

Fast GUN startup

Olaf Hensler

-MCS-

Motivation / How to

RF GUN startup > 30min == down-time

Concept :

Reduce reflected power by frequency modulation or to come in resonance at the given temperature

=> heat up with RF power instead of water

Idea from Mariusz Grecki and proven by a MatLab script by him

RF FSM Main State GUN

RF On / Off

RF On / Off (see only in case of problems)

State Name: STARTUP_STATE

State Error Message: ok

RF running

RF Startup GUN

- WATER_TEMP_ONSTATE
- WATER_FTTEMP_ONSTATE
- PREFL_ONSTATE
- ELREAMPL_ONSTATE
- WATERTEMP_ONSTATE
- PULSELENGTHWAT_ONSTATE
- PULSELENGTHRAMP_ONSTATE
- FREQMODUOFF_ONSTATE
- FREQMODUZERO_ONSTATE
- WATERSETPOINT_ONSTATE
- OUTPUTMATRIX_ONSTATE
- FEEDBACKTIMER_ONSTATE
- FEEDBACKCHECK_ONSTATE
- FEEDBACK_ONSTATE
- LFF_ONSTATE
- EASTPROTECT_ONSTATE
- RF CORR_ONSTATE

RF Shutdown GUN

- WATER_TEMP_OFFSTATE
- WATER_FTTEMP_OFFSTATE
- PREFL_OFFSTATE
- ELREAMPL_OFFSTATE
- WATERTEMP_OFFSTATE
- PULSELENGTHWAT_OFFSTATE
- PULSELENGTHRAMP_OFFSTATE
- FREQMODUOFF_OFFSTATE
- FREQMODUZERO_OFFSTATE
- WATERSETPOINT_OFFSTATE
- OUTPUTMATRIX_OFFSTATE
- FEEDBACKTIMER_OFFSTATE
- FEEDBACKCHECK_OFFSTATE
- FEEDBACK_OFFSTATE
- LFF_OFFSTATE
- EASTPROTECT_OFFSTATE
- RF CORR_OFFSTATE

PITZ RF Operation

RF Settings

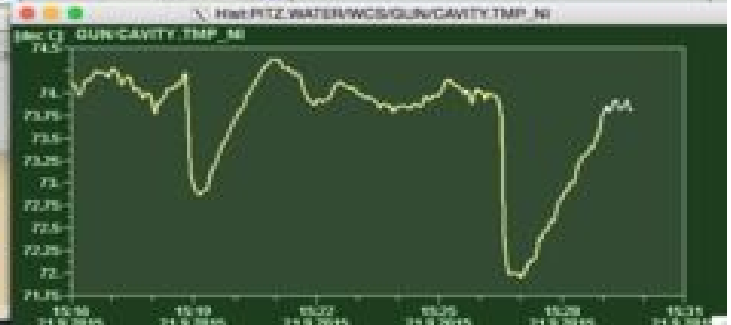
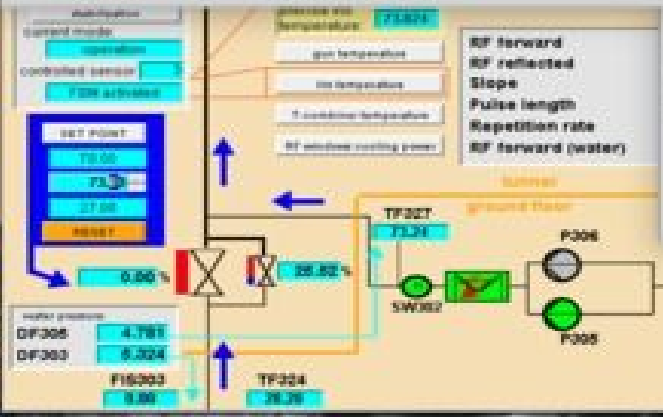
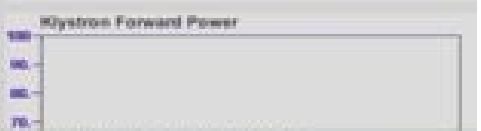
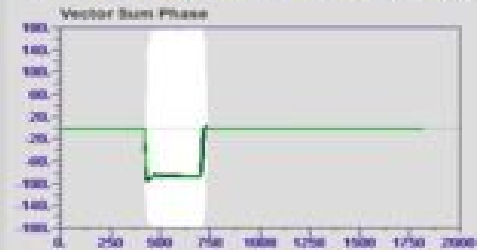
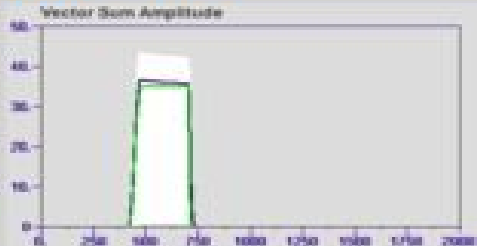
- Amplitude SP: 30.00 MHz
- Phase SP: 00.00 deg
- VecSum Gradient: 36.7 MHz
- VecSum Phase: -63.0 deg

Operation Buttons

- Feed-Forward
- Output Rot. Cor.
- Fast Feedback
- Feed-Forw. Cor.
- Learning Feed-For...

LFF: LFF is switched off
 ORC: Output Matrix correction switched off

- Expert Panels:
- Overview
 - ADCS
 - Ref
 - Timing
 - Watchdog
 - Crates
 - High Voltage
 - RF Pulse
 - Rep. Rate



Achievements

- Integrated into the RF - FSM
- working detuning calculation
- done 5,6 times w/o problems

=> startup time around 2 min to 35 MV/m and 300 μ s

Problems and Todos

Problems :

- when final amplitude is reached, water temperature starts oscillating due to OutputCorrection
 - Probably too fast ?
 - check with LLRF experts

Todos :

- go to higher gradient
- ramp pulse length instead
- or amplitude and pulse length in parallel
- switch on everything (FeedBack,LFF ...)