

A detailed wireframe model of the UNILAC (University of New Mexico Ion Linac) particle accelerator is shown. The model is a complex, elongated structure with many straight and curved sections, representing the path of the particle beam. It is rendered in a perspective view, showing its three-dimensional structure. The text is overlaid on the central part of the model.

„hands-on“ UNILAC Operator Training 2016

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Outline

- reasons
- preparation
- concept
- results
- lessons learned



reasons/ goals

last beam time till 2018

why now?

- operations act □ obligatory periodical operator training (last training shifts in 2012)
- operator theory workshop in January □ practical part
- 2 new department members and 2 persons came back from parental leave (>1,5 years without operation)
- inhomogeneous knowledge distribution in shift crew
- last chance for a long time to extract the information, how we operate the UNILAC □ create some guides for future operator training

(one has to make a start)

Preparation

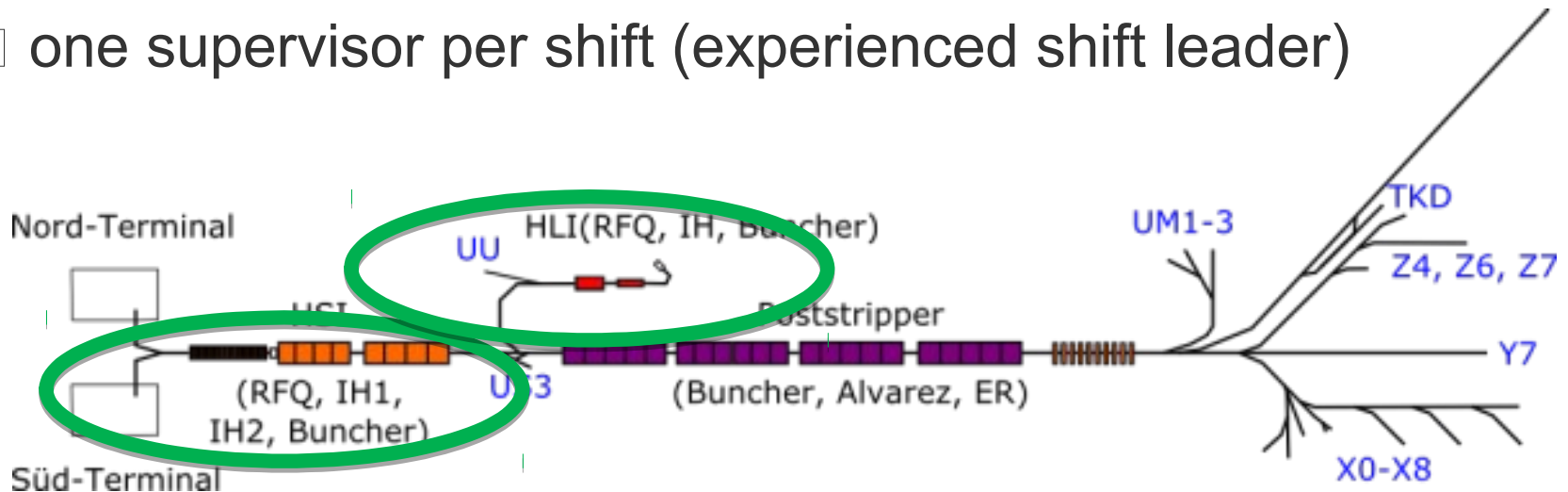
we applied for 9 shifts for operator training exclusive
but there was no preconception from former training shifts

- what do the operators know?
- where are the knowledge gaps?
- what do experienced operators think is important?
- do we need individual training concepts?
- how many persons can be trained at the same time?
- how long will it take

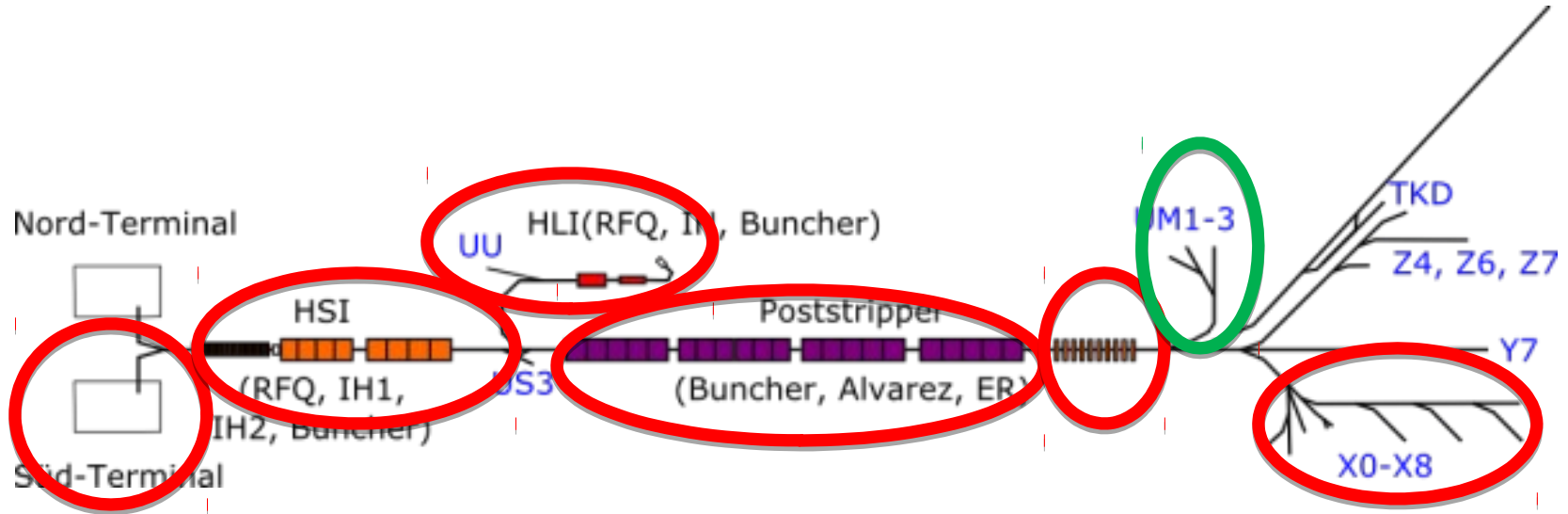
☐ small working group (6 persons)

Conditions

- 9 exclusive shifts (22.04. – 24.04.)
 - UNILAC/ RF commissioning finished
 - 2 Ion sources available (ECR with He, PIG with Ti)
 - 2 Targets (M-branch and Z6)
-
- ☐ 2 teams possible (1HSI, 1HLI)
 - ☐ one supervisor per shift (experienced shift leader)



Setup Guides



- Separate UNILAC in 7 logical sections
- preparation of 7 rough guides:
 - collect information and write short setup guides (done by experienced operators and shift leaders)
 - 1 document per section (1-5 sides)
 - Result: mixed quality, but very good for a rough document

what else

- all operators were asked for their individual preferences
 - result: a very small list
 - most asked was the complete setup from source to target
- shift leaders usually don't meet on shift, so they all have their own ways of thinking the machine
 - so we decided to bring them together for discussing „hands-on“
 - for limiting these discussions □ decision for clear „roles“
 - supervisor, documentation, trainees
- we had 2 free training slots for interested „guests“ from CSCO and PBSP

The Concept

- shift composition
 - in each shift are 5 operators in 3 different roles
 - 1 experienced supervisor
 - at least 1 responsible for documentation
 - 2-4 Trainees
 - some trainees got 2 or 3 shifts in a row
- content/ schedule
 - in principle trainees should try to setup the machine alone, using the guides
 - all sections: PIG, HSI - Stripper, HLI - UN7DC2, Alvarez, ERs, M3, X6
 - individual preferences were included into the training schedule
 - the supervisor guides and helps the trainees if needed and assure the link to the theory talks from the workshop
 - goal of the last 2 shifts was the beam setup for the experiments
- documentation
 - the experienced operators discuss their „way of operation“ and correct/extend the prepared guides
 - they add pictures and explanations
 - the trainees check permanently, whether the guides are understandable and usable

Trainings Schedule

Ablaufplan Trainingsschichten:

22.04. Frühschicht Supervisor: Wetzel Dokumentation: Motitschke, Böhm Trainees: Catta + Gallus <ul style="list-style-type: none"> • PIG+HSI nach M3, X6 • Schwerpunkt: Schnittstellen, Übergabepunkte zw. Beschleunigerabschnitten 	23.04. Frühschicht Supervisor: Motitschke Dokumentation: Böhm Trainees: Catta + Stein + Steiner <ul style="list-style-type: none"> • EZR+HLI nach X6, PIG+HSI nach M3 • Schwerpunkt: HLI-Einstellung (Catta + Stein) • Schwerpunkt: HSI-Einstellung (Steiner) 	24.04. Frühschicht Supervisor: Boehm Dokumentation: Vossberg Trainees: Ziegler + Stein Gäste-Trainees: Steinhagen + Hillbricht <ul style="list-style-type: none"> • EZR+HLI nach X6, PIG+HSI nach M3 • Schwerpunkt: HSI-Einstellung
22.04. Spätschicht Supervisor: Borisch Dokumentation: Kummerfeldt Trainees: Pilz + Sapinski + Vossberg <ul style="list-style-type: none"> • Anfahren PIG mit Ladungs- + Massespektrum • Einstellen + Optimieren HSI (Einschuss RFQ bis IH2, Einschuss HSI-Gasstripper, Gasstripperdruck wählen) • Einschuss HLI RFQ 	23.04. Spätschicht Supervisor: Bloch-Späth Dokumentation: Wetzel, Kummerfeldt Trainees: Schmidt + Sapinski <ul style="list-style-type: none"> • EZR+HLI nach X6, PIG+HSI nach M3 • Präferenz: Schwerpunkt HF-Einstellung 	24.04. Spätschicht Supervisor: Wetzel Dokumentation: Bloch-Späth Trainees: Schmidt + Steiner, Kummerfeldt <ul style="list-style-type: none"> • Kompletter Reset • Umstellung PIG auf Gold • Vorbereitung IPD Setup für Montag • Einstellung He-Experimente (UBIO nach X6 und UB000 nach TK) für Montag (Schmidt + Steiner) • Einstellung HSI bis Stripper (Kummerfeldt)
22.04. Nachtschicht Supervisor: Rödl Dokumentation: Kaufmann Trainees: Zimmermann + Walasek + Lorenz <ul style="list-style-type: none"> • Beschleuniger einrichten • PIG+HSI nach M3 • Anfahren PIG mit Ladungs- + Massespektrum • Schwerpunkt: Einschuss Alvarez 	23.04. Nachtschicht Supervisor: Kaufmann Dokumentation: Menges Trainees: Zimmermann + Walasek + Lorenz <ul style="list-style-type: none"> • EZR+HLI nach X6 • Schwerpunkt: HF-Optimierung • Einstellung, Änderung d. Energie 	24.04. Nachtschicht Supervisor: Kaufmann Dokumentation: Menges Trainees: Zimmermann + Lorenz + Sapinski <ul style="list-style-type: none"> • Einstellung M-Zweig für UMAT für Montag • Ggf. UBIO und UB000 Endeinstellung • Ziel: SAT für alle Experimente

Helium-Strahl nicht in den M-Zweig einschießen und nur bei geringen Intensitäten fahren.

Experience/ Results

- conclusion: excellent training, average documentation
- after a very short storming phase, the first shift performed well and worked very concentrated
- even the night shift performed well (at least till 4am □)
- feedback was consistently positive, all operators seem to be satisfied
- Side-effect: experiments on Monday after the training shifts could start on time with perfectly adjusted beams

main question: **WHY NOT EARLYER**

- suggested improvements
 - not more than 2 trainees on shift

(it seems that we have some very talented „teachers“ in our shift crew)

TODO

- check the guides and notes and bring all together
- improve the guides und check with UNILAC experts

- ☐ after the beam time

- the same was planed for SIS18 operation in May
 - TK-setting + SIS injection (C.K.Wetzel, Y.El Hayek)
 - BI Guidelines from the Workshop (C.K.Wetzel)
 - fast and slow extraction, ...

- ☐ but the SIS18 commissioning is late this year ...

lessons learned 4 FAIR?

- thus we have no experienced fair operators, the concept is not one-by-one copyable for FAIR accelerators

but:

- shift leaders should take a strong part in commissioning of all new machines
- then they can start writing the corresponding guides and adjust it with experts knowledge
- so they should be able to train new operators in a similar way
- ☐ Discussion

Thanks