AN ACTIVE TILTING SYSTEM FOR RAILWAY CARS

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ABSTRACT

When super limited express trains swing around one of the many curves on these older rail systems at high speed, centrifugal force can bounce passengers about. In order to keep passengers comfortable, they must slow down to negotiate curves. The active tilting trains controlled by pneumatic servo actuators keeps high speed and passengers comfortable. This whole system is composed of a curve detector, curve data memories, microcomputers making control signals, feedback circuits on swing angles and pneumatic servo actuators.

KEY WORDS

An Active Tilting Train Pneumatic Servo Actuator Passengers Comfort

INTRODUCTION

Advances in electropneumatic servo technology place increasing high performance pneumatic servo equipment in the new applications. The electropneumatic positioning servo actuator (described herein) is used to be provide very high reliability, highest actuation performance, high vibration and acceleration capability and good compliance at a range of high frequency, therefore suits railway cars with riding comfort. This discussion will focus on positioning system of electropneumatic servo actuator used in an active tilting system for railway cars

SERVO ACTUATOR

The artist's concept of Figure 1. and an explanation are in order for the person who is not familiar with an active tilting train.

A servo actuator is a high performance cylinder, servo valve and feedback transducer totally enclosed in assemblies specifically designed for an active tilting system. The installation details of servoactuator and the positioning system diagram with closed loop are shown Figure 2. The specifications of servo actuator are shown in Table 1.

Figure 1 Scheme of an active tilting system

DESIGN FEATURES

- Integral, co-axially mounted feed back transducer avoids inadvertent mechanical damage
- Directly manifolded servovalve minimizes pneumatic volume to give highest actuator stiffness.
- Heavy duty aluminum alloy cylinder tube coated with anodic oxidation and Teflon gives extremely long actuator cyclic life.
- Low pressure elastomeric rod wiper seals.
- Completely assembled and totally tested package.
- Simply constructed direct drive servo valve.

Table 1 Specifications of servo actuator

Supply pressure	5 bar
Operating temperature range	-20°C~60°C
Stroke	±150mm
Piston area	122cm ²
Weight	23kg
Servo valve rated flow	1500Nl/min
Servo valve rated current	0.7A 24V

Figure 2 Installation details & block diagram

REFERENCE

Seizi YUKAWA and others Active Tilting System for Railway Cars
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