

## TEST RIG for Endurance Study Of Gear Shift Mechanism

Dynaspede is at its best when it comes to Total Solutions right from conceptualizing through implementation of application Specific machines and control systems. What sets Dynaspede apart?... is that we enjoy working long hours..... on off-the-beat concepts..... that very often results in resolving problems than solving them. Our Special Projects Group (SPG) is a multi-disciplinary group of academicians and practicing engineers, working in an institutional atmosphere and well trained in the art of looking beyond the obvious.

Dynaspede offers a wide range of custom built test benches for endurance and production line testing.

**TEST BENCHES** designed and manufactured by Dynaspede include:

- Load testing of Engines.
- Engine friction monitoring
- Endurance testing or production line testing of Mechanical transmissions Viz., Gear boxes, Belt transmission, Chain transmission, Axles etc.
- Load testing of starter motors
- Load testing of wiper motors
- Testing of window regulators
- Performance evaluation of Alternators
- Test benches for defence and R & D institution.
- Load testing of Pumps.
- Customised requirements.

**SYSTEM COMPONENTS** for Test Benches Offered by Dynaspede include:

- Variable speed drives.
- Dynamometers
- Force and speed sensors.
- Dynamic loading system for 4 square test benches



### TEST RIG FOR ENDURANCE STUDY OF GEAR SHIFTING MECHANISM

#### **OBJECTIVE:**

The objective of this test bench is to validate the design limits of endurance of gear shifter linkages under cyclic operating conditions. The Test bench has adequate versatility to put to test a variety of designs and validate the design limits of endurance of the shifter linkages under adverse operating conditions.

#### **INTRODUCTION :**

The test bench automates all cyclic sequencing with dynamic simulation of load profiles arising due to acceleration and deceleration of inertial loads of vehicles. The sequential testing in single or double clutching modes of gear shifting are possible by appropriate set-up menu on a dedicated PLC system and associated man-machine interface. The test bench accepts the test unit consisting of transmission case, centre housing and trans-axles with the two wheels mounted on them. The gear shifting sequence and dwell time in each gear position, as mapped in the software, are repeated for a specified number of cycles or till onset of failure.

#### **TEST SETUP:**

##### **Mounting Arrangement:**

The Test unit, consisting of Transmission case, centre housing and trans-axle housing is supported on the two adjustable pillars and flanged to the test bed by means of interchangeable adapter plates. Adapter plates, suiting the dimensions of various models of transmission units can be used for mounting different types of transmissions.

##### **Gear/ Clutch lever actuation :**

Actuation of clutch mechanism and gear shifting lever are done through fast-acting pneumatic cylinders and associated electro-pneumatic devices controlled by a dedicated Programmable Logic Controller.

### **Force monitoring arrangement :**

Dynaspede's exclusively designed force sensors are employed to separately monitor the gear shifting forces needed to shift the gear lever between gate positions and gear engagement.

### **Drive Arrangement:**

The input of the transmission is driven at adjustable speeds by an induction motor speed controlled by an AC motor controller. The adjustable speed drive is programmed with dynamic braking for fast deceleration.

### **Speed Measurement:**

Dynaspede 48-pole AC Tachogenerator is used to monitor the driving speed of the transmission and the wheel speed is separately monitored by a specially designed pulse-resolver.

### **Control System:**

PLC based control system serves all the control needs of the Test Bench. The system automates all cyclic sequencing with dynamic simulation of load profiles arising due to acceleration and deceleration of inertial loads of vehicles. The sequential testing is in single or double clutching modes of gear shifting.

## **Questionnaire on the Gear Shift Mechanism**

### **1. Enginedetails**

Power ..... Speed ..... Torque .....

### **2. The transmission ratios:**

No. of forward gears ..... Ratio of each gear ..... Ratio of reverse gear .....

### **3. Stroke length required**

Between the gate positions (mm) .....  
Stroke length between gate and gear position (mm) .....

### **4. Lateral force required for gate positioning (kgf) .....**

### **5. Gear engagement force (kgf) .....**

### **6. Parameters to be monitored:**

\* Input speed / driving speed ..... \* Wheel speed .....  
\* Force for gear engagement ..... \* Any other parameter .....

### **7. Accuracy of measurement .....**

### **8. Automation**

\* PLC based control system \* PC based control system  
\* Control panel without PLC & PC \* Any other automation required

### **9. Test Cycle Time**

Time of total test (hours) .....  
Time for each cycle (secs) .....

*For more details and application assistance, contact:*



## **Dynaspede Integrated Systems (P) Limited**

136 A, SIPCOT Industrial Complex, Hosur – 635 126 (TN), INDIA  
phones: 04344-276915 (5 Lines)  
fax : 04344-276841  
email : mail@dynaspede.com  
web : www.dynaspede.com

**\*Bangalore \*Baroda \*Calcutta \*Chennai \*Delhi \*Lucknow \*Mumbai \*Secunderabad**



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