DSP based Accelerator Applications at the COoler SYnchrotron COSY, U. BECHSTEDT, J. DIETRICH, F.-J. ETZKORN, R. MAIER, S. MARTIN, D. PRASUHN, A. SCHNASE, H. SCHNEIDER, H. STOCKHORST, R. TÖLLE, Forschungszentrum Julich GMBH - Modern floating-point Digital Signal Processors (DSPs) improve stimulus generation and measurement of beam parameters. We show 3 applications. As stimulus a DSP-based function-generator calculates sequences of 3rd order polynomials at 1 μs resolution to generate complex frequency, amplitude and noise band sweeps, necessary for ultraslow extraction. We analyse the spill by looking at detector signals of the actual experiment. Up to 1 million bins are sampled with a minimum bin length of 2 μs. A workstation calculates online-statistics (mean, max, RMS, Duty-Factor). So we can monitor for example all fluctuations up to 5 kHz of a 100 s spill. We can correlate fluctuations of the extracted beam to the kind of noise feeding the extraction process. We measure BTF and related parameters as transient response with a modular 2 channel vector-FFT-analyser based on VXI AD-converters and DSP-boards. From DC-20 MHz it operates without mixers. Mixers extend the frequency range to 20 MHz-3.4 GHz covering the operation regime of stochastic cooling. Specs: max. 12801 frequency lines, 1 mHz resolution, max. 8 MHz bandwidth, 800 lines complex FFT in 0.8 ms.