

HLS and WPS used at PSI

(Karsten Dreyer)

Specification HLS used in the SLS Storage-Ring:

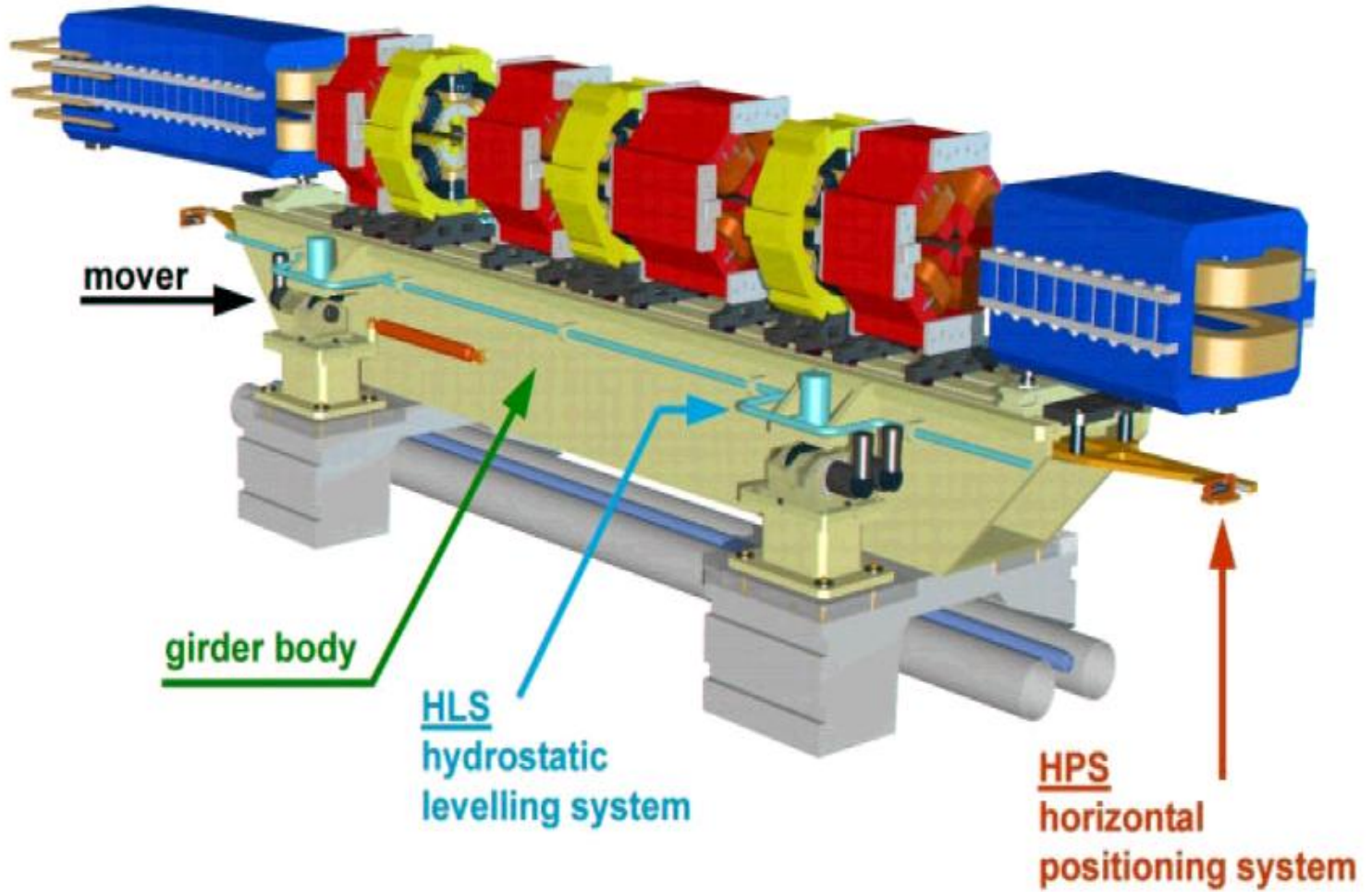
Manufacturer: Edi Meier + Partner AG

Principle: capacitive proximity measurements, half filled pipe (water+anti fungus)

Range: 14 mm

Resolution: $<2 \mu\text{m}$

Accuracy/Repeatability: $< 10 \mu\text{m}$



A.Streun

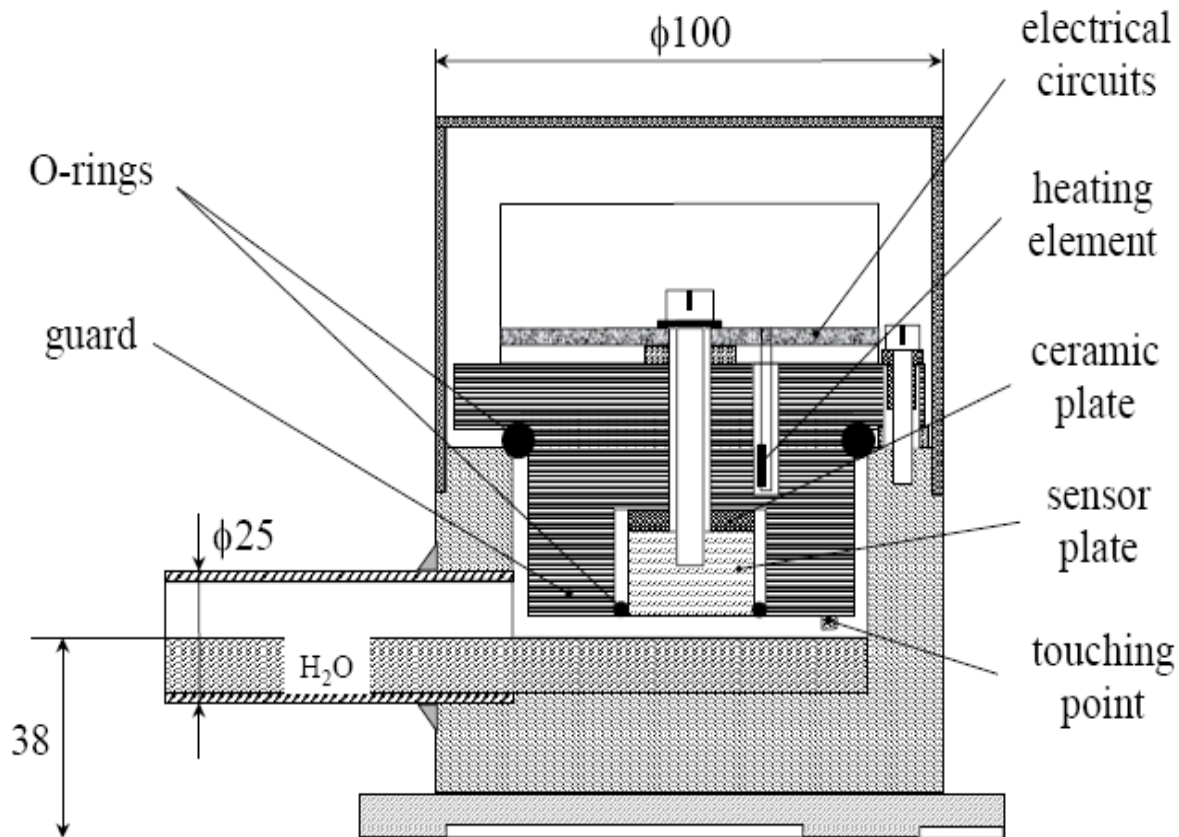


Fig. 1: Schematic representation of the HLS pot interior.

S.Zelenika

Assets and Drawbacks

Settlement time: 5min. Up to >15min.

Errors/Drifts: humidity, biologie (fungus),

Various drifts Millimeter-Range, technical problems (solved 2002)

Reference: average of water level resp. 4 pots/girder or other averages (section, ring) using valves

Users: long term stability monitoring, HPS-users (calculation of vertical unknowns, SR-Diagnostics) since 2003

+ automated filling station.

- Black-Box, no external/absolute reference, to slow for interactive alignment.

- Installation 2000 ----- (technical problems, drifts) -----> Operational 2003

Girder movement: Comparison to Survey and HLS/HPS data

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Set Movers of Girder	02G1	
Survey of Girder	02G1	(18 reference marks)
HLS/HPS readouts of girders	02G1..4	(sector 02 evaluation)

	Set	Survey	HPS/HLS	comment
<u>Single motions:</u>				
Sway [μm]	+100	89 ± 9	100	02G ₂ sway = 14 micron
Heave [μm]	+100	93 ± 6	6	HLS too slow
Roll [μrad]	+100	103 ± 24	100	
Yaw [μrad]	+100	85 ± 7	80	surge 7 ± 6 instead of 35 expected
Pitch [μrad]	+100	99 ± 6	99	surge 63 ± 6 instead of 81 expected
<u>Combined motion:</u>				
Sway [μm]	+50	33 ± 9	35	<div style="border: 2px solid red; padding: 5px;"> <p>+ HPS/HLS evaluation works</p> <p>– HLS very slow ($\tau > 15$ min)</p> <p>– Yaw too small</p> <p>– Coupling to adjacent girder ?</p> </div>
Heave [μm]	+50	50 ± 6	30	
Roll [μrad]	+50	89 ± 24	55	
Yaw [μrad]	+50	41 ± 7	31	
Pitch [μrad]	+50	51 ± 6	49	

Andreas Streun, Dynamic Alignment at SLS, IWBS 2004, Grindelwald, December 6-10, 2004

Horizontal Positioning System

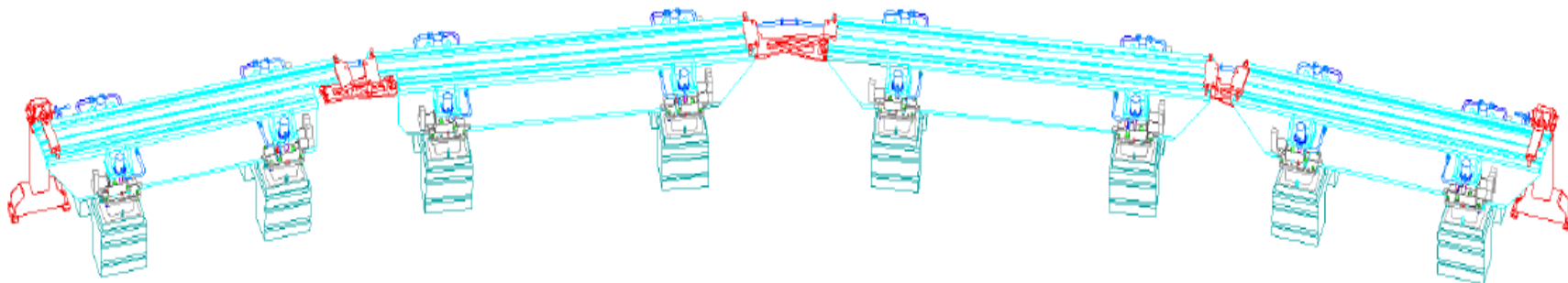


Figure 2: Four girders forming one sector. HPS sensors between adjacent girders and between end girders and sector terminating monuments are shown in red colour.

No WPS used at PSI instead HPS (Horizontal Positioning System) is used :

Manufacturer:	PSI workshop
Principle:	digital encoder (+ lever arms)
Range:	+/-2.5mm
Resolution:	0.5μm
Accuracy:	unknown
Errors/Drifts:	absolute encoders
Reference:	local reference 2 columns per section.
Users:	controls group, machine stability