



The SPS Movable table experience

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16.10.2018 HL LHC Collaboration meeting

SPS SRF Test stand Transfer table



Transfer table Main Requirements

- Payload: ~ 8 tonnes

Flexible connections (force 3.3 kN)

Vacuum forces from cryo transfer (4 kN)

- Range: 510 mm +- 10 mm (530 mm)
- Transfer time 10 min, $a < 2 \text{ m/s}^2$
- Repeatability: beam axis in 100 μm radius cylinder
- HSE:
 - Environment: 50 Gy/ year,
 - SPS Fire safety
 - CE conformity
- Maximum component sizes + mass, strict integration in SPS
- Fully remote control, no electronics in tunnel, up to 200 m cables
- Interlocks for safety and SPS Operation
- Design life 15 years,
- High reliability MTBF > 200 khours



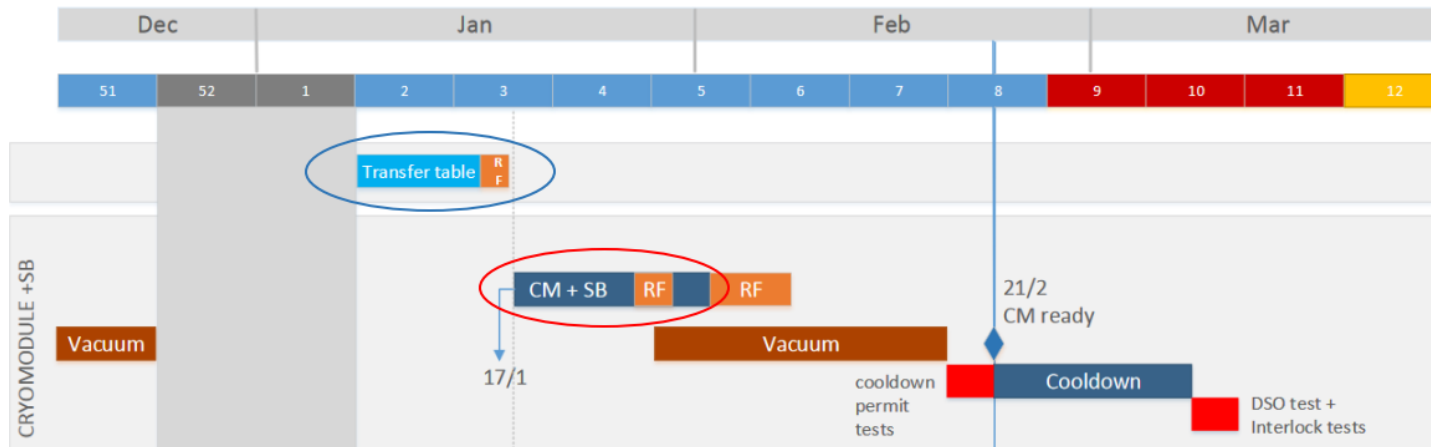
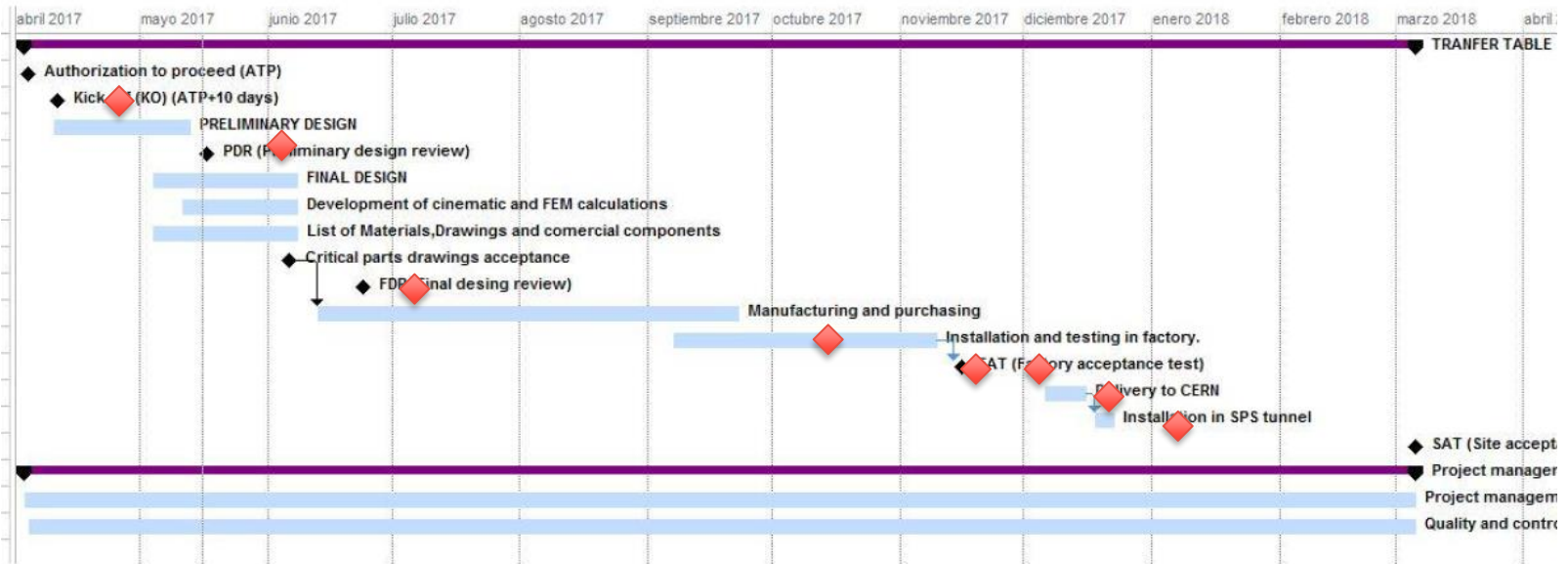
Elgoibar, Spain

Precision, Micromechanics
Radiation, U.H.V., Cryogenics
Large Mechanics
Optomechanics, LASER
Space



<http://www.a-v-s.es/projects>

Largest challenge:



Early effort on HSE requirements for SPS

Fire safety and radiation compliance with CERN IS41

Material list verified in detail and cleared with HSE during design and ordering Phase

- Selection grease
- Clearance of small quantities exceptions
- Protection bellows

Conformity electrical cables IS23 (fire safety and radiation resistance)

CERN provided ALL cables for tunnel (STORES with IS23 conformity)

- electrical design focussed to that
- Certificates for rack components
- Some detailed checking with providers: e.g. motors, LVDT

Metallic items clearance with guidelines from «Actiwiz» + check HSE to avoid activation

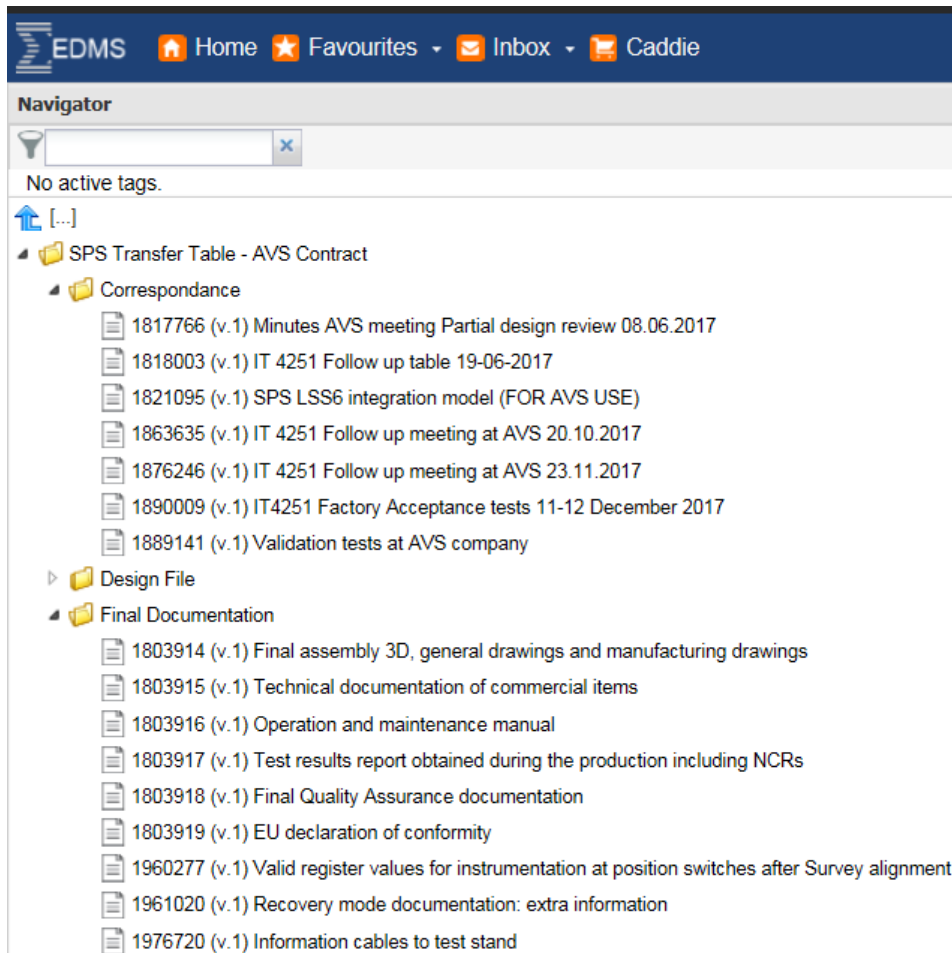
CE conformity declaration and risk analysis ISO12100

- Partly completed machinery

Carlos Rementeria
Jean-Paul Julien
Simon Marsh
Jose Gascon



Documentation direct in EDMS by AVS



The screenshot displays the EDMS web interface. At the top, a navigation bar includes the EDMS logo and links for Home, Favourites, Inbox, and Caddie. Below this is a 'Navigator' section with a search bar and a 'No active tags' message. The main content area shows a hierarchical tree structure:

- SPS Transfer Table - AVS Contract
 - Correspondance
 - 1817766 (v.1) Minutes AVS meeting Partial design review 08.06.2017
 - 1818003 (v.1) IT 4251 Follow up table 19-06-2017
 - 1821095 (v.1) SPS LSS6 integration model (FOR AVS USE)
 - 1863635 (v.1) IT 4251 Follow up meeting at AVS 20.10.2017
 - 1876246 (v.1) IT 4251 Follow up meeting at AVS 23.11.2017
 - 1890009 (v.1) IT4251 Factory Acceptance tests 11-12 December 2017
 - 1889141 (v.1) Validation tests at AVS company
 - Design File
 - Final Documentation
 - 1803914 (v.1) Final assembly 3D, general drawings and manufacturing drawings
 - 1803915 (v.1) Technical documentation of commercial items
 - 1803916 (v.1) Operation and maintenance manual
 - 1803917 (v.1) Test results report obtained during the production including NCRs
 - 1803918 (v.1) Final Quality Assurance documentation
 - 1803919 (v.1) EU declaration of conformity
 - 1960277 (v.1) Valid register values for instrumentation at position switches after Survey alignment
 - 1961020 (v.1) Recovery mode documentation: extra information
 - 1976720 (v.1) Information cables to test stand

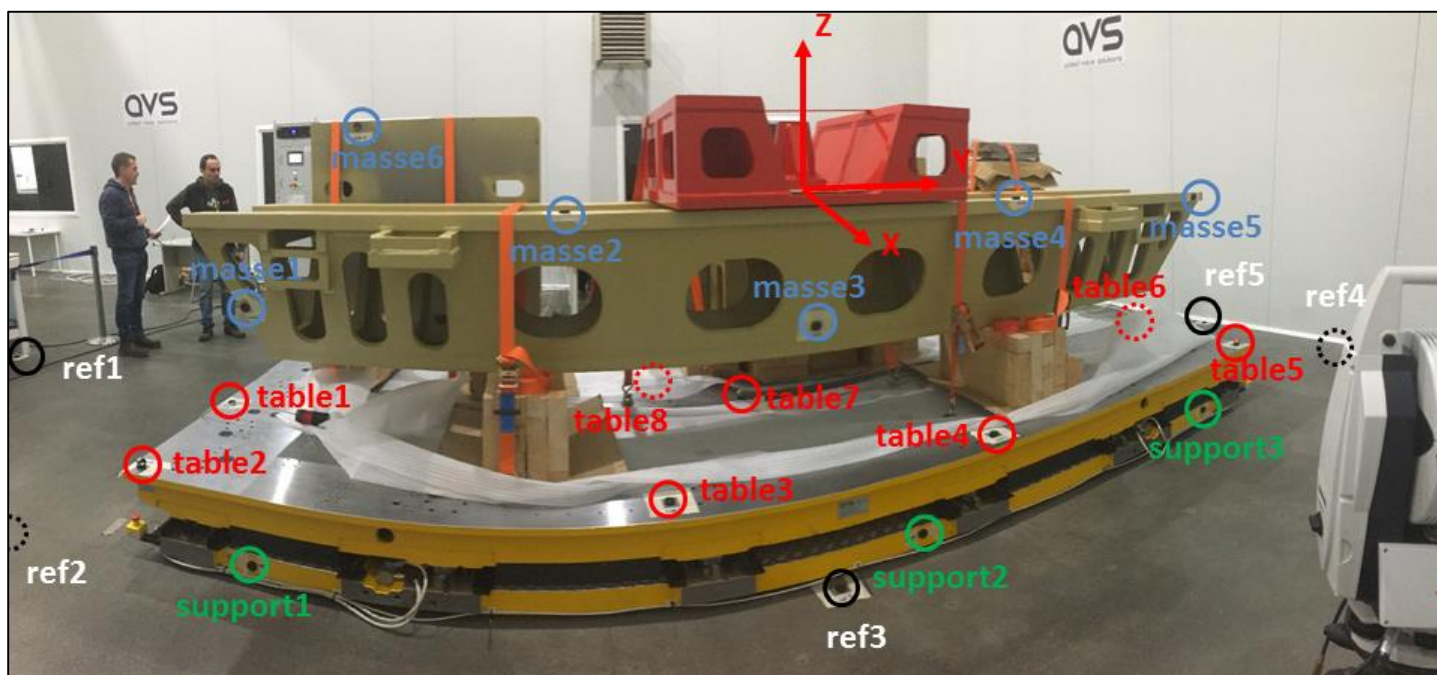
Hector Garcia Gavela

Factory Acceptance Testing (Elgoibar, Spain)

- Full rehearsal of installation in SPS tunnel Including anchoring to floor (1 week !)
- With test loads
- With 200 m cables
- CERN Survey measurements with LASER tracker

Repeatability in x out of specification (LVDT), Y and Z OK

11-12 Dec. 2017

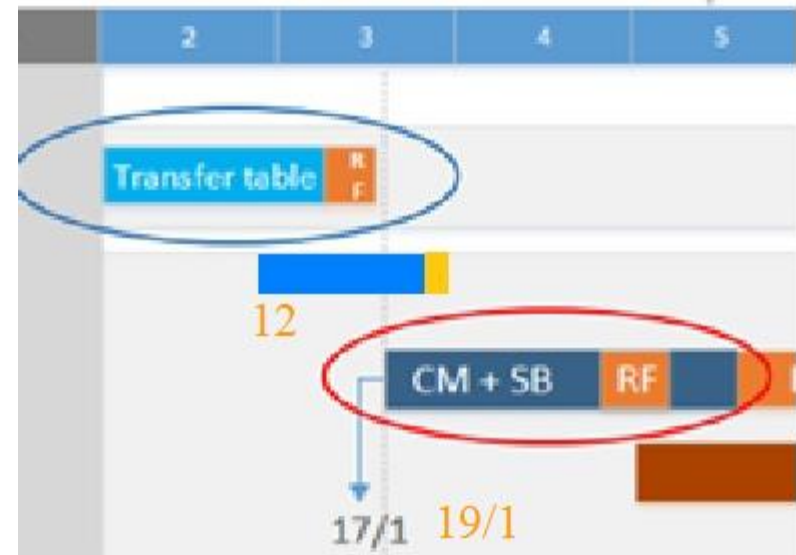


Accepted for delivery, with some remaining work

Delivery at CERN

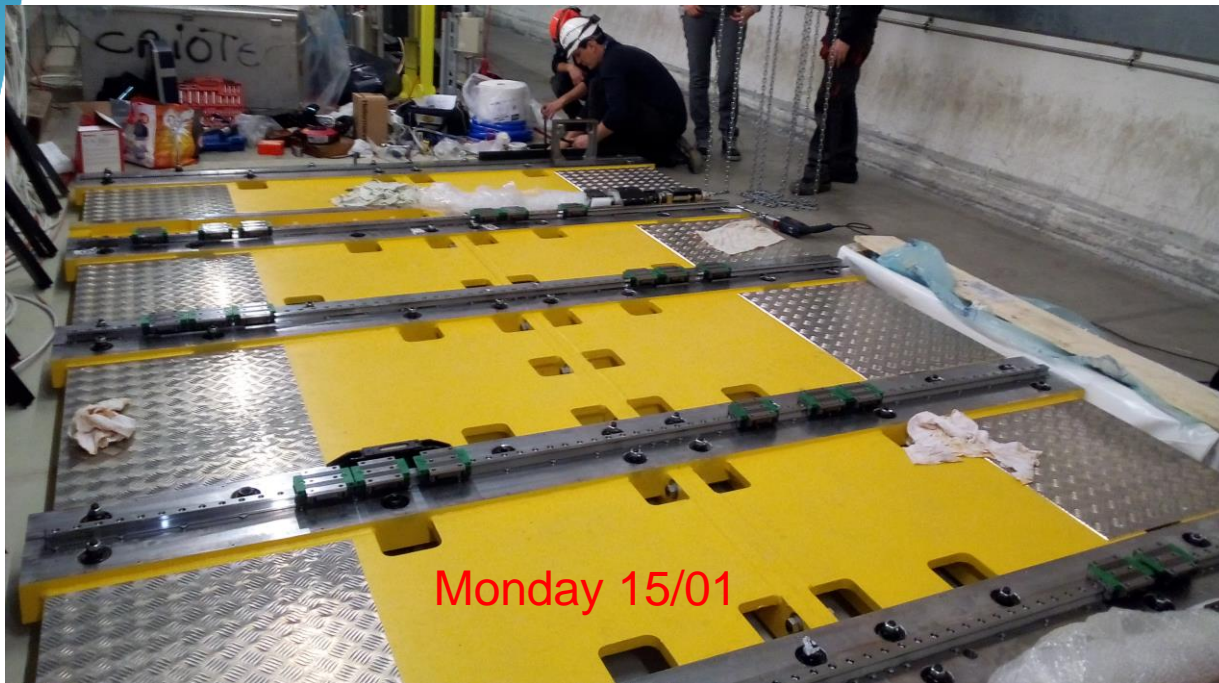
20 December 2017





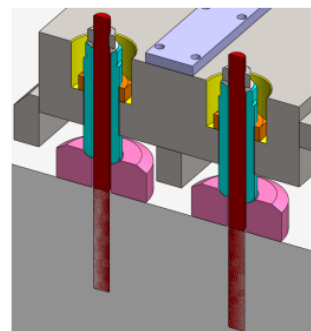
EN/HE: Sylvain Fumey, Pascal Brunero
 EN/EL: Guillaume Gros, Thomas Slettestol
 Glaerum, Gerardo Velazquez Gutierrez
 EN/SU: Vivien Rude, Mathieu Duquenne

Friday 12.01



Monday 15/01

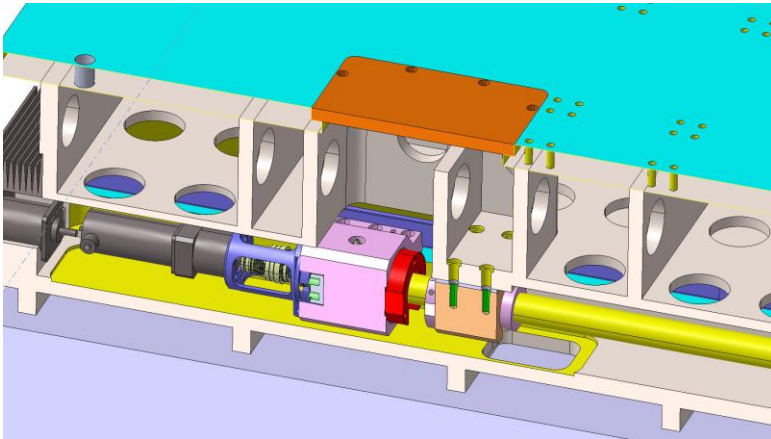
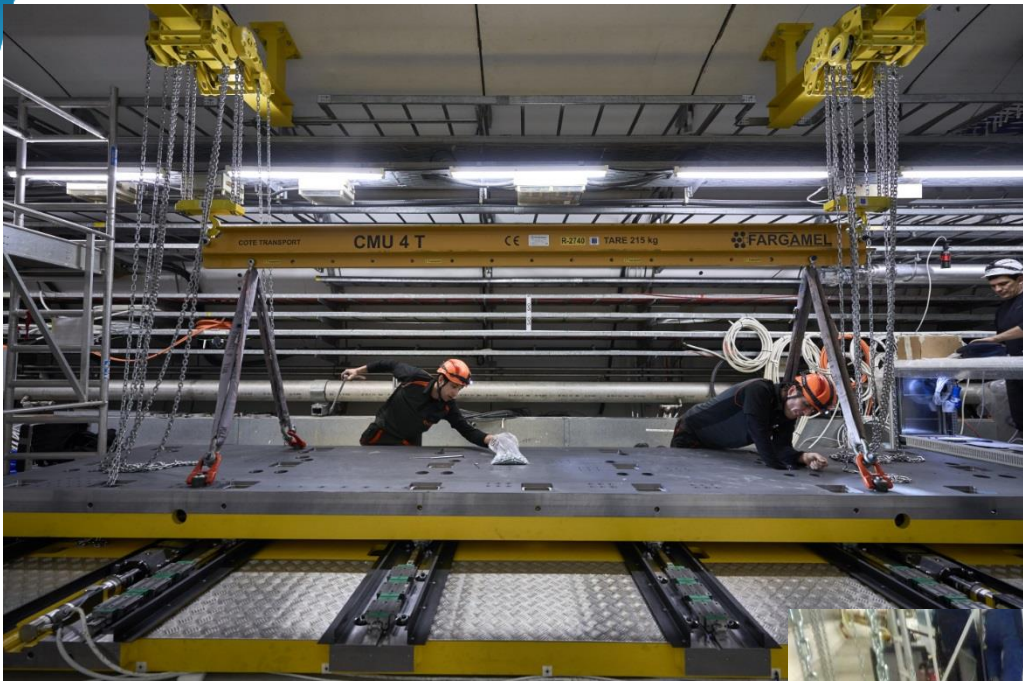
Precision rails and ball bearings
Base precisely aligned
Two stepper motors with gear and ball screw



84 Anchor points (AVS)
Reinforced floor (SMB/SE)



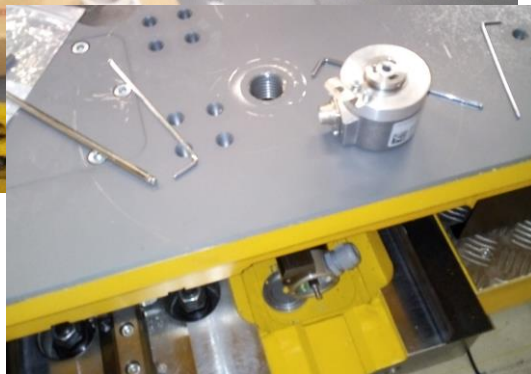
Sat. 13.01
One (long) day!



Tuesday 16/01



Wednesday 17/01:
instrumentation
Installation surface rack
19:45 First transfer



Friday 19.01 Afternoon

Thursday ...

Friday morning: Alignment Parking
and experiment position

Table finalised 1-2 March, changed control

Interlocks

List of conditions for operation:

- Vacuum valves

- Cryo level

- SPS Access

- Table at right position (Exp/Park)

- Table moving

- Beam



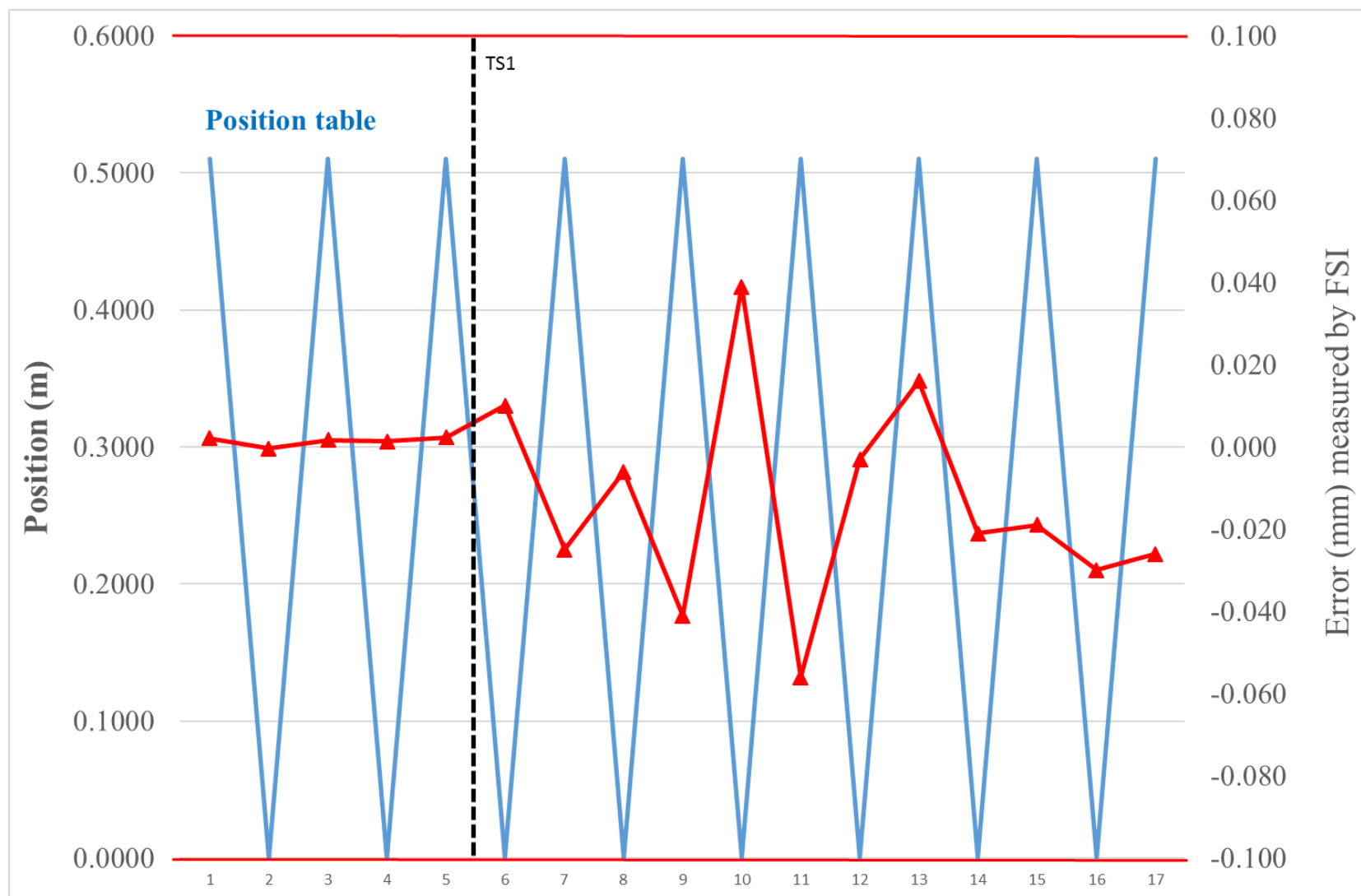
David Glenat

Table can only be moved through the Interlock verification chain

Validated 12th March during DSO tests

Position measured by FSI

M. Sosin
V. Rude





Thank you for your attention!

