Damper Standard System for MTS Systems Corporation

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How Many Engineers does it take to...
Problem Statement

To develop a damper standard which will be used to characterize the performance of MTS damper systems.

For internal use on the 850 system
What is a Damper?

Why is there a need for this system?

Currently MTS can accomplish:
- No-Load velocity testing
- Static load testing

- NO STANDARD FOR DYNAMIC LOAD AND VELOCITY TESTING!
- MAXIMUM LIMITS OF THE SYSTEM ARE UNKNOWN!
Considered Designs

Hydraulic Systems

Pneumatic Systems

Electro-Magnets

Magneto-Resistive Fluids

Selected Design

MTS Technician

Program

850

Damper Standard

Force & Velocity Feedback
Damper Standard Breakdown

Servo valve

Manifold

Actuator

Software Design
Completed Damper Standard

10 Hz or 126 in / sec

Testing

Procedure
- Half orifice adjustments
- Force limited by tested machine
- 1Hz – 16Hz frequencies

\[ F = A_p \left( \frac{A_{850} \cdot V}{S \cdot Q_{rated}} \right)^2 \cdot \Delta P_{rated} \]
Theoretical Model

Test Results
User’s Manual

- Instructions on how to use the damper specimen
  - Initial setup
  - How to run tests
  - Product information about the specimen
  - Warnings / Cautions
  - Trouble Shooting

Project Costs

- Total Cost ~ $31,500
  - Materials (actuator, servo-valve, manifold, hoses, fittings etc...)
  - 143 parts
  - Estimated $10,700
  - Labor
  - Student @ $10.00/hr = $13,000
    - About 1300 hours
  - Assembly = $6400
    - 19 hours
  - Engineering = $1400
    - 69 hours
Conclusions

- Multi-Disciplinary Project
  - Mechanical Design
  - Manufacturing
  - Fluid Flow
  - Heat Transfer
  - Software Design
  - Testing
  - Project Management

Questions?