MSK collaboration workshop for the European XFEL.

Testing components
Test Stand for DESY Boards

- Provide a method to do characterisation of every major board built into FLASH/XFEL
- Complex MATLAB-based, fully automated, distributed test system

- Idea: Make a perfect “out-of-crate” test suite to measure all parameters
- To be used by any technician

- Running tests at the moment: DAMC-DWC10, SIS8300L
- Started Projects: AMC backplane dummy, uLOG test software, DAMC-DS800 test software, KLM RTM test software, HOM RTM test software, inventory automation, RFB reliability tests
Problems:
- Calibration Method does not allow precise measurements above 3.0 GHz (DRTM-DWC10)
- Performance not satisfactory related to the effort spent in this project
- Stability: Software crashes (SIS8300L) and un-handled operator mistakes

Design very complex
- Distributed system with 2 PCs with custom TCP/IP-Link (single PC?)
- ARM-Based software incl. USB communication for RF switch control (off-the-shelf solution?)
- Special FPGA Test-Software (integration into standard FW?)
- Object-oriented test software

Findings
- Effort spent in development of many projects in parallel
- Effort spent in developing ease-of-use instead of core functions
- Many self-made “support” PCBs instead of off-the-shelf-solutions (some of them never used)
- Bring-up only possible by collaboration partners
- Very little progress in the last 12 Months
- Boards are not MTCA-Compliant → difficult to mount to “professional installation”
- Wrong focus?
Actions in next 12 Months

1. Work on core functionality
   - Check end-to-end calibration method, (instead of partial calibration)
   - Consult the authors of the code (bad!)
   - Improve cabling
   - Improve stability of existing tests

2. Install new tests:
   - DRTM-VM2
   - DRTM-DWC8VM1
   - DRTM-DS8VM1
   - Digital Class: DAMC-TCK7, DAMC-FMC20, DAMC-FMC25

3. Framework (Step-by-step)
   - Build **universal** analog adapter, fitting for DRTM-DWC10, DRTM-DS8VM1, DRTM-DWC8VM1, mountable to a crate
   - Build up a second test stand
   - Move all software to single PC (in-crate)
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Board Design Guidelines
Introduction

New quality demands for XFEL and Industry-Licensed design (Design Guide created)

High board count → higher cost of mistakes and less control

Customer view: Inner quality = outer quality (if a design looks bad, it possibly is bad)

Review process has been introduced

Many issues found, some of them got into PCBs → new revision

Aim: Find silly and avoidable mistakes (You only have the right to make “intelligent” mistakes)

All Items listed here are taken from Reviews
- Mark open pins with NoERC
- Do not let texts collide with symbols
- Use standard template and fill it out
- Use decoupling for digital ICs
- Use proper input/output capacitors for voltage regulators (→ datasheet)
- Clean up projects (use PCB and SCH folders below project)
- Call unpopulated parts „DNP“
- MAKE COMMENTS!
Clean PCBs

- Enable rule checks (ERC + DRC), run them and read the messages

- Necessary PCB checks: Clearance, Routing Width, Short-Circuit, Un-Routed net, Minimum Annular Ring, Hole Size, Min. Solder Mask Silver, Net Antennae

- PCBs shall have 0 Rule violations!

- Do not let ILFA correct your mistakes, do it yourself!

- PCB finish: Import from SCH, repour polygons, run DRC (consistent design)

- Check Gerber Files!

- Include Board Description file (incl. Layer Stack)

- Archive the final data produced by ILFA
Sync your data with DESY Servers
Make sure final data matches the produced board
Put all your bugs to our servers
Track all your issues (Redmine provided)

SVN – for design files
  - Provides version control, archives every state, documents changes
  - is auto-synced to N Drive (fast!)
  - Put only design files there, no tmp
  - put finished boards to „tags“

https://mskllrfredminesrv/projects/msk-hardware
https://svnsrv.desy.de/basic/MSK_HVF-PROJECTS
https://svnsrv.desy.de/basic/MSK_PROJECTS
Testing Components

Thank you