FiDeL & LSA settings generation

Marek Strzelczyk

Introduction

- ## What is FiDeL?
  - A set of equations to describe the functional dependence of the field and field errors
  - A set of parameters to fit the equations to the measured behaviour of the set of magnets
- ## What is LSA?
  - LHC Software Architecture
  - A set of supervisory control applications based on common framework (LSA-core)
    - Used – among the others - for setting generation and trimming

FiDeL in LSA - overview
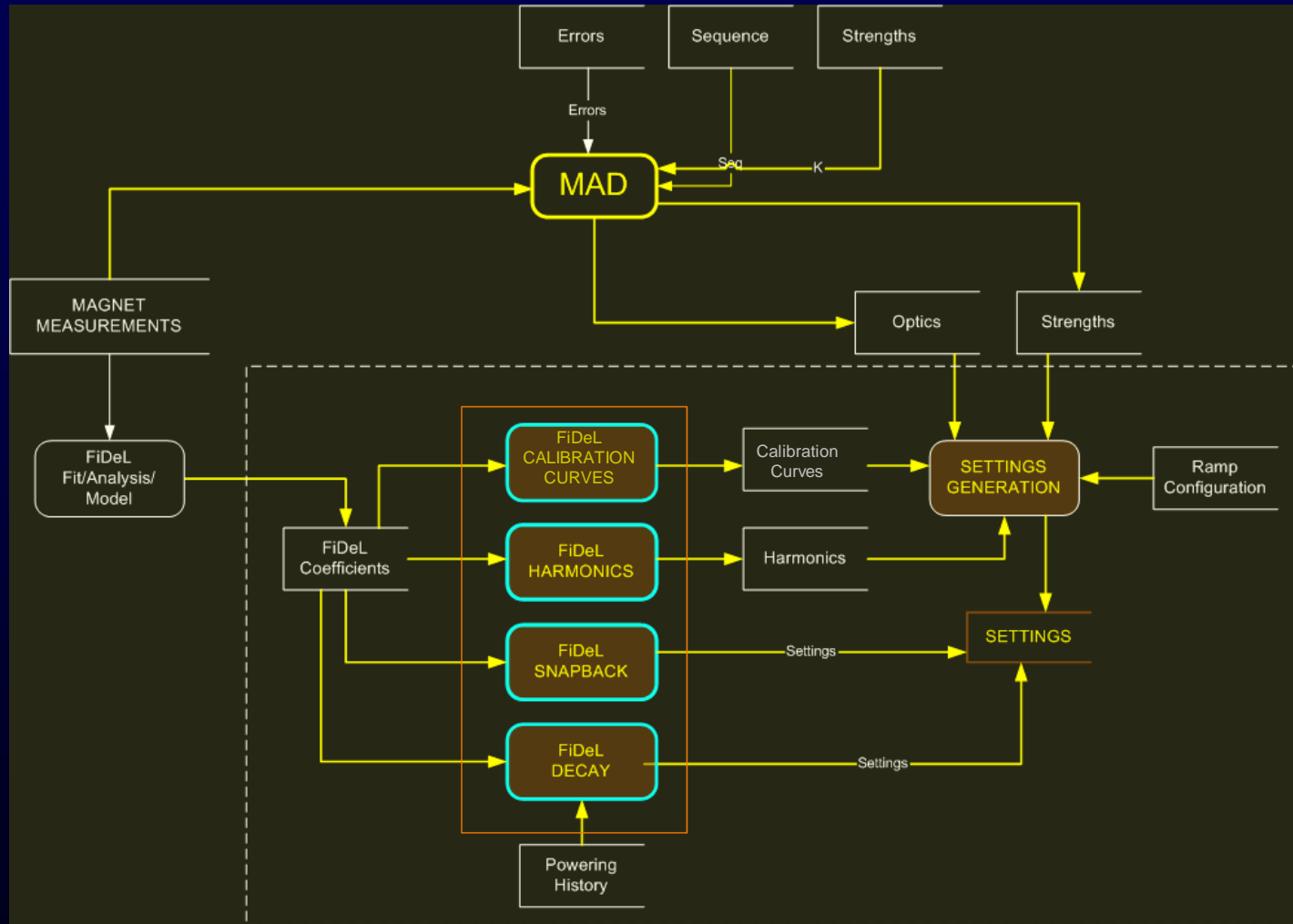
Settings generation – principles

- Pre-defined parameter space – dependencies between parameters
  - Source parameters settings must exist before generating dependent setings
- Settings parts: value = target + correction
  - Generating target
  - Trimming correction
- Calculations done in generators and makerules

Settings generation – from K to IREF example

- K – comes from strength defined for the optics
- Calibration curve is generated based on FiDeL model
- I depends on K and Momentum
  - K, Momentum $\rightarrow$ B $\rightarrow$ I
  - Calibration curve used to convert B to I
- IREF is a copy of I
  - For the other device (actual hardware)
  - With some filtering, if necessary
 - Must be acceptable for the power converter

Settings cross-check

- **Two paths of computing**
  - Model parameters → LSA → calibrations → settings
  - Model parameters → WISE → settings
- **Results should agree**
- **Check method**
  - Generate full settings for a beamprocess
  - Add some artificial trims for correctors to cover full operational range
  - Extract settings
  - Compare with WISE
  - Identify and fix problems
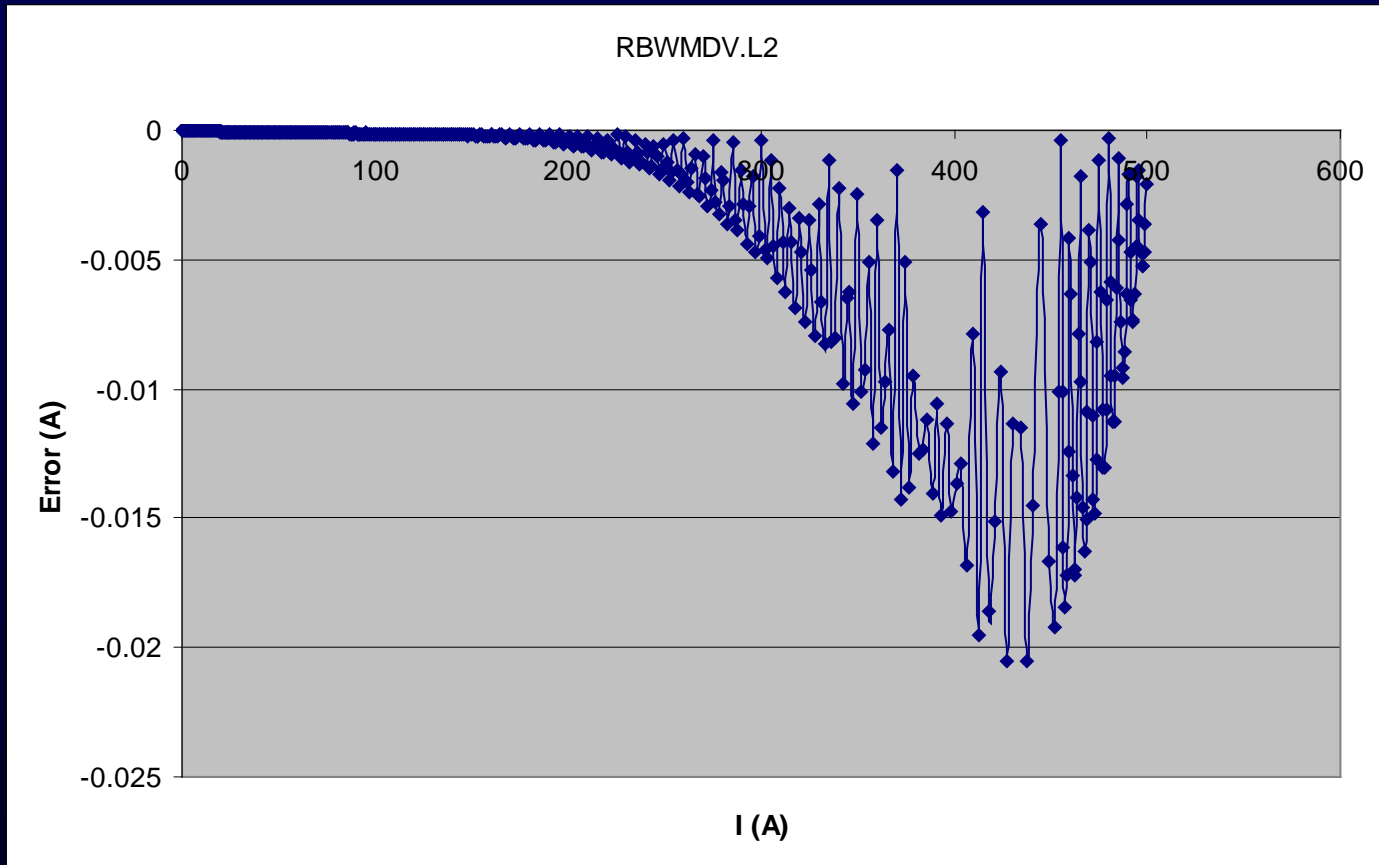
Cross-check examples

Cross-check examples

RQT4.L3 - before fixing
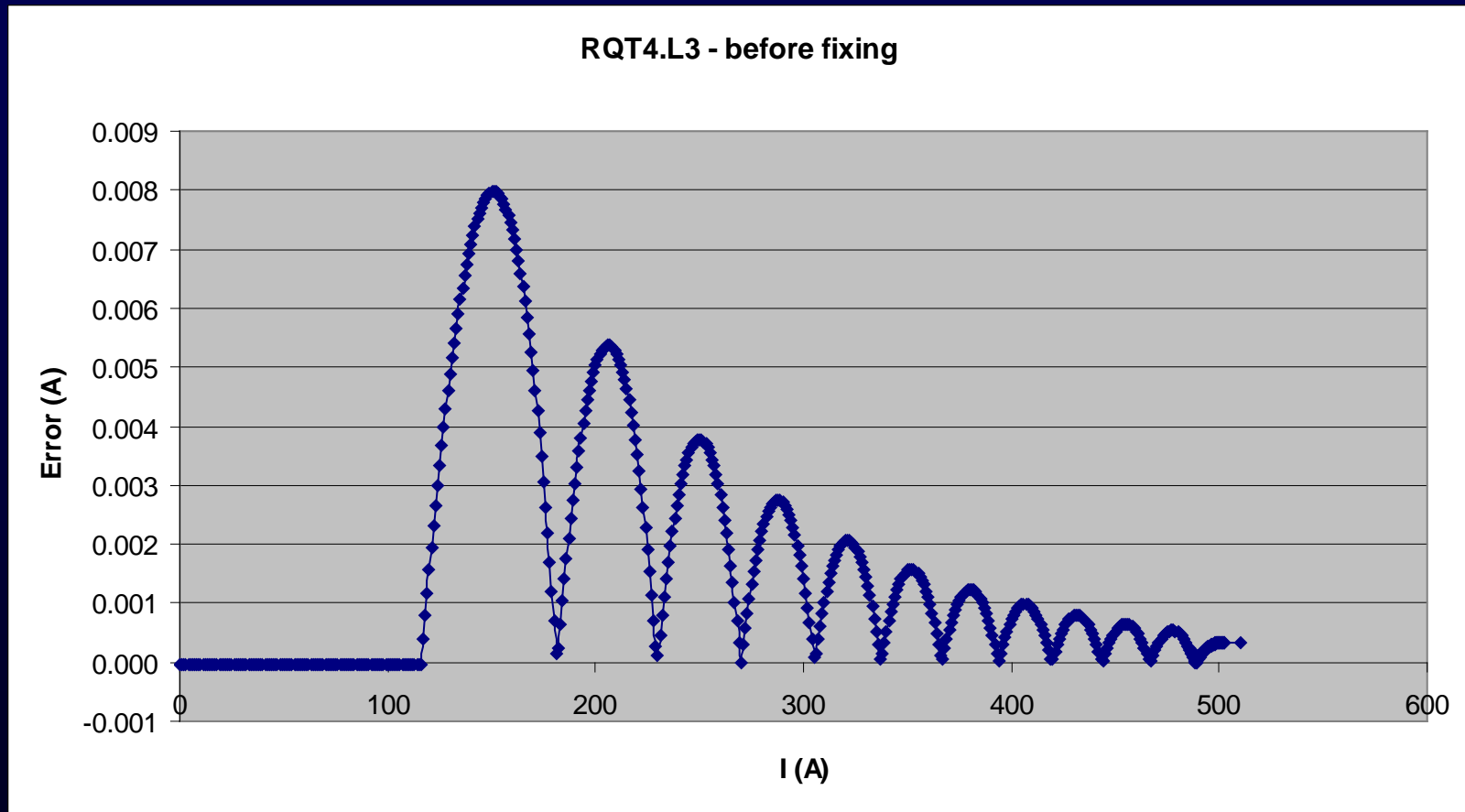
Cross-check status

- Results agree for almost all devices
- Orbit correctors check is pending
- Suspicious devices:
    - RBWMDV.L2
    - RBXWH.L8
- No FiDeL model
    - RBAWV.R2
    - RBLWH.R8
- Dynamic effects (decay and snapback) check is pending

Questions?

- ...