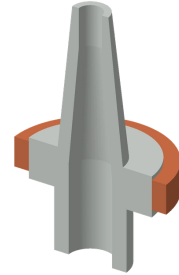


INTERNAL FLUID FLOW

Dispensing nozzle

Maintain the required flow while reducing the pressure the pump must supply.



CONCEPT ILLUSTRATION

Flow study brief; operating range to define

THE PROBLEM

A viscous liquid is dispensed through a restrictive nozzle. The outlet and mounting envelope cannot change freely, so the internal geometry needs a closer look. This study compares bore size, transition shape, and outlet length.

SCOPE

- Use a specified Newtonian liquid with known viscosity at a fixed temperature.
- Model steady, slow, rotationally symmetric flow through candidate nozzles.
- Compare required pressure, internal velocity, and retained liquid volume.

PLANNED DELIVERABLES

- Baseline and candidate nozzle CAD models
- Pressure-versus-flow comparisons and reproducible simulation inputs
- Selected nozzle drawing and a pump-pressure test procedure

CONSTRAINTS**Fluid**

Known, essentially constant viscosity

Flow regime

Steady, slow, single-phase flow

Geometry

Axisymmetric bore within a fixed mounting envelope

Acceptance

Required flow within a defined pump-pressure budget

VERIFICATION PLAN**Known flow solution**

Check the solver against a straight-pipe case with an analytical pressure-drop solution.

Mass balance and mesh

Check inlet/outlet flow balance and refine the mesh around transitions and narrow passages.

Operating range

Repeat the comparison across the required flow range and a realistic viscosity range.

NEXT STEP

Specify the liquid, temperature, required flow range, and available pump pressure.

This scope covers internal flow. Droplet formation, shutoff behavior, and physical dispensing accuracy need separate investigation.