

# Framework for Integrating Experiment-Preconditioning Subsystems to Support Downline Shots on the Z Machine

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MOMPL05

# Implement new subsystems to enhance experimental initial conditions on the Z Machine

- Gas Puff Subsystem
  - Introduces nested columns of gas that the Z current pulse implodes
- Applied B on Z (ABZ)
  - Uses pulsed field coils to pre-magnetize deuterium fuel up to 30T
- These high current subsystems have tight timing, permissive, and integration requirements for proper operation when fielded on the Z Machine
- While not used simultaneously, both subsystems enhance capability of experiments performed on the Z Machine

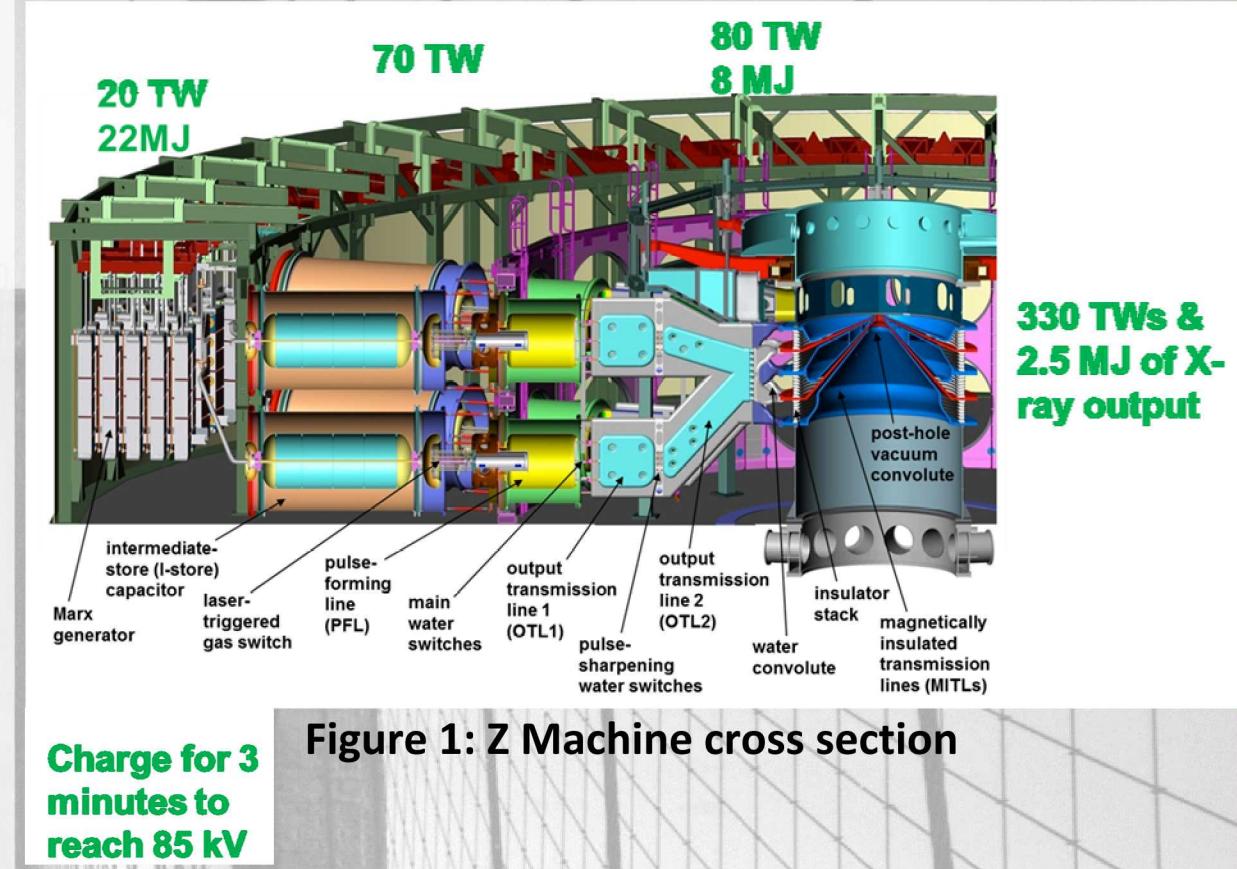


Figure 1: Z Machine cross section

# Common Framework for integrating subsystems in Z was used

- The Z Machine's control and monitoring system (CM) interfaces with all subsystems on the machine
- CM coordinates timing, parameters, and status of each selected subsystem every shot
- Architecting these systems to meet the CM interface requirements led to new methods of interfacing with CM
- Upgrading the Gas Puff subsystem to be autonomous would eliminate the need for human interaction. This has been successfully demonstrated on ABZ and would allow less reliance on personnel for shot operations

Figure 2: CM Interface

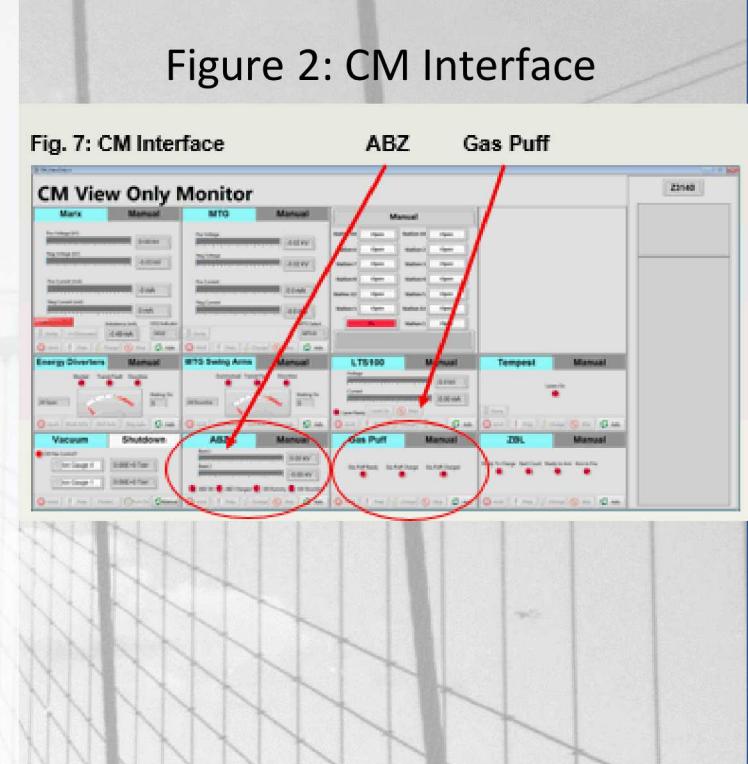
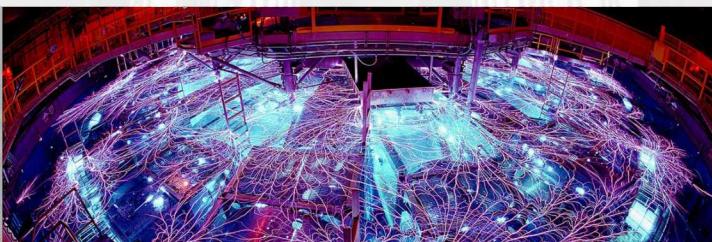


Figure 3: Z Machine Photo



# Gas Puff and ABZ had similar operational requirements and were implemented using a common framework

- Feedback of systems to CM uses software permissive and is critical for system operation
- ABZ and Gas Puff are implemented into CM in similar fashion to other subsystems
- User interfaces provide similar look and feel for user allowing for consistency in operation
- Integration efforts from Gas Puff and lessons learned helped with the successful deployment of ABZ
- Architecting these systems to meet the CM interface requirements led to new methods of interfacing with CM

Figure 4: ABZ Interface

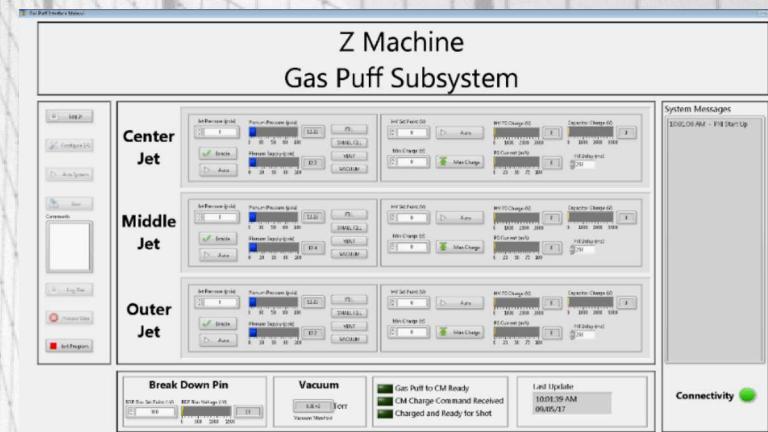
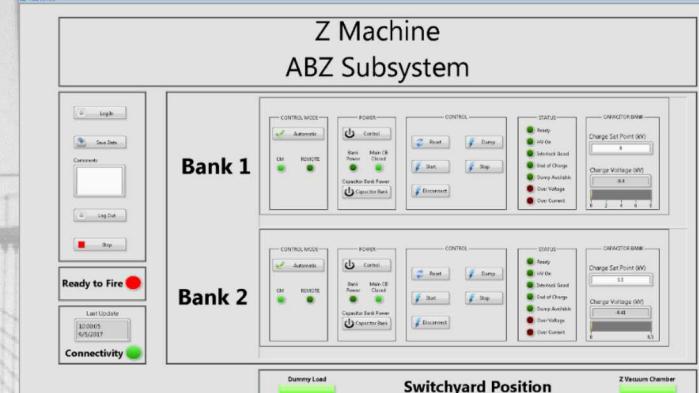


Figure 5: Gas Puff Interface