Control-theoretical approach for workflow management

The industrial scenario
An international aerospace organisation → large-scale simulations → aerodynamic simulation techniques → utilising complex processes run on a range of computer resources → workflows of ever-growing complexity → requiring increasing numbers of resources.

Problem formulation
Control theory → controlling admitting jobs into the system → via monitoring the QoS levels & compute resource states.

Initial work: PID-based admission controller
Single-CPU system.
Accept/reject jobs w.r.t. reducing Deadline hits.
Issues: single optimisation objective only.

Current work: MPC-based admission controller
Multi-CPU system.
Accept/reject jobs w.r.t to CPU utilisation and reducing deadline latency offset.