YASKAWA introduces Low Harmonics Regenerative Matrix Converter U1000 drive with inbuilt regenerative unit for Engine testing machine, has successfully installed in Accurate Test Equipment’s & Engineers Pvt Ltd, Kolhapur. Accurate Test Equipment & Engineers is well known for manufacturing of Engine Test Bench machine for automobile industry, DG set machine located in Kolhapur, Maharashtra.

**Application Overview**

**Why an Engine needs a test??**

- To find out performance before mass production & fitting it into a vehicle
- To improve the design & configuration, integrate new materials & technology.
- To find out the power & fuel consumption, also to test effectiveness of cooling, vibration, noise, lubrication & controllability etc.
- To reduce harmful emission & comply stringent regulation.

**Dynamometers-**

A Dynamometers or dyno is a device for measuring force, power or torque. For example, the power produced by an engine, motor or other rotating prime mover can be calculated by simultaneously measuring torque & rotational speed.

**Types of Dynamometer:-**

- Water Dynamometer
- DC Dynamometer
- AC Dynamometer
- Eddy Current Dynamometer
In Accurate Test Equipment & Engineers, we used AC Dynamometers with U1000 drive.

In Engine testing machine, Dynamometer operates in two modes

1) **Speed Mode:** In speed mode, there are various test to be performed.
   a) **Friction Test:** - In this test, Dynamometer operates in motoring mode with given Speed demand & engine is in off state.
   b) **Part Throttle Test:** - In this test, Dynamometer operates in motoring mode but with part throttling to the engine.
   c) **Performance Test:** - This is very important test in speed mode. In this test, engine is on state & dynamometer has to run in regenerative mode. In this mode engine runs at a certain speed & dynamometer has to load the engine with speed demand given by the system, which lesser than the engine speed & generated torque is to be measured through HMI.
   
   Example: - If engine is running at 1066 rpm & dynamometer is in off condition as shown in graph 1.1 at cursor V1. In cursor V2 dynamometer is running at 769 rpm which is the speed demand by the system to load the engine, to measure the parameter.

2) **Torque Mode:**
   In Torque mode, there are various test to be performed as mentioned below
   a) **Motoring Torque:** - In this test, dynamometer has to run with set torque demand but in motoring mode.
   b) **Regenerative Torque:** - This is very important & critical test in torque mode. In this test, dynamometer has to run with set torque demand but in regenerative mode. In this test, torque response is very important.

   For Example: - Engine is running in torque mode & trend is mentioned in graph1.2. At Cursor V1 engine is running & dynamometer is in off condition & In Cursor V2, engine is running with set torque demand of -19.1%, to load the engine. Here (-) indicates the dynamometer operates in regenerative mode.

**Benefits:**
- Fast Torque response
- Energy Regeneration during regeneration
- Low inertia with AC dynamometer
- Easy installation process
- Less Harmonics (compliance IEEE519)
- Improved Power factor (>0.98)