

Abstract

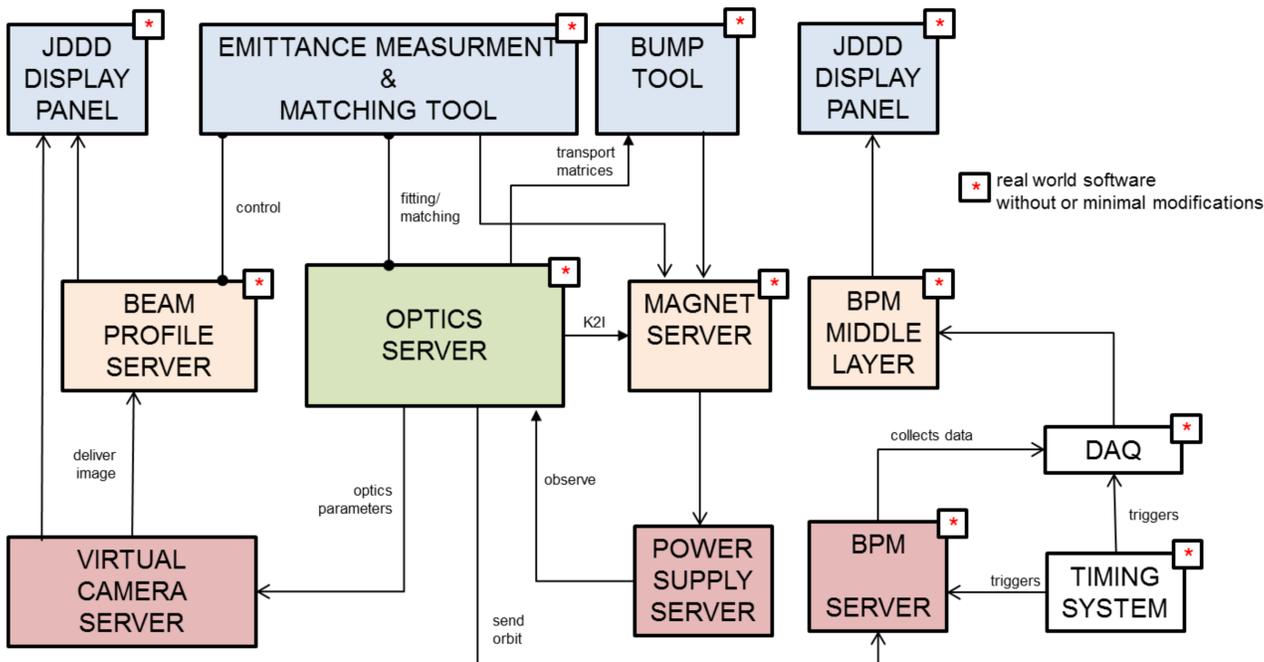
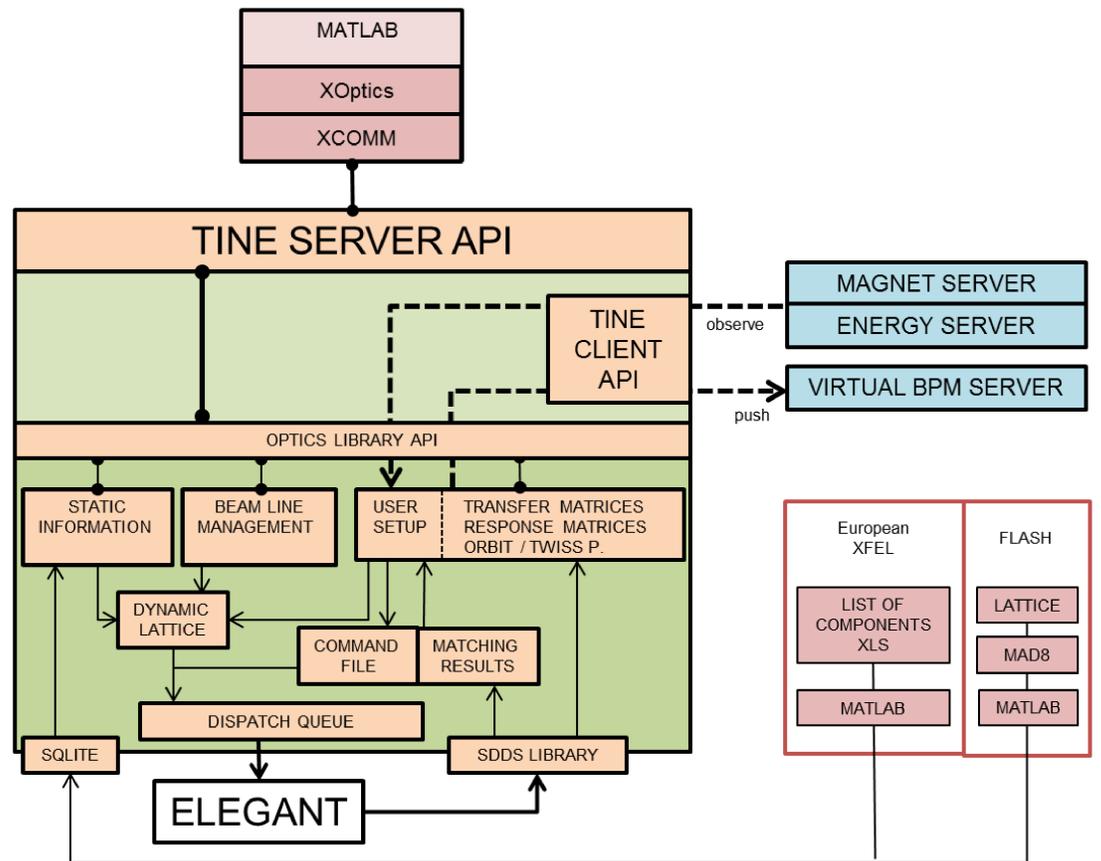
For the European XFEL and the upgraded FLASH Facility we require a toolbox for beam optics calculations. A newly developed software library manages accelerator parameters and dispatches beam dynamics calculations. Additional server components offer an interface between the library and the control system. A MATLAB interface allows convenient access to the optics server. This framework provides an online model which is integrated in the control system. It's used for a simulated European XFEL environment with realistic controls interface. We use this environment for extensive software developments and tests.

Optics Library

- Distributes static information about components and beam-lines
- Offers multiple beam-line setups
- Dispatches beam dynamics calculations to an external code (currently ELEGANT)
- Delivers transfer and response matrices, orbit, and twiss parameters
- Performs optics matching and parameter fitting

Optics Server

- Full access to all optics library functions
- Allows multi user access
- Online monitoring of current machine parameters
- Push orbit parameter to virtual BPMs



Virtual XFEL

- Development and test environment
- Real world hardware, servers, and high-level software
- Test capabilities of data flow concepts
- Machine status is simulated by our Optics Server

Use case: Orbit Bump Tool

- Orbit bump tool calculates kicks for closed orbit bumps and writes values to magnet server
- Magnet server converts angles to currents and updates the power supplies
- Optics Server observes currents and updates internal lattice
- Recalculated orbit will be delivered to the BPM Server
- Data flow from BPM Servers to control room orbit displays is similar to the real European XFEL

