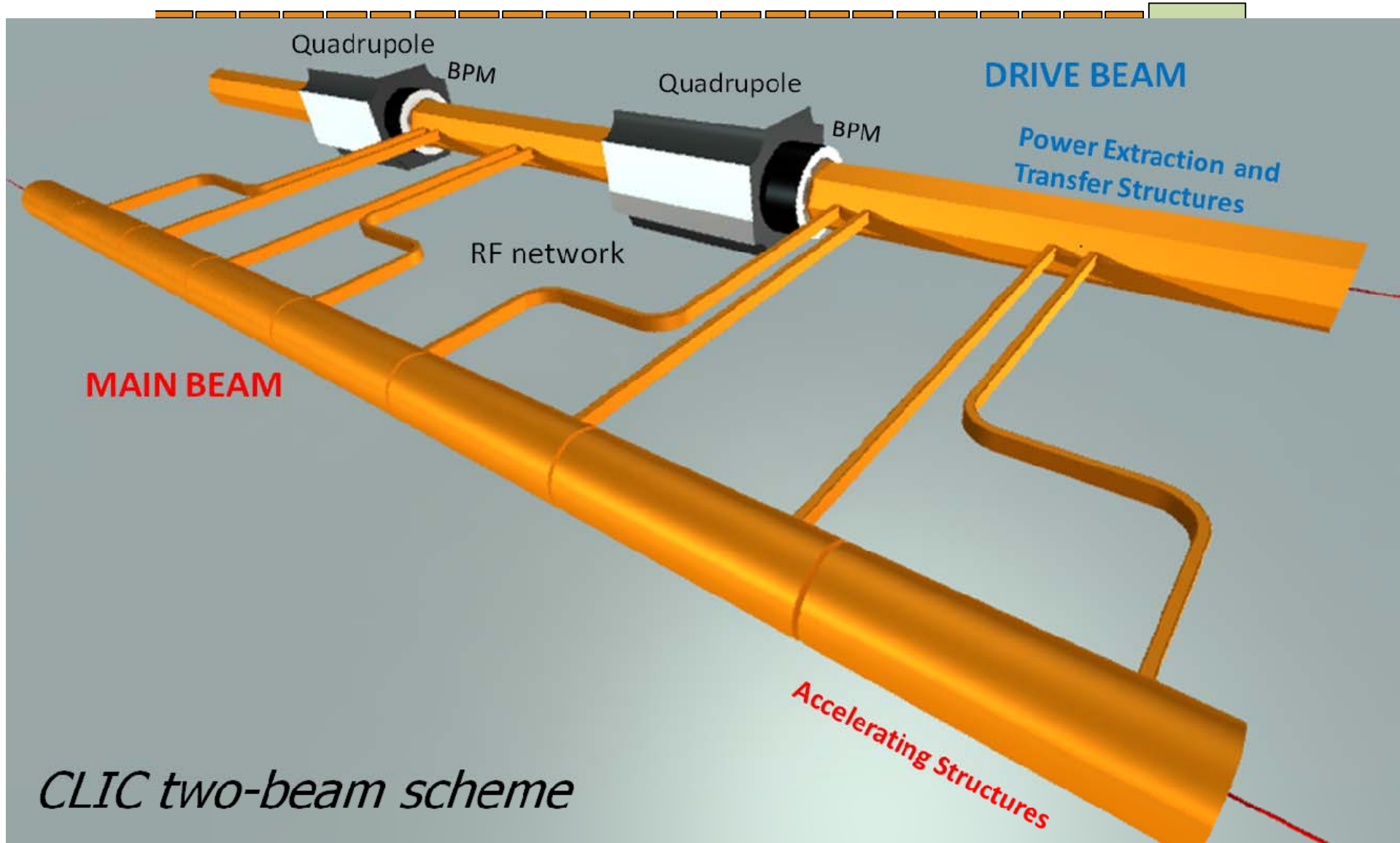
Outlook

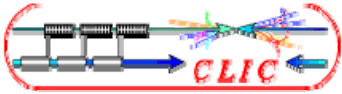
- Supporting system
 - Module components and accessories
 - Requirements
- Current configurations
- Supporting / Alignment strategy
- Subsystems
- Installation requirements
- Integration requirements
- Thermo-mechanical model
- Conclusions





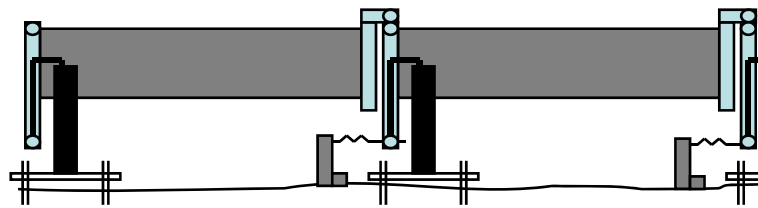
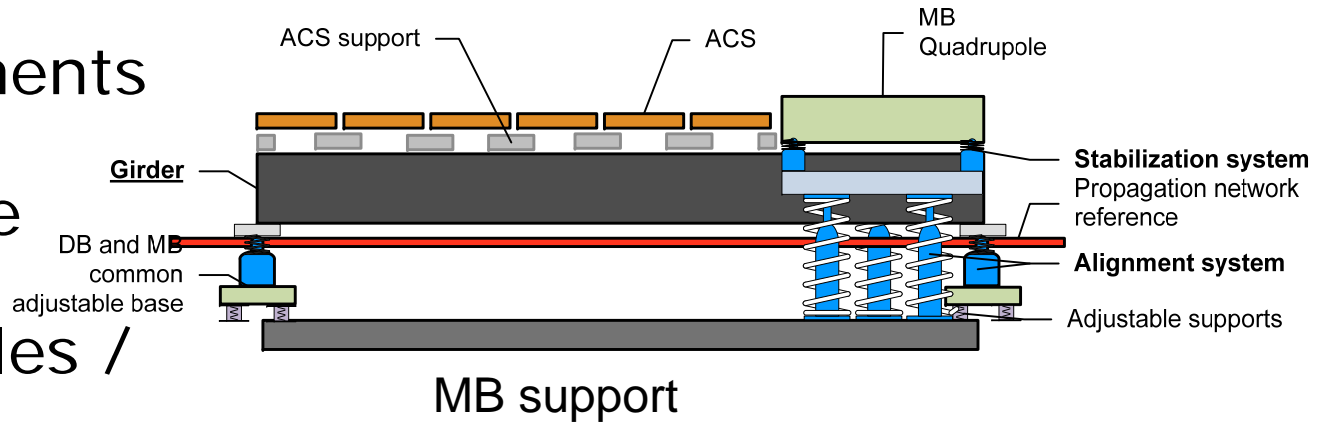
Supporting scheme





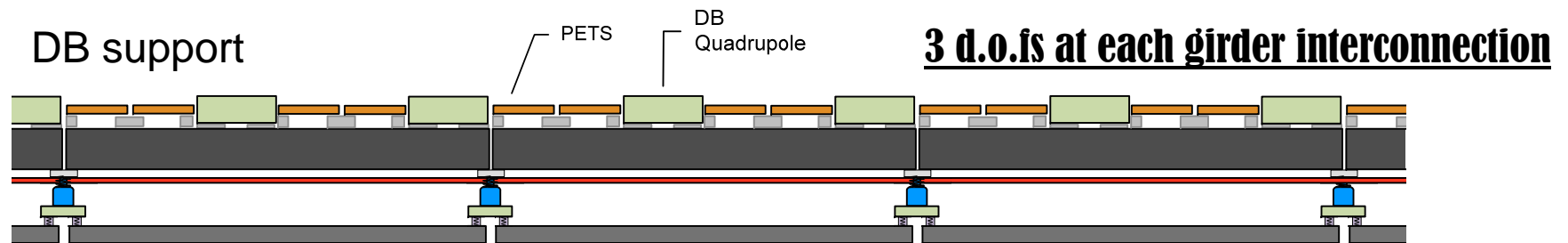
Supporting system

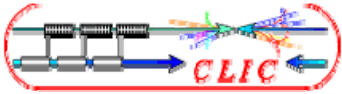
- Main components
- 1 + 4 module types
- 10000 modules / linac



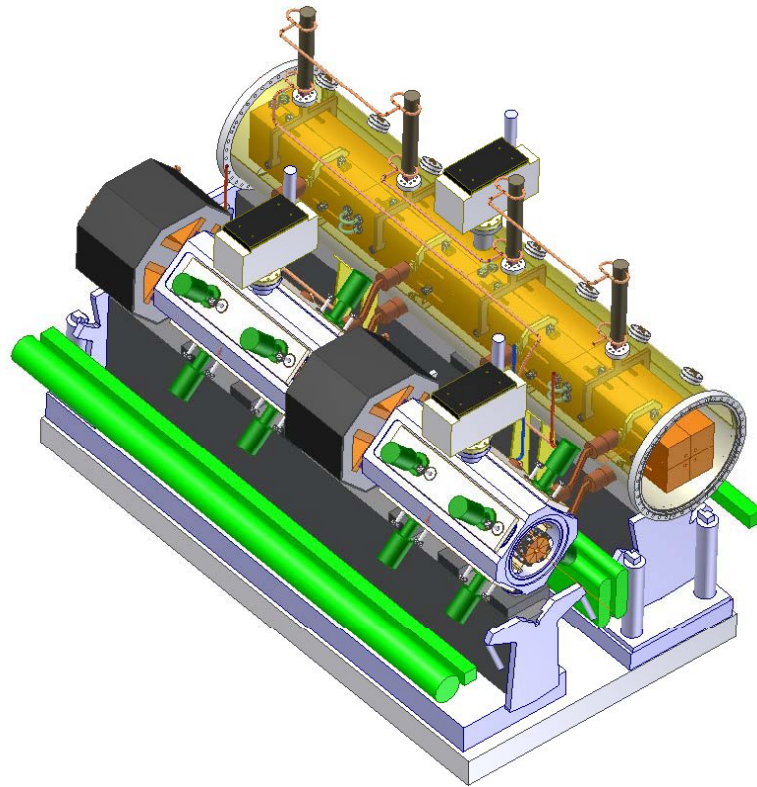
Component	Tolerance (1 s)
ACS	14 mm (PA)
PETS	31 mm (PA)
Main beam quadrupole	17 mm (PA)
BPM for main beam quadrupole	14 mm (PA)
Relative position of quad. and BPM	5 mm (BBA)

PA = pre-alignment, BBA= beam-based alignment

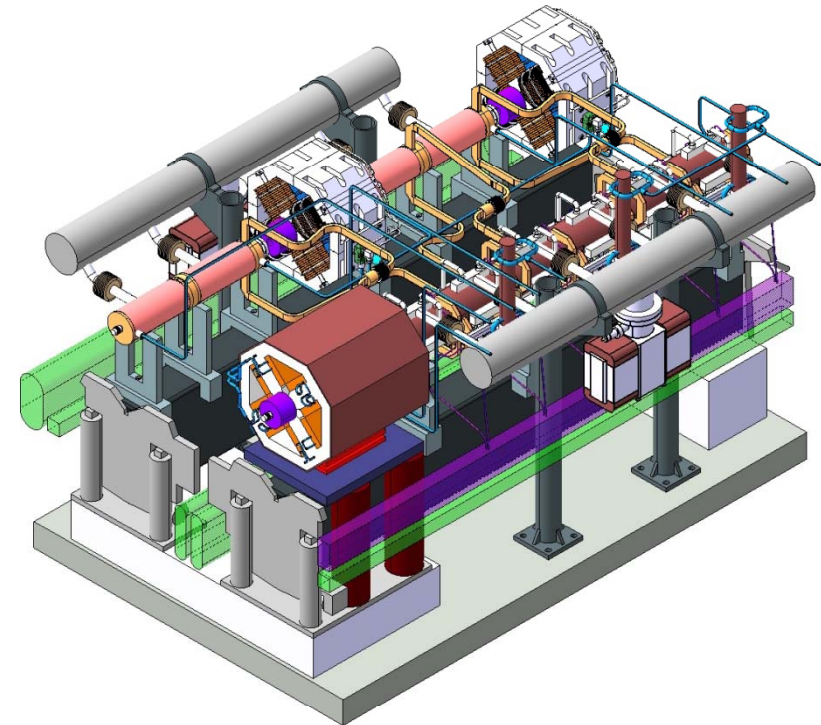




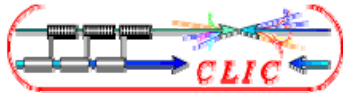
Current Configurations



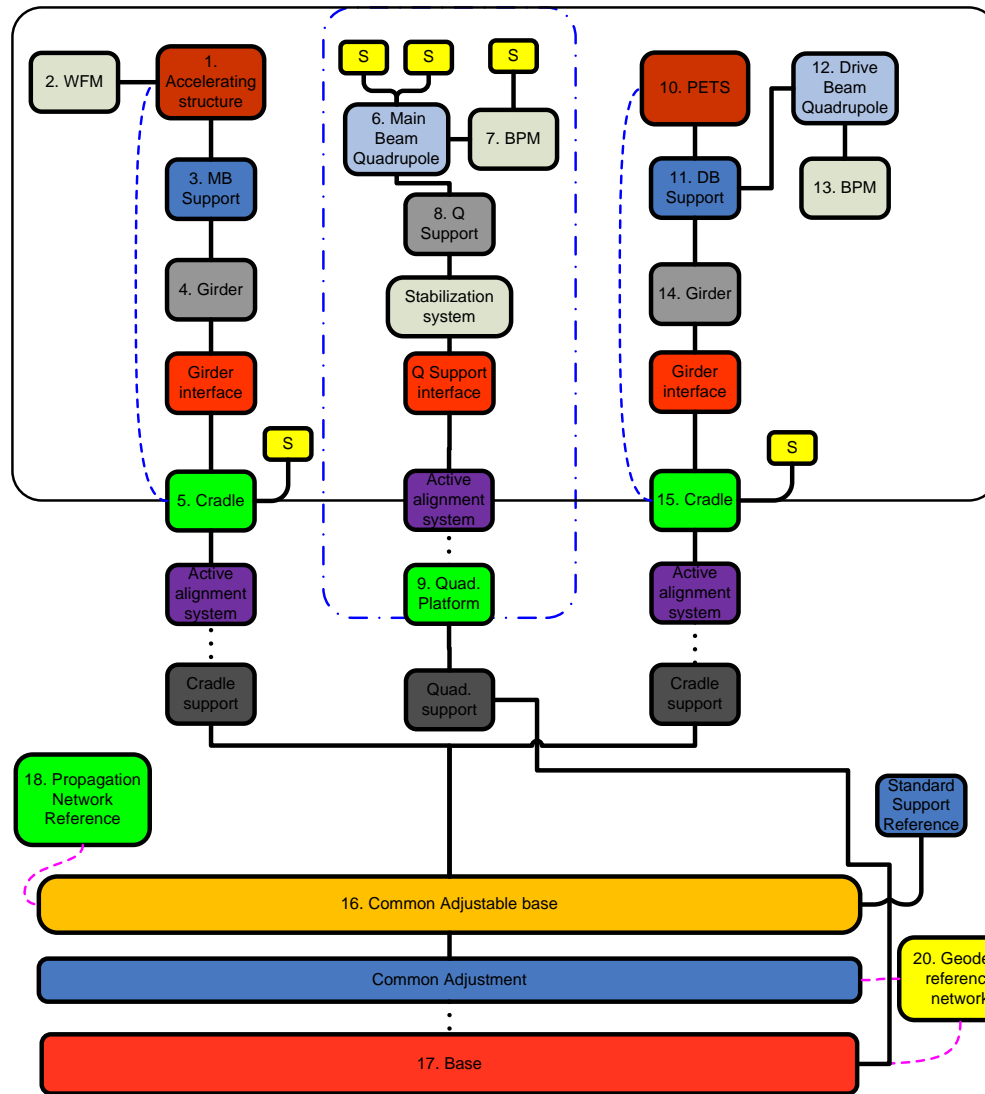
TANK



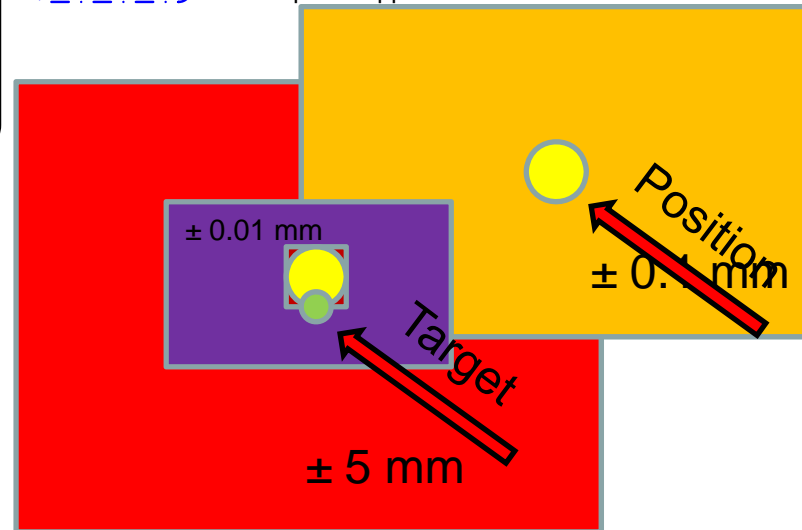
SEALED



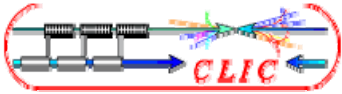
Alignment/supporting strategy



- Mechanical contact
- - - Adjustment / Reference information
- Mechanical Adjustment
- - - Mechanical reference measurement
- Accelerator Support
- - - Quadrupole Support

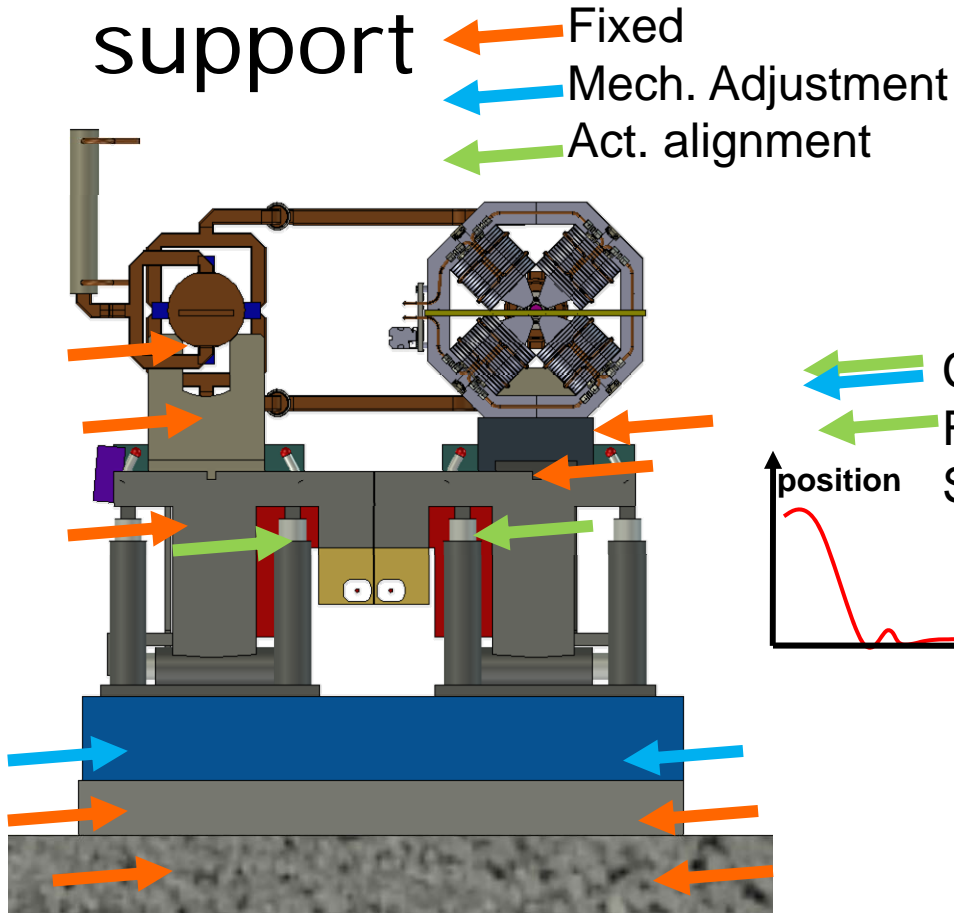


Same ext. reference for each sub step!!!

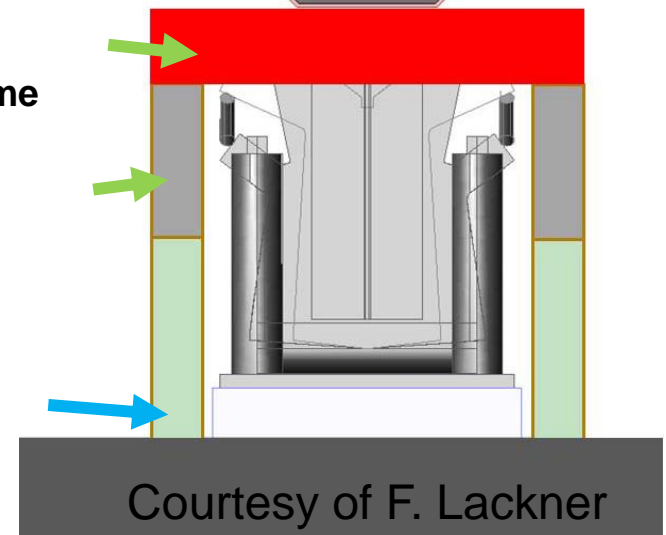
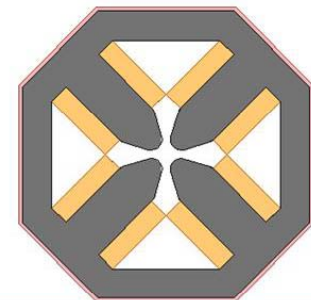
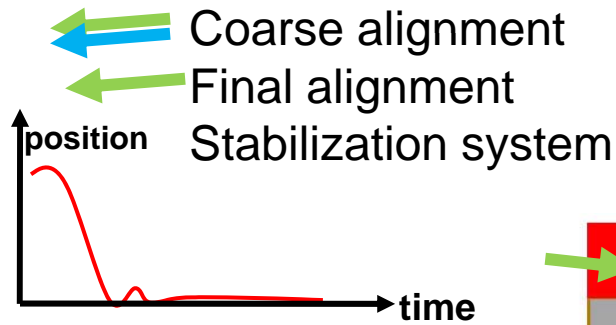


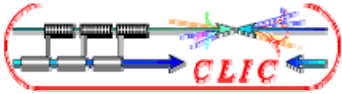
Subsystems

- MB support & DB support



- MB quad support
 – Developed in collaboration with TS-MME

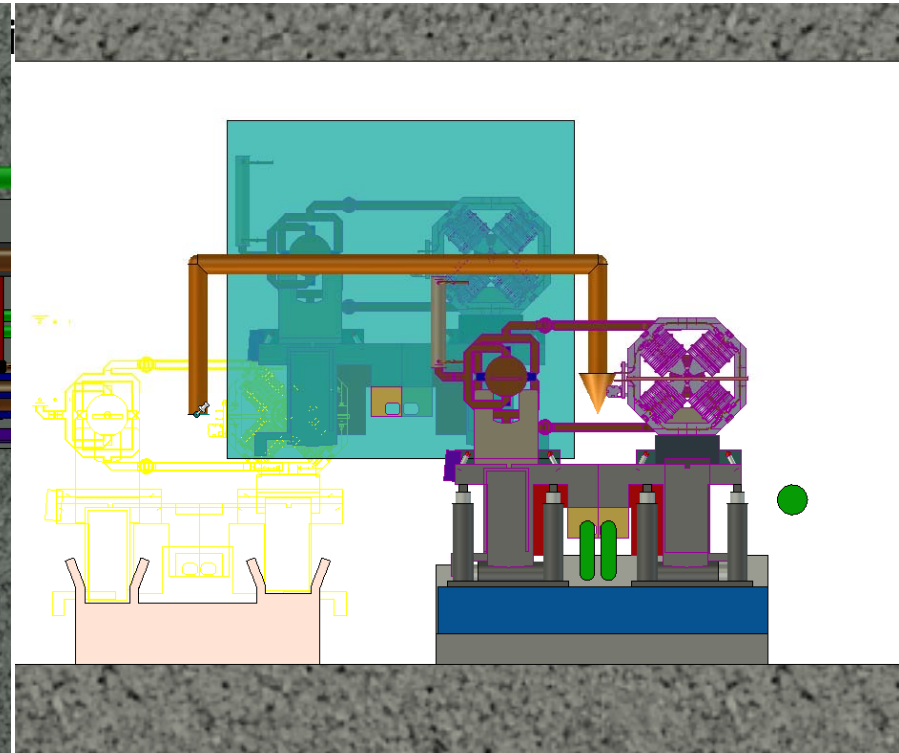
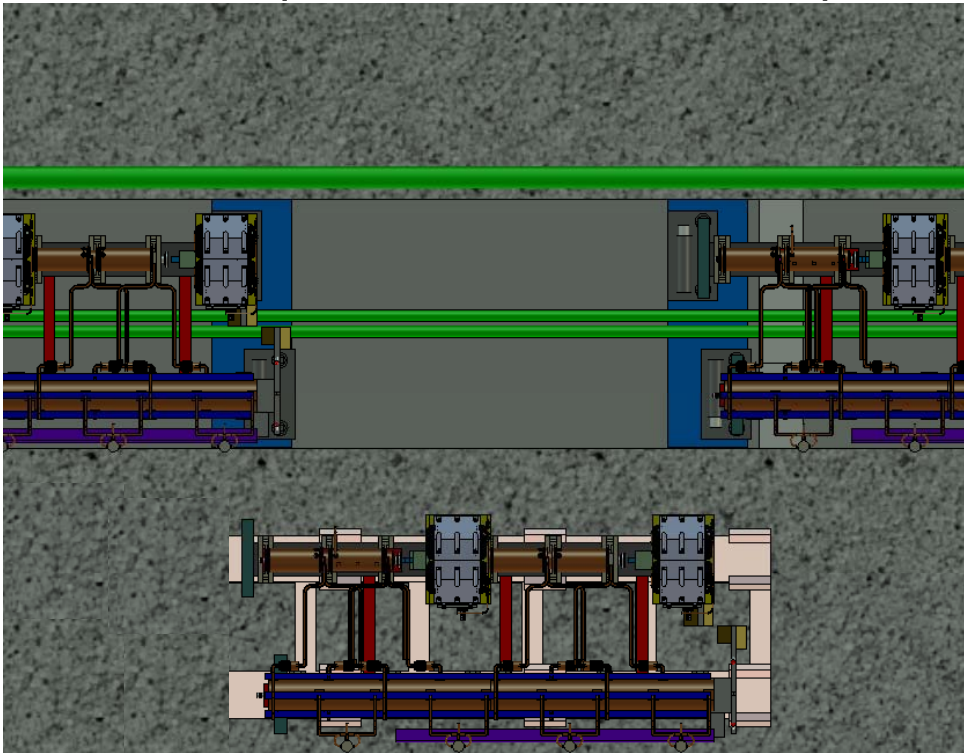




Assembly, Transport and Installation requirement

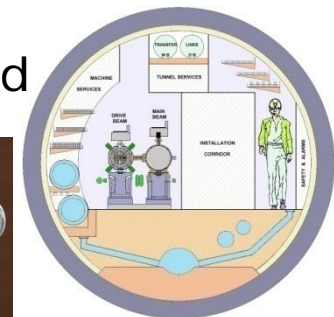
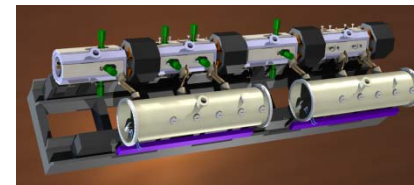
- Alignment accuracy should not be directly a function of module installation precision
- Non sequential installation required

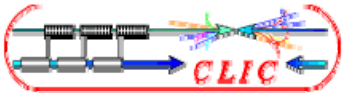
Do what you can at surface!!



- Development of detailed concept for installation
- Strategy of assembly / transportation / installation developed with TS

Risto Nousiainen,
16.10.2008

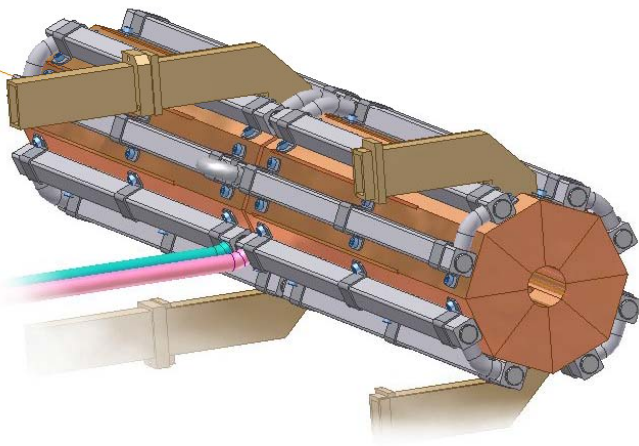
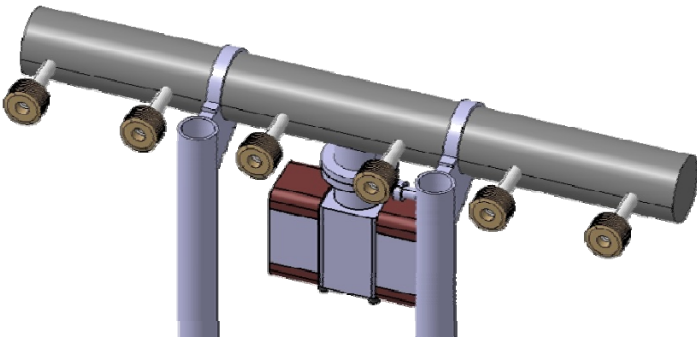
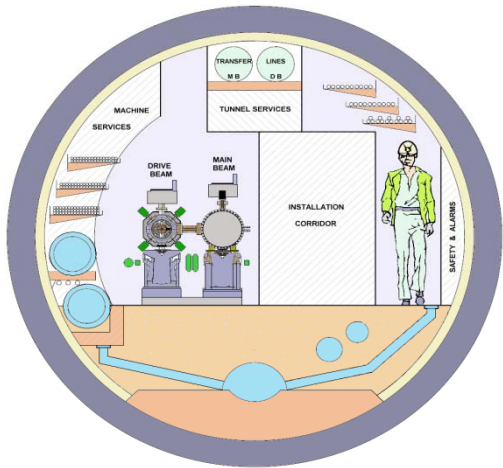
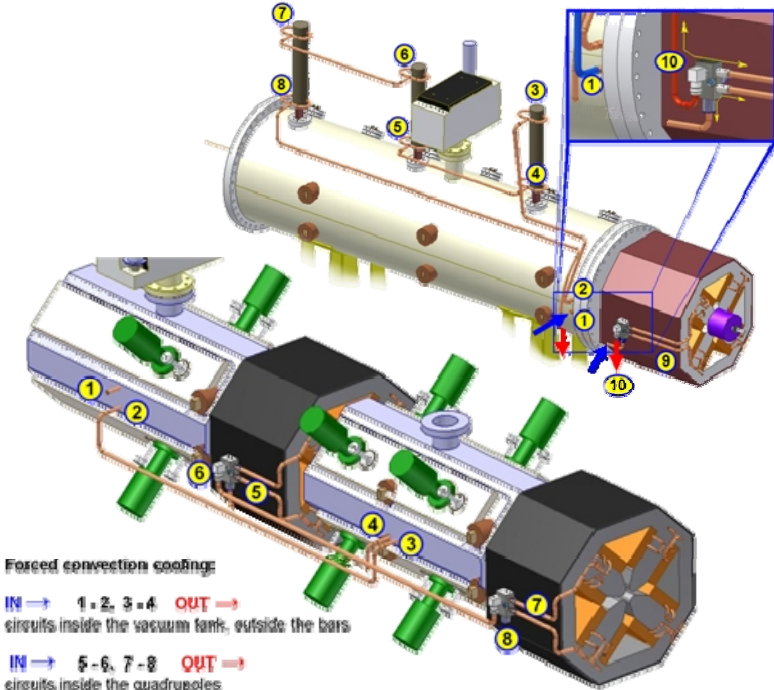
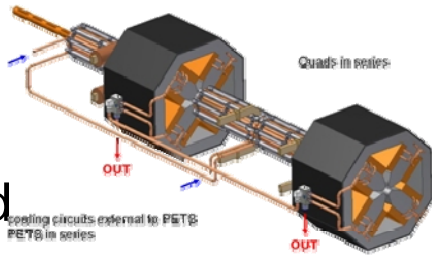
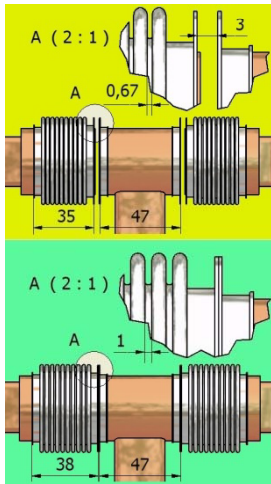




Integration requirement

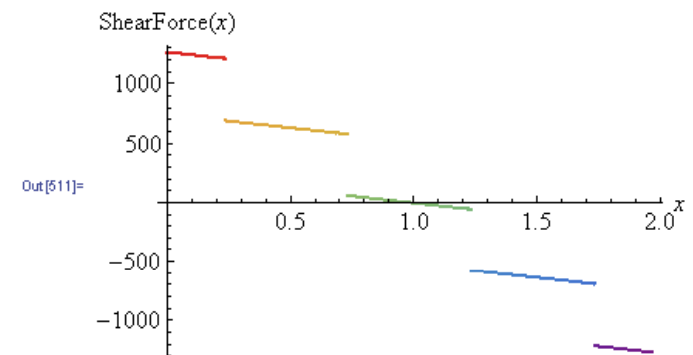
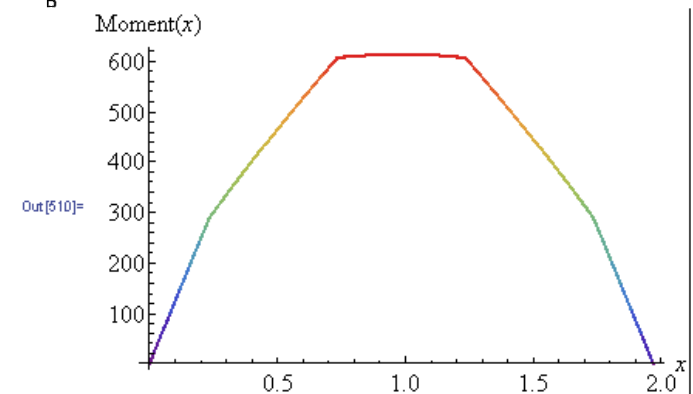
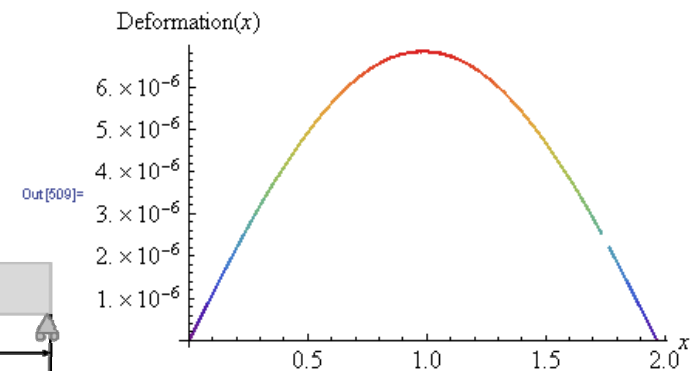
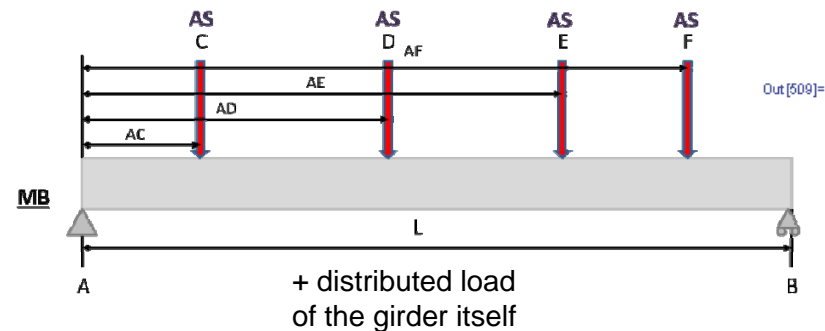
- Alignment system
- Stabilization system
- Interconnections
- Vacuum system
- Cooling system
- Tunnel integration

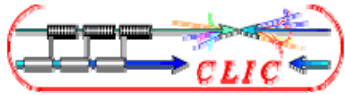
- System interactions need to be assessed



Main beam girder - standard module

- Definitions
- **Input**
- Girder & Material
- Moment of inertia
- Loading
- Calculation step1
- Deflection curves for subloads
- Superposition
- Deformation step1 - max values for each subsection
- Deformation step2 - Plot for the deflection curve
- Moment step1 - max values for each subsection
- Moment step2 - Plot for the deflection curve
- Shear Stress step1 - max values for each subsection
- Shear Stress step2 - Plot for the deflection curve
- Summary of results
- Plots
- Analytic results for the optimization





Conclusions and future work

- Conceptual design of the supporting system is well advanced
- Module supporting system consist of extensive amount of R&D work in the near future
- Different subsystems and procedures such as alignment, stabilization, cooling, assembly, transportation and installation need to be developed as parts of supporting system.
- Organization of the work between collaborators is essential
 - Organization of work is on going
- Current work
 - Interconnection specification finalization -> soon to development iteration
 - Module assembly, transportation and installation sequence
 - Creek collaboration for the girder material studies
- Future work
 - Study mechanical model of the module
 - Next iterations for the specification for the supporting and alignment systems
 - Increase the amount of collaborators

Thank you!