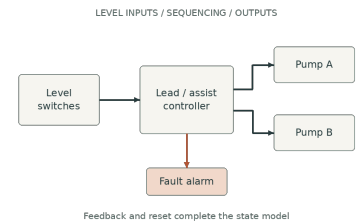


CONTROL SYSTEMS

Duplex pump controller

Alternate two pumps and make failure recovery predictable.



CONCEPT SCHEMATIC

Control brief; operating sequence to define

THE PROBLEM

Two pumps serve a collection sump. A simple level switch does not define which pump starts, when the second joins, or what happens after a failed start. This project specifies and tests that sequence before selecting control hardware.

SCOPE

- Build a deterministic state machine for lead rotation, assist demand, and minimum run times.
- Represent level inputs, running feedback, manual requests, and unavailable pumps.
- Simulate failed starts, conflicting sensors, and power restoration.

PLANNED DELIVERABLES

- Executable controller model and automated scenario tests
- I/O list, state diagram, and cause-and-effect table
- Hardware acceptance-test script and recorded simulation traces

CONSTRAINTS

Equipment

Two duty-capable pumps with independent running feedback

Inputs

Discrete level signals with explicit fault assumptions

Restart

Defined behavior after power loss and fault reset

Boundary

Supervisory sequencing; independent protections excluded

VERIFICATION PLAN

State coverage

Exercise every transition and verify command interlocks.

Fault injection

Replay stuck inputs, missing feedback, and simultaneous requests.

Repeatability

Run event traces against an independent table of expected outputs.

NEXT STEP

Define the level-switch arrangement, pump feedback, and permitted restart behavior.

No field operation is claimed. Electrical protection, emergency functions, and site commissioning require separate design and testing.