Configuration Management and Operational Aspects in Experimental Areas at CERN

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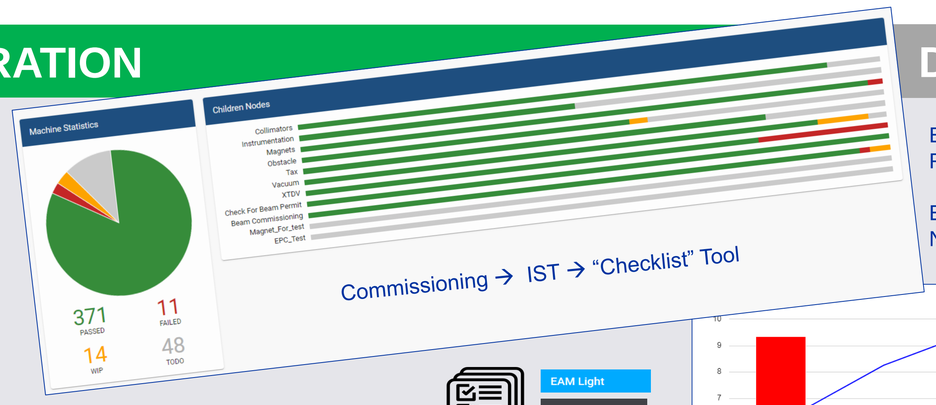
ACCELERATOR RELIABILITY WORKSHOP ARW 2022

Reliable and optimized beamline component

OPERATION



Commissioning → IST → "Checklist" Tool

Preventive Maintenance: Work Orders in Infor

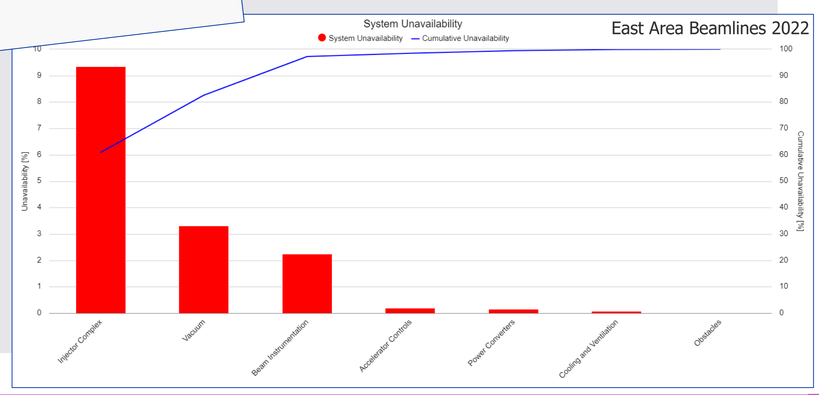
EAM Light

infor EAM

Faults Registration: AFT

Accelerator Fault Tracking

Faults analysis: equipment parameters → Timber



DECOMMISIONING - REX

End of Life approach → REuse? REcycle? REeduce? REepurpose? REpair? REmanufacture? REcove?

EA CONSOLIDATIONS PROJECTS:
NACONS, ADCONS, East Area REnovation

INSTALLATION

Layout **BEAMLINE CONFIGURATION**

FUNCTIONAL POSITIONS
(+ powering source/electrical circuits)

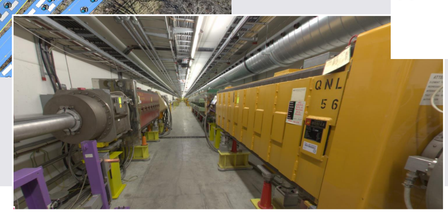
GIS Portal - Machine

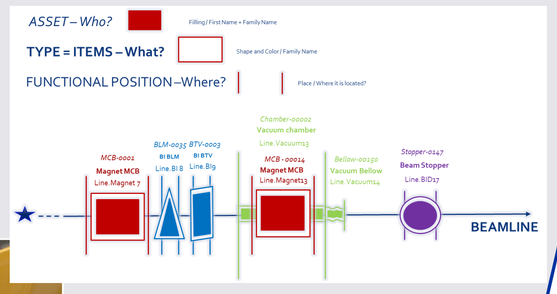
360 Panorama Project

New MADX sequence

GitLab

Alignment and cumulative positions





Access limitations due to radiations (ALARA principle) →
IMPORTANCE of reliability and remote handling compatibility

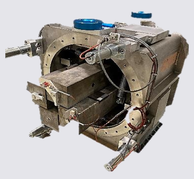
Naming Convention
ECR - SRR

EDMS **HARDWARE BASELINE**

PRODUCTION - TESTING

Test reports
Material certificates

Make or buy?
Technical Specification



MTF Equipment Management Folder

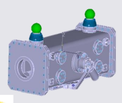
Manufacturing workflow

infor EAM

EAM Light

ASSET

ENGINEERING SPECIFICATION



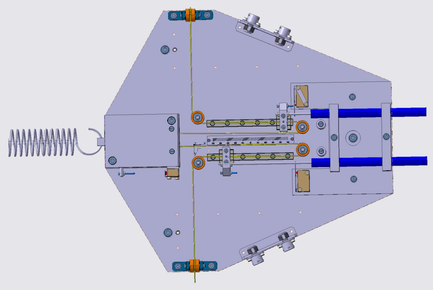
3D Model (.stp)

2D Drawings

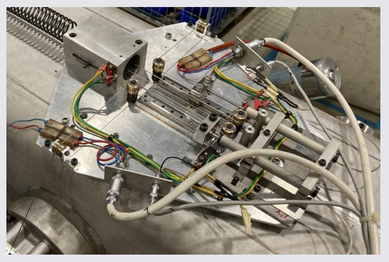
EDMS **ITEM**

CERN Drawing Directory Server

Accelerators Naming Portal



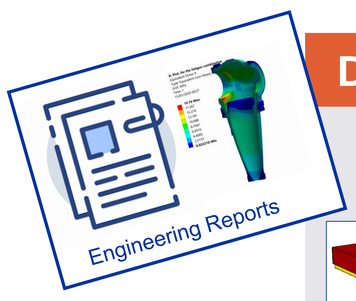
New read-out system concept for 2-block collimators:
- Analysis of most common faults/problems of current design
- Conceptual model for new system
- 3D model
- Prototype
- **Testing**
- 2D drawings
- Production



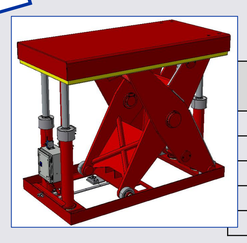
Fatigue testing:8200 cycles in 3 months
Lesson learned:
- Pulley material to be changed for wear-out

Simulated 22 years of functioning with problems

DESIGN - STUDY



XTDV lifting platform [1]
designed for a lifetime of 20 years for less than 1000 cycles/year
with typical frequency of 20 cycles per day

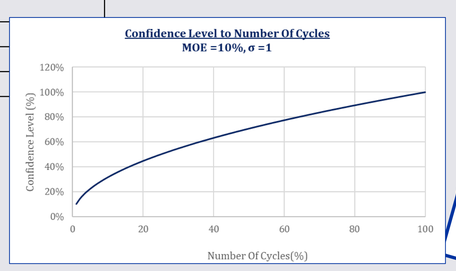


High safety margins since it is a EIS element < less then one failure/year

Reliability, R	Number of Cycles N at C=70%	Number of Cycles N at C=95%
91%	13	32
95%	24	58
97%	40	97
99%	120	284
99.9%	1,147	2,852

the least number of cycles to have a reliability of 91% with a confidence level of 70 % and 95% is 13 and 32 cycles, respectively

± 3 mm positional accuracy is required →
testing the tables for between 35 and 90 cycles would allow to measure the reliability of the equipment with confidence levels ranging from 60% to 95%.



ECR

Work notification

NEED

USER REQUIREMENT
FUNCTIONAL SPECIFICATION

Physics simulations

New component or functional change

REFERENCES:
[1] I. Chatzigeorgiou, "Statistical Assessment of Cyclical Testing for XTDV Lifting Tables", EDMS 2719296
[2] G. Romagnoli, "Guideline for Identifiers of Beamline Equipment in the Experimental Areas", EDMS 2355703
[3] Rae, B., et al. "Controlling the CERN Experimental Area Beams." arXiv preprint arXiv:2202.01705 (2022)
[4] Gerbershagen, A., et al. "CERN Secondary Beam Lines Software Migration Project." 17th Int. Conf. on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'19). 2019

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