SIEMENS

Whitepaper

Test Stands Industry

Energy savings when using Siemens drives and motors

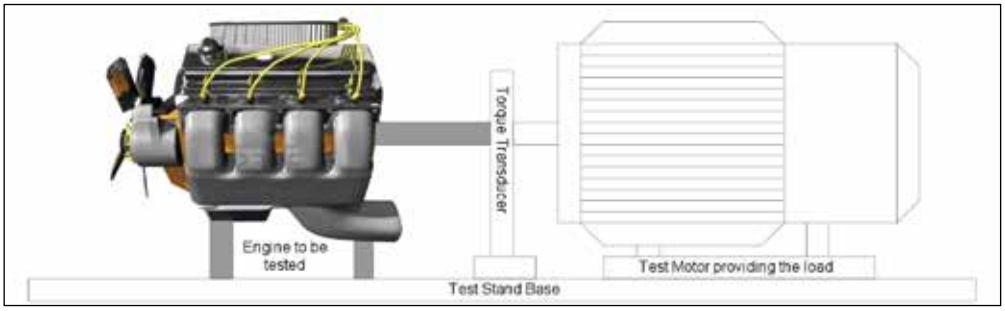
usa.siemens.com/energysavings

Everyone is aware that using a variable frequency drive with a motor will result in energy savings. But there is no other application like a test stand application that can have such a dramatic savings. In the following pages we discuss several test stand applications examples and how the Siemens test stand solution will result in savings.

Energy Generation

One type of test stand consists of an engine or any other self driven machine that needs to be tested for performance or endurance. In these test stands, a Siemens Motor is used to "load" or hold back against the part under test. This part could be an engine, a turbine, an electric motor, or any other device that rotates under its own power.

Figure 1
Engine Durability Test Stand



In the diagram above an engine is gas powered. The customer might need to test this for endurance or for performance. The engine will run on gasoline and the test stand must hold back against the engine to provide the proper hold back torque needed to test the part. In the past, a water brake was used to hold back against the shaft of the engine. An alternate solution is to use Siemens Variable Frequency Drives and Motors instead of the water brake. With this alternative, the motor acts as a generator while holding back against the engine. The Siemens motors are around 92% to 97% efficient and the drives are typically 96% to 97% efficient. This means that as much as 95% of the energy from the engine can be utilized in the rest of the engine plant. For example, if a 400hp engine is being tested, 286kw of power would be generated for use in the rest of the engine plant. With the water brake solution, the power created by the gas powered engine is wasted. If a factory has many endurance test stands running for many hours, the power generated is huge.

There is also other savings associated with the Siemens solutions. There is lower maintenance cost associated with a VFD solution due to the elimination of the water cooling system. The energy associated with the pumps to move the water and the fans of the cooling tower also can be eliminated.

Siemens Solution has other important benefits. For example, the VFD used by Siemens is usually an active front end (AFE) drive which insures the power generated is clean power. With ordinary regenerative drives, the power generated has poor harmonics. The Siemens AFE drive has the minimum possible harmonics. Poor harmonics in a supply system cause additional energy losses, defective operation of other electrical equipment, reduced life on other electrical equipment, nuisance tripping of other electrical equipment, and reduced performance of other electrical equipment. This is a very important feature that should not be overlooked when selecting a drive for this application.

Another advantage of the Siemens Solution is the AFE drive can control power factor. So if your factory has good power factor, the drive can be setup to run at unity power factor. If your factory has poor power factor, this will cause the utility to have reduced capacity and the utility will often fine the consumer for poor power factor. With the AFE drive, the drive can be setup to run from 0.8 PF leading to 0.8 PF lagging. This can compensate for the other poor power factor in your facility to possibly eliminate the fine from the utility.

prepared by:

Chuck Fernandez
Consulting Applications Engineer

Siemens Industry, Inc.
100 Technology Drive
Alpharetta, GA 30005

phone: (770) 740-3000

e-mail: charles.fernandez@siemens.com
web: usa.siemens.com/energysavings

Energy Savings by using a Common Bus Drive Lineup

These test stands must do both the turning of the component (referred to as the “Input”) and the holding back of the component (referred to as the “Absorber”). Examples of a common bus test stand would be a Transmission Test Stand, a gearbox test stand, and a generator test stand. This type of test stand has a huge energy advantage for the user because the input motor uses the energy generated from the absorbing motor. Very little energy is required from the utility. In the example below, there are two 1000hp motors connected to a gearbox. In a normal drive lineup, we would supply a 2000hp bus supply or infeed. Since the absorbing motor is holding back against the input motor, it is regenerating to the DC Bus. The input motor gets a majority of its energy generated from the absorbing motor. Therefore, the infeed might only be sized for 200hp with a transformer to match. See the example one line below.

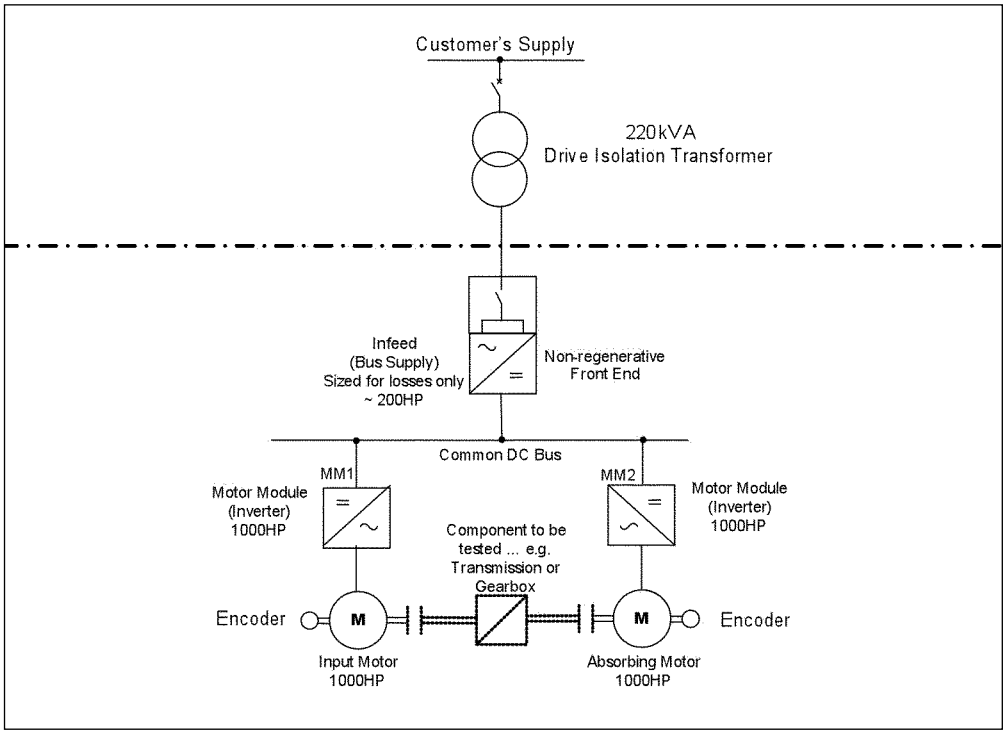


Figure 2
Input-Absorber Common Bus Application

This solution reduces the wiring from the supply into the drive system. Instead of 3000 amp cable, only 300 amp cable is needed. The same is true of the amount of energy that is required. This solution puts very little energy demand on the utility.

An AFE drive could be used on the front end but it is not necessary due to the common bus approach. A much less expensive diode rectifier front end could be used which would significantly reduce the customers pay back time.

Application Support

Test stand applications are all slightly different and the test stand customers often have different goals. Siemens has application engineers who are very experienced in the test stand industry. These engineers have experienced hundreds of different types of test stands from energy generating engine test stands to the complicated transmission test stand to simple pump stands and even unique test stands like crash test stands. These engineers are available to help specify the solution that matches the customer’s needs. Contact your Local Siemens Sales Representative to maximize the energy savings and the return on investment on your next test stand project.

Siemens Industry, Inc.
5300 Triangle Parkway, Suite 100
Norcross, GA 30092

1-770-871-3800
drives-marketing.industry@siemens.com

Order No. INWP-TSTSD-0813

Printed in USA

usa.siemens.com/motioncontrol