



# **BURGI ENGINEERS LLC.**

TO: Rudi.Guo  
General manager  
SHANGHAI JY SEIKO MACHINE CO., LTD  
No. 81, 419 Lane, Ju lianRoad  
Baoshan district,  
201907 Shanghai, China

1/22/2015

Dear Mr. Guo

Along with this letter please find additional information about our company. Burgi Engineers is primarily a contract engineering company which specializes in mechanical and electrical design related to rotating machinery, high performance AC motors and associated applications including test stands. We provide project management including planning, costing estimating, cash flow management, personnel oversight, design, manufacturing, installation and startup. Our approach to all projects is comprehensive, giving consideration to the final application and installation requirements, intricacies and constraints. The attached qualifications list shows a few similar projects we have managed for others which speaks to our experience. Turnkey systems designed and built to meet our customer's requirements are also available.

Burgi Engineers is dedicated to providing value to it's customers. To that end qualified and capable people are employed, effective design and productivity software is utilize and our work stations are high performance. Our design software is SolidWorks. We take full advantage of the features available in this software to increase our accuracy, repeatability and efficiency. We use Microsoft project for project management and other time tracking software to help us manage our resources effectively.

To answer your specific questions Burgi Engineers employees 19 People. Of these people 10 are engineers, 4 are administrative 2 are technicians and 3 are machinists.

We have in house machining capability to produce our smaller line of motors. Many of the components we would manufacture for your system would be manufactured by outside contractors. We would do the assembly and testing. We have testing capability that includes, regenerative variable frequency drives rated to 600amps, Variac voltage supply, Schenck vibration monitoring equipment, Schenck balancing equipment, Power analyzer equipment, and necessary cooling and lubrication equipment.

We have designed large high speed motors with inertia of  $15\text{kgm}^2$  operating up to 8000rpm. We have built assemblies weighing 12,000kg. We have the design experience and knowledge to build the system you requested. Our largest gearbox designed to this date is rated at 300Hp and 28,000 rpm.

Thank you for your consideration of Burgi Engineers to work with you to meet your project design and management goals.

Sincerely

A handwritten signature in black ink that reads "Robert C. Burgi". The signature is written in a cursive style with a large, stylized 'B'.



## Summary of Qualifications

2015

- **Over 200 years of combined engineering experience in machine design, system integration and mechanical engineering contracting related to:**
  - **Rotating machinery design and trouble shooting**
  - **Variable frequency drive and AC motor system integration**
  - **Electro-mechanical and hydraulic systems integrator.**
  - **AC Electric motor design**
    - **High and Low Speed, Squirrel-Cage**
    - **Liquid Cooled motors**
    - **Air Cooled motors**
  - **Machine structure design.**
  - **Structural engineering to UBC codes.**
  - **Process machinery design and trouble shooting.**
  - **Wind energy system design modification and operation.**
  - **Power transmission design includes V-belt and timing belt drives, ring and pinion gear drives, worm gear drives, hydraulics and pneumatics, spring-loaded clutches and brakes, and magnetic couplings.**
  - **High speed couplings**
  - **Experienced in automation design including integration of robotics, end effectors, pneumatic and servo-controlled actuators, stepper motors, leveling mechanisms, position sensing and control systems.**
  - **Extensive experience & knowledge of manufacturing methods including die castings, investment castings, vacuum castings, sand castings, spin castings, forgings, weldments, plastic injection moldings (thermoset & thermoplastic), cold-headed parts, screw machined parts, hobbed gears and sprockets, stampings, powdered metal gears and sprockets, extrusions (aluminum, plastic and rubber), laser cuttings, water jet cuttings, wire EDM patterns, rolled threads, splines and worm gears, magnets, permanent-magnet electric motors, ultrasonic welding and CNC machining.**
- **SBA Hub Zone Certified**
- **CCR registered. Cage Code 4SE77**



**BURGI**  
ENGINEERS LLC

1091 Rose Crossing, Unit B, Kalispell, MT 59901  
Phone: (406) 257-2734 • Fax: (406) 257-2733

- **D& B # 96-465-2010**
- **Experienced with solid modeling CAD programs including Solidworks Unigraphics, ProEngineer, Catia and Autocad.**
- **Finite Element Analysis with Algor and Cosmos design software for stress analysis, dynamics analysis and heat transfer analysis.**
- **Educational background of Burgi Engineers employees includes Bachelors Degrees in**
  - **Mechanical Engineering**
  - **Electrical Engineering**
  - **Agricultural Engineering**
  - **Engineering technologies**

**References: Provided on request**



*Delivering Unique Solutions  
for High Performance Rotating  
Machinery Systems.*

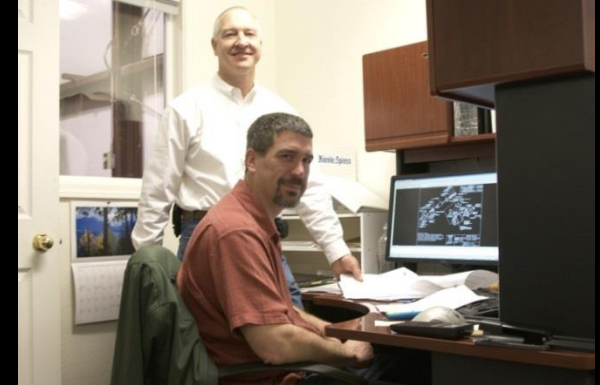
## In business since 1990.

- Currently 10 degreed engineers on staff.
- Core competency in the design and build of custom rotating machines for high performance applications.
- Primary products are fully integrated, liquid cooled, motor and gearbox drive packages.

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ENGINEERS LLC

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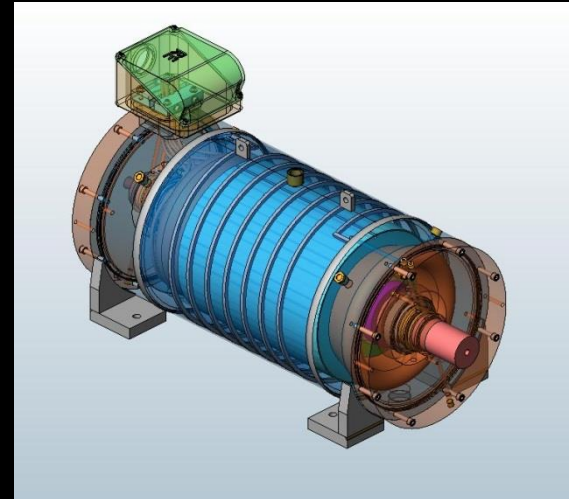




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## Capabilities

- Mechanical engineering
- Electrical engineering
- Rotating machinery design for custom applications
- Gearbox design
- Coolant and lubrication recirculating systems
- Control panels
- Support structures
- System Integration
- Parametric design using Solidworks
- FEA analysis
- Project Management
- Over 100 Years of machine design experience in house







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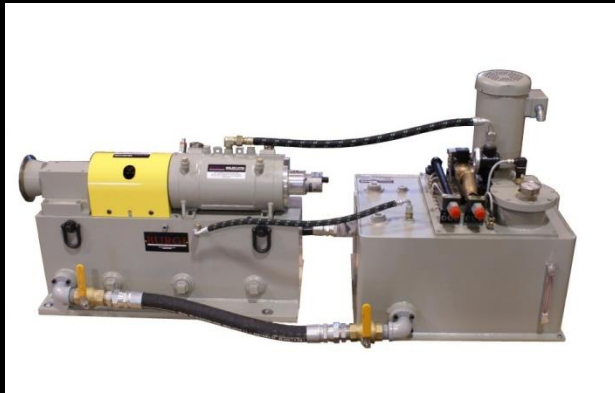
- **CUSTOM AND STANDARD DESIGN  
HIGH PERFORMANCE AC MOTOR  
SYSTEMS**
- **TEST STANDS AND  
DYNAMOMETERS**
- **COOLING AND LUBRICATION  
SYSTEMS**
- **CUSTOM GEARBOXES**
- **VARIABLE FREQUENCY DRIVE  
INTEGRATION**
- **AIR OIL LUBRICATION SYSTEMS**
- **SHAFT MOUNTED SPEED  
FEEDBACK DEVICES**
- **MOTOR CONDITION SENSOR  
MONITORING**







*Delivering Unique Solutions  
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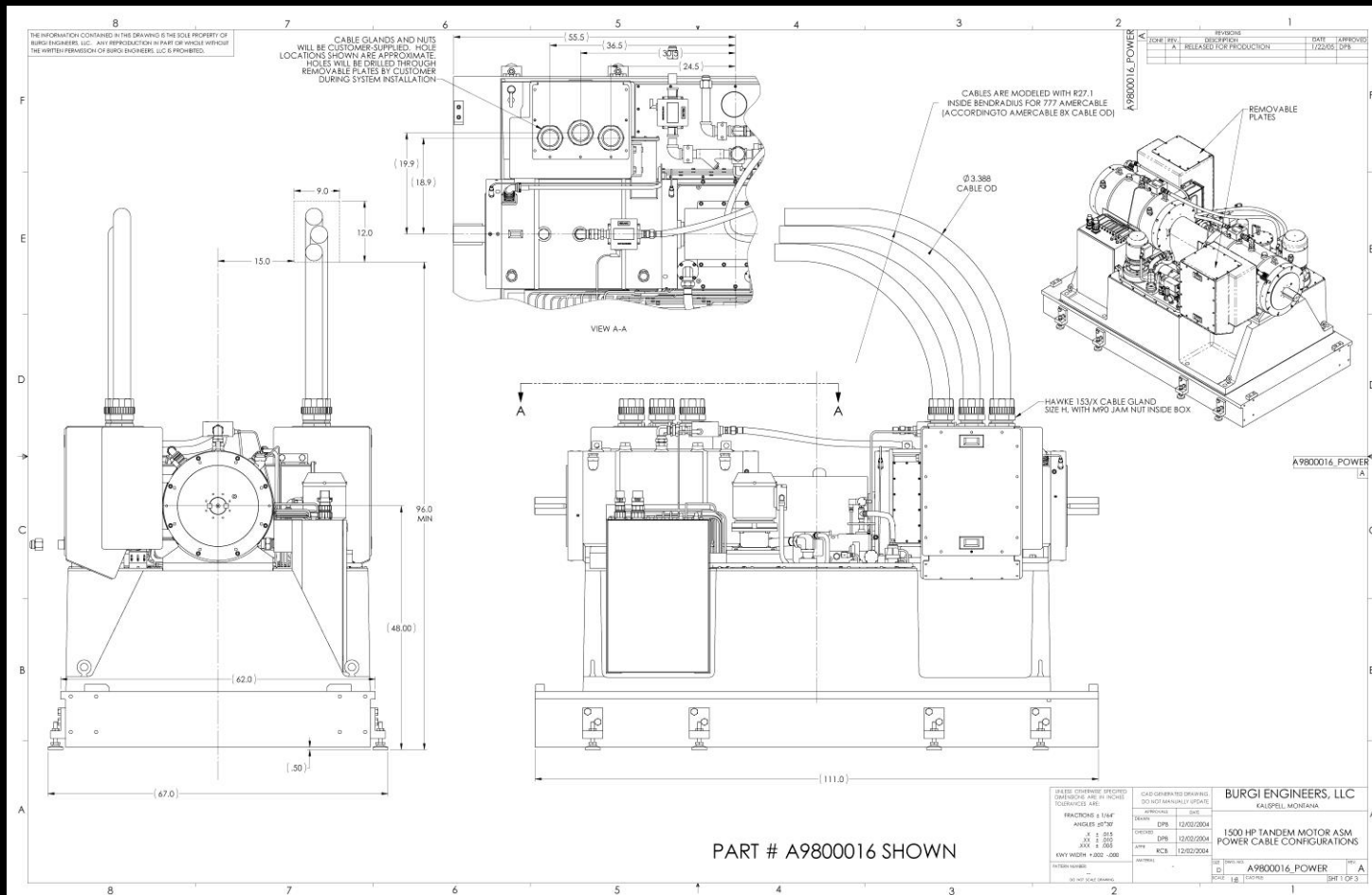




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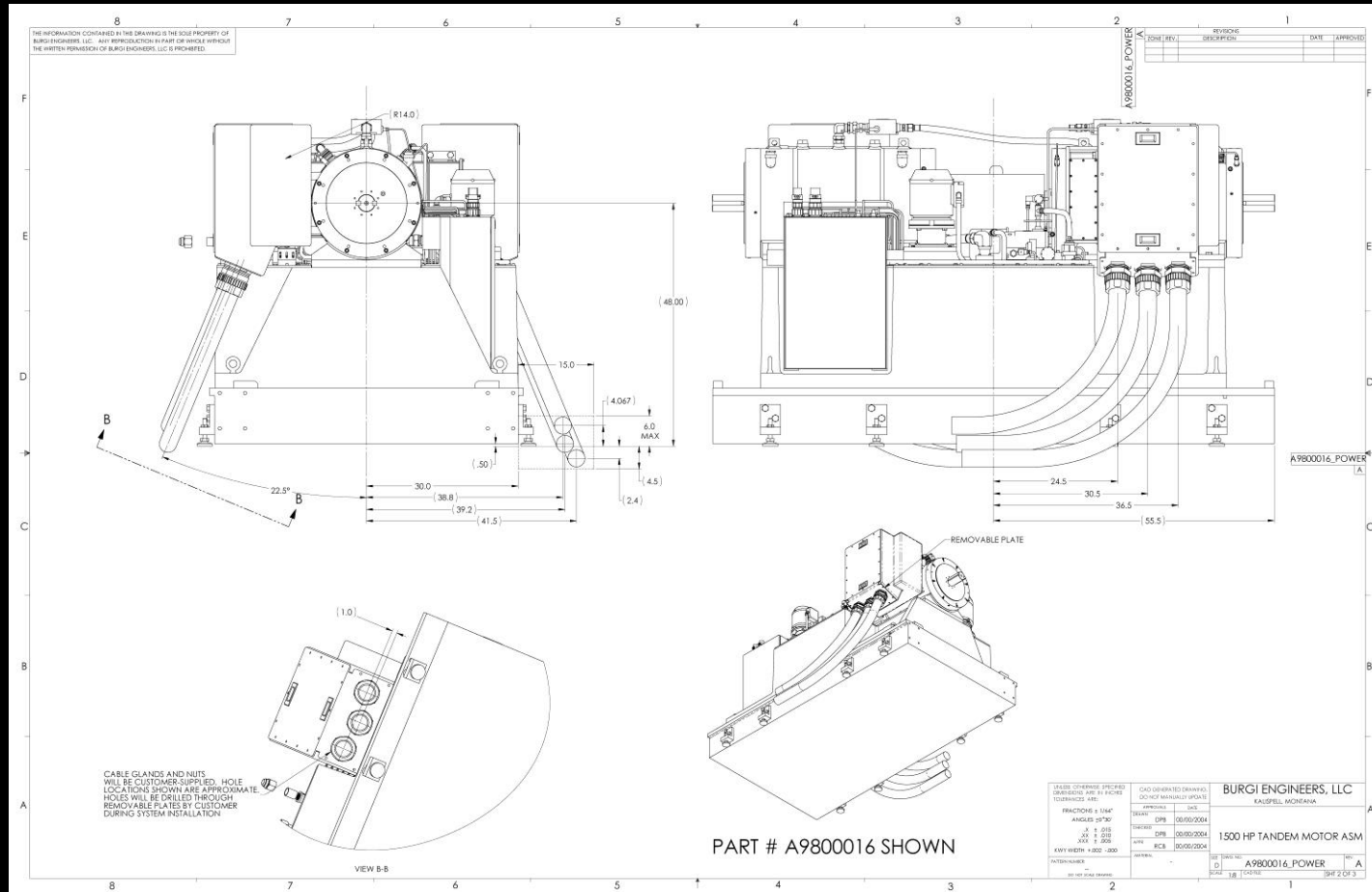
Delivering Unique Solutions  
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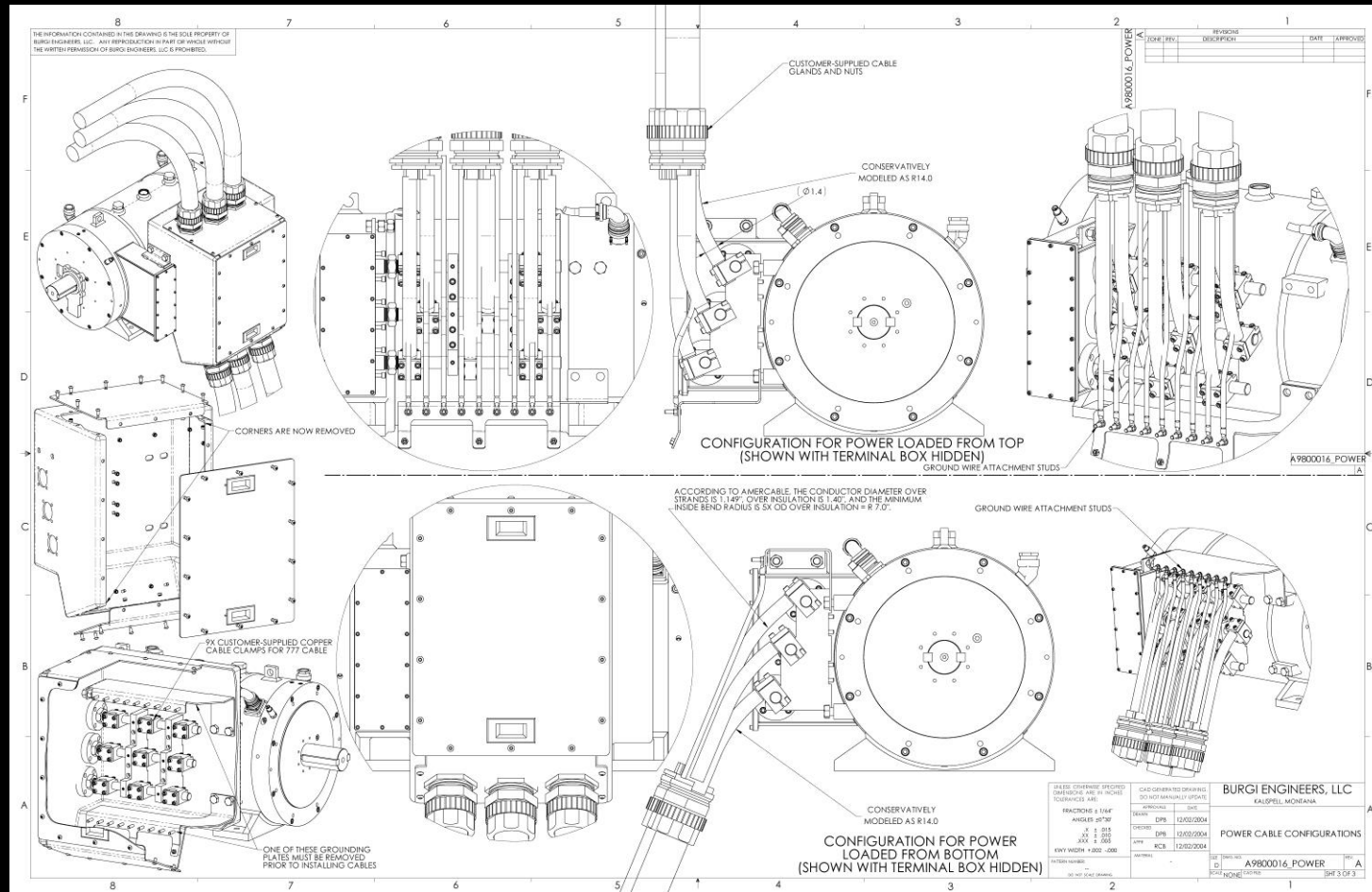
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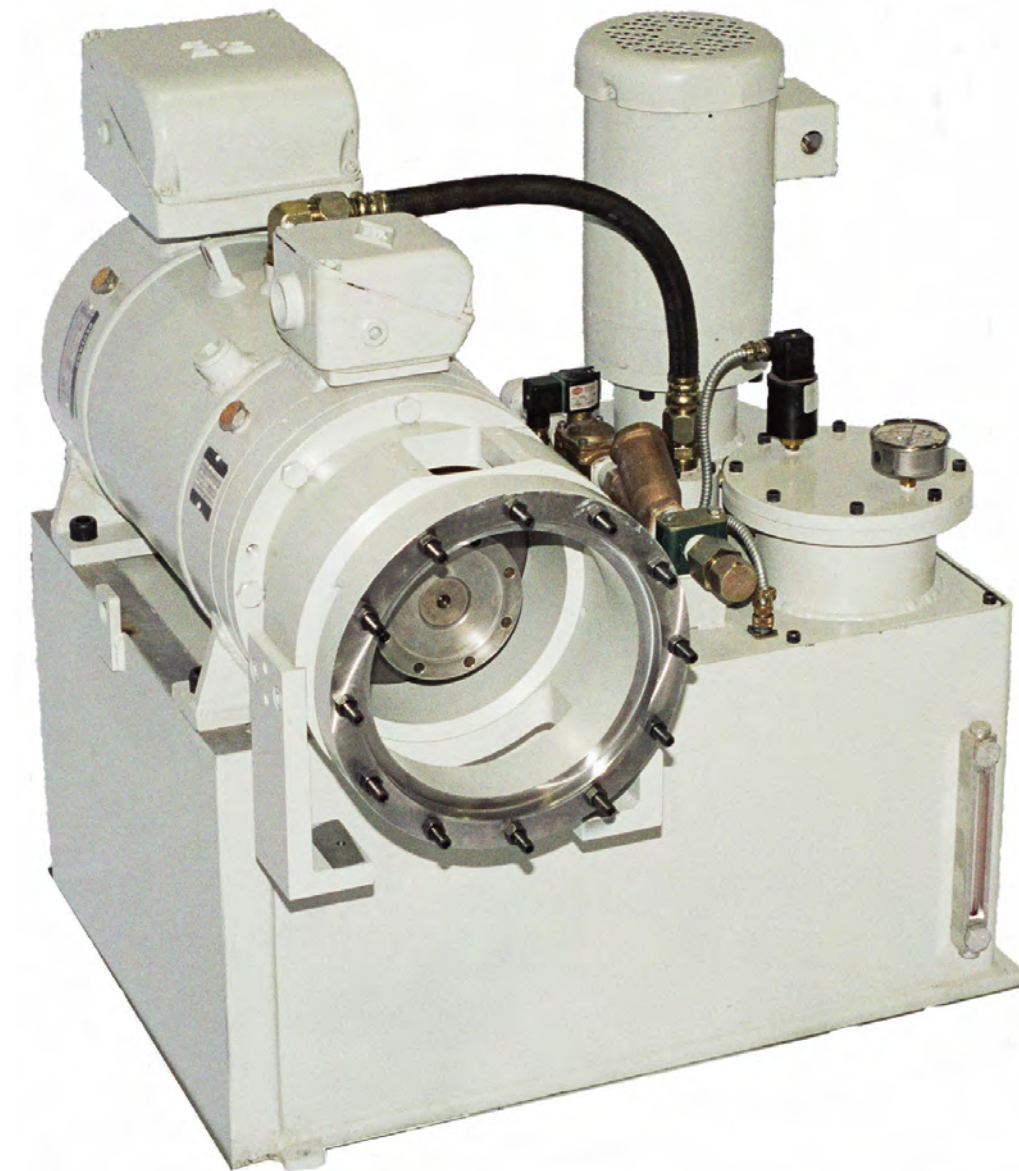
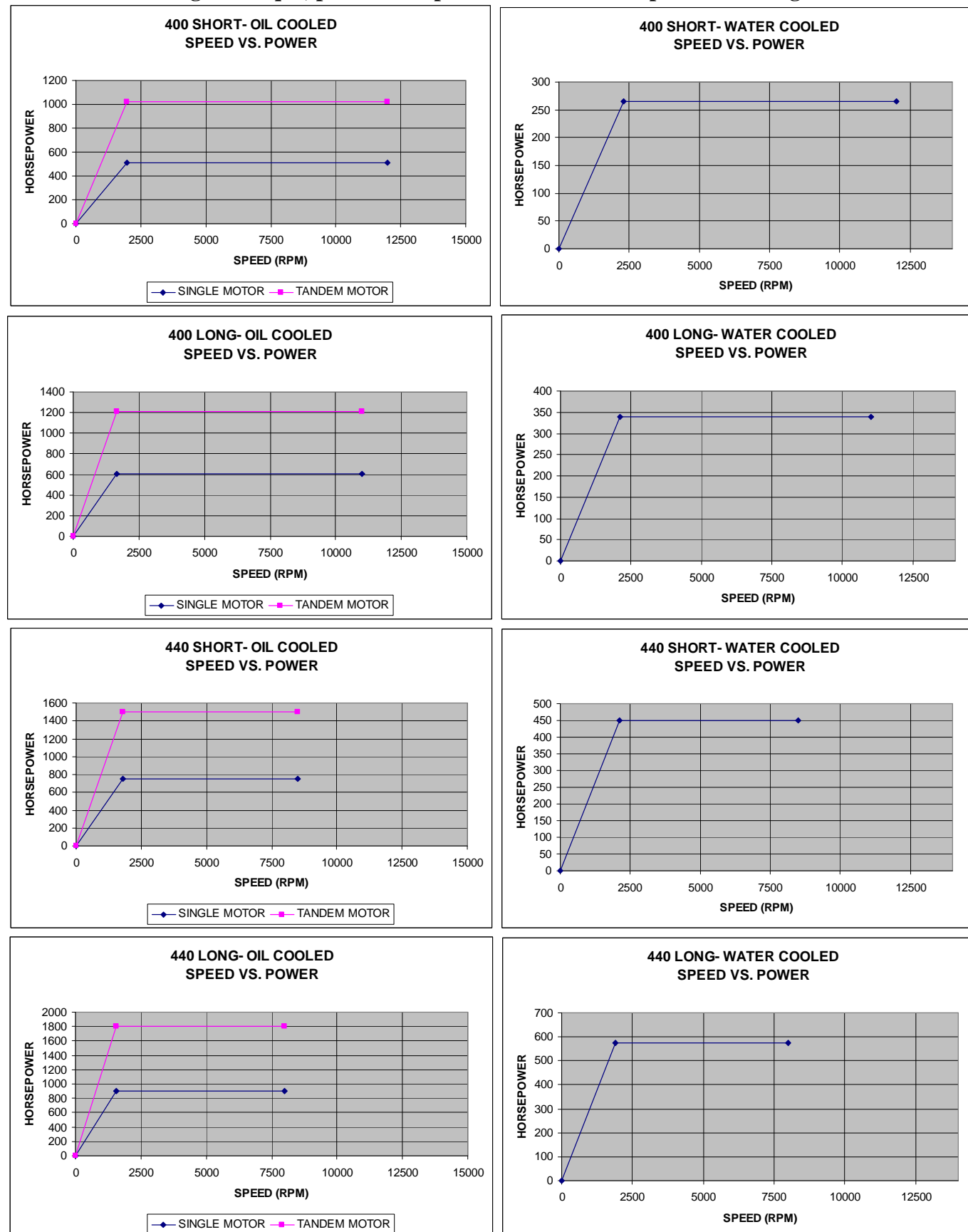




# High Performance AC Motor Systems

## STANDARD MOTOR RATINGS (contact the factory for inertia values)

Higher torque, power and speed are available in specialized designs



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1091 ROSE CROSSING  
KALISPELL, MT 59901  
(406)257-2734 FAX (406) 257-2733  
[WWW.BURGIENGINEERS.COM](http://WWW.BURGIENGINEERS.COM)



## High performance test stands

Burgi Engineers LLC is the choice when it comes to custom and high performance AC motoring and absorbing test stands. That's because we design the motors we use in our test stands. When we build a driving or absorbing test stand system we have complete knowledge of what is being built from the materials being used down to the fit between the motor rotor and shaft. Because we design it, we know among other things the electrical design, the natural frequency of the rotor, bearing stiffness values, rotor yoke stress levels and we know the heat transfer data for the various parts of the motor. This gives us an edge over many test stand builders when it comes to integrating custom and high performance AC motors into test stands. Our mechanical, structural and electrical design and analysis capabilities allow us to create test systems that optimize performance. We have a large range of motor ratings to choose from to meet your requirements. We also have the ability to tell you quickly what we can do in terms of custom power curves, speed performance and interfaces. We have years of experience that allows us to consult with you on options that other integrators and motor manufacturers do not recognize or understand. This gives you the advantage in your development projects because you have more sophisticated testing capabilities.

We offer a broad range of custom and high performance motor options ranging from air cooled to internally liquid cooled. We have years of experience dealing with specialized motor cooling. We have developed a number of cooling and lubrication systems, the most specialized of these offer cooling and lubrication fluid conditioning and degassing. Mist handling equipment is also available.

We offer monitoring and control packages. We also offer air oil lubrication systems.

Thanks to modern variable speed motor drives known as variable frequency drives or VFDs it is possible to design an electric motor to provide a specific torque to speed profile. Variable frequency supply allows for variable speed control. With closed loop operation very accurate control of speed is possible. Integration of shaft torque transducers allows accurate control of motor torque by the VFD. With proper control methods and utilizing power dense, low inertia motors, real world loads and load profiles can be generated. We work with many manufacturers of motor drives to provide systems with a broad range of performance capabilities.

Please call us to discuss your system needs.

## Liquid cooled machinery delivers the following superior performance for demanding applications:

- 1. High power and high speed:** Speed dictates the size of rotating machinery. Mechanical stresses are greater at high speeds which drives high speed machinery into smaller packages. If power and speed requirements are high, then enhanced liquid cooling can be used to increase heat transfer efficiency and allow higher power density.
- 2. Low Inertia Requirements:** Designers specify low inertia when they want a responsive system. Low inertia dictates small rotor diameters for electric motors. For a given power rating, a smaller rotor will require enhanced heat transfer through liquid cooling.
- 3. Size and Weight Restraints:** When the envelope for a machine is small, or weight constraints drive the machine size down, then a liquid cooled machine in a smaller frame size can be utilized.



Liquid Cooled Motor



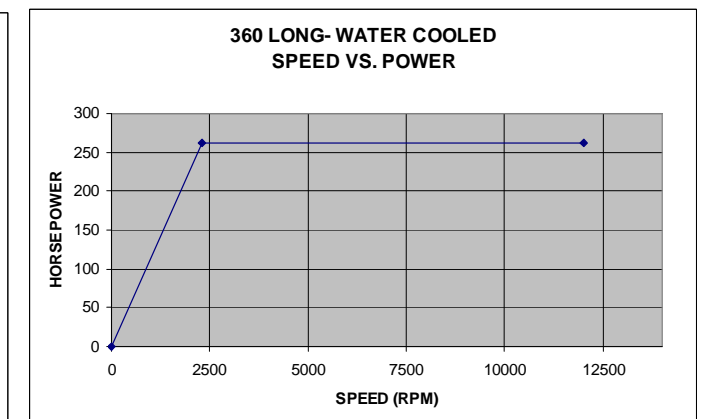
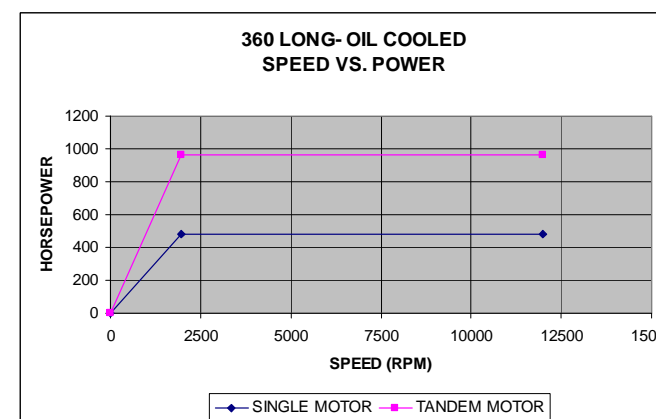
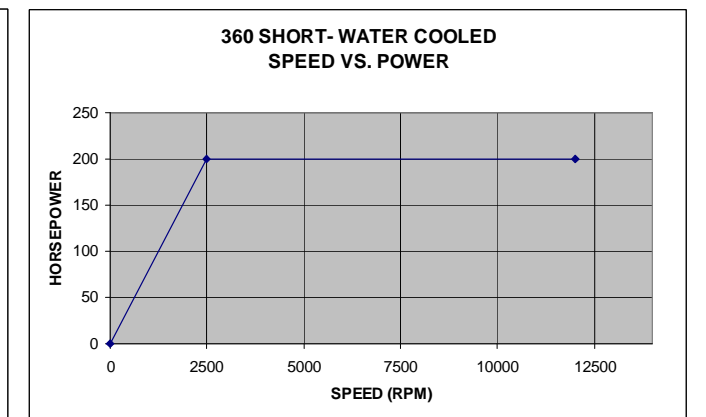
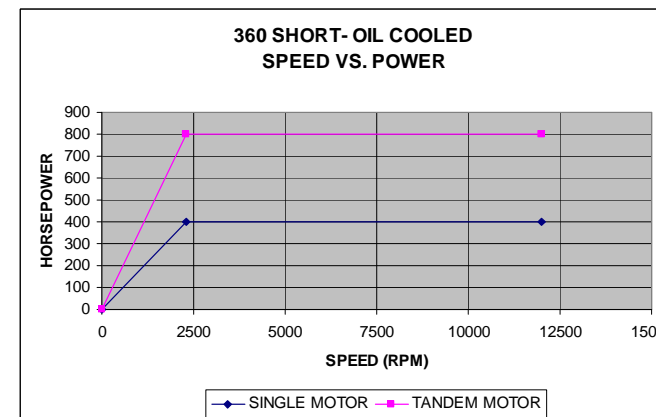
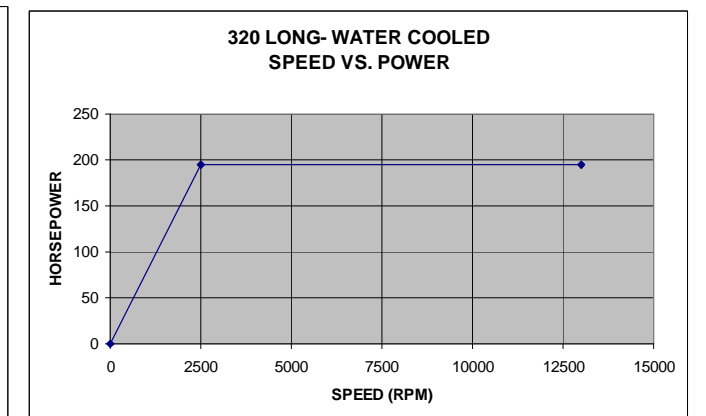
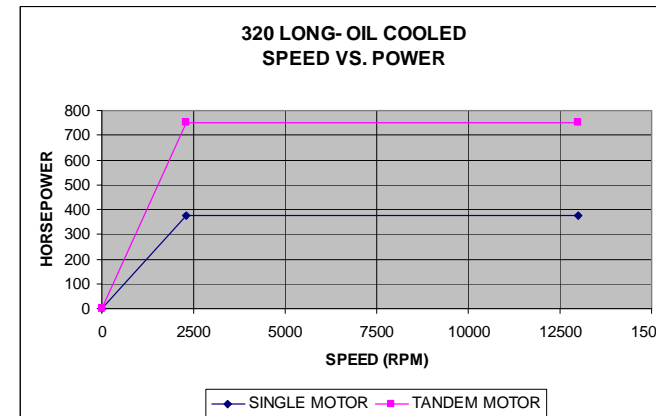
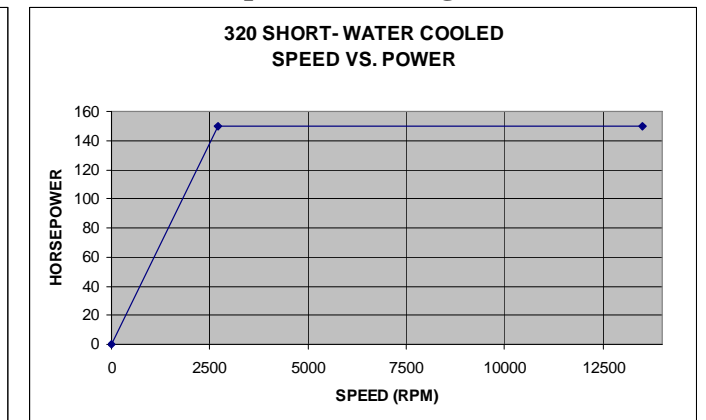
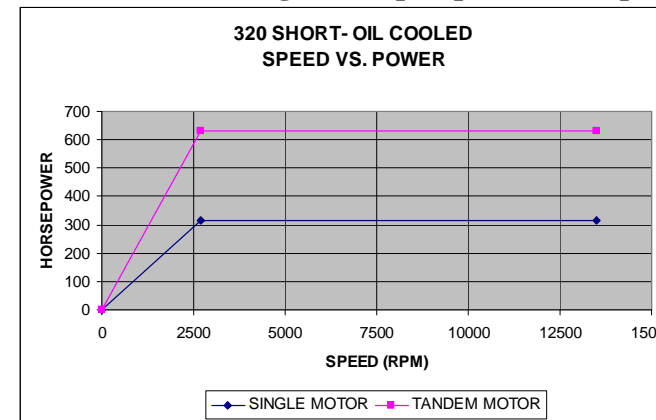
787 Starter-Generator Test Stand Motor System



Helicopter Gearbox Test Stand

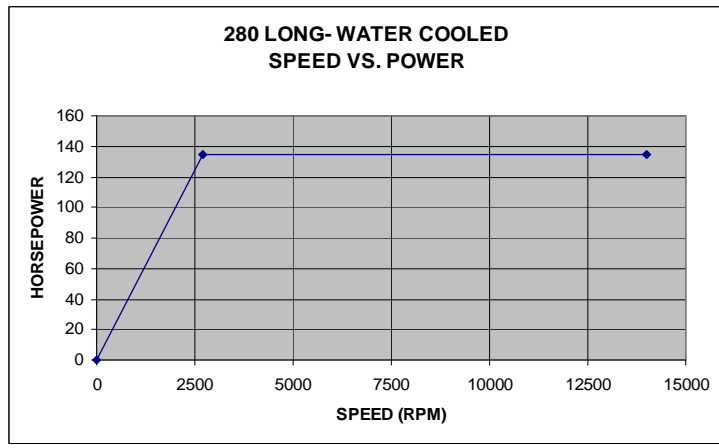
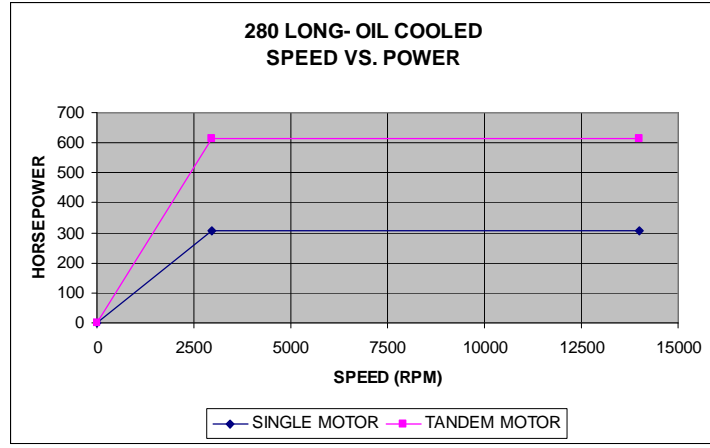
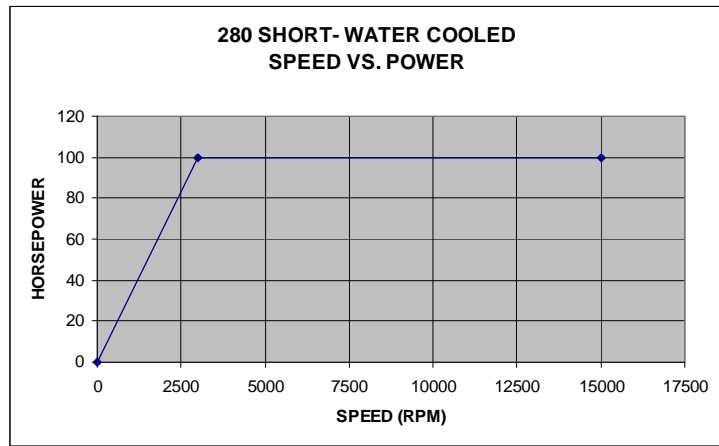
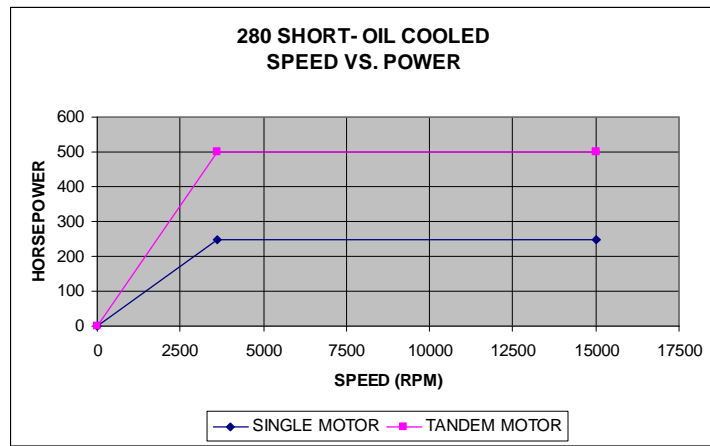
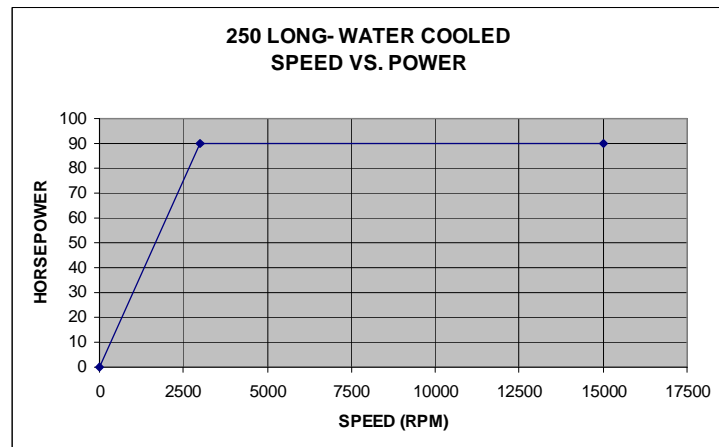
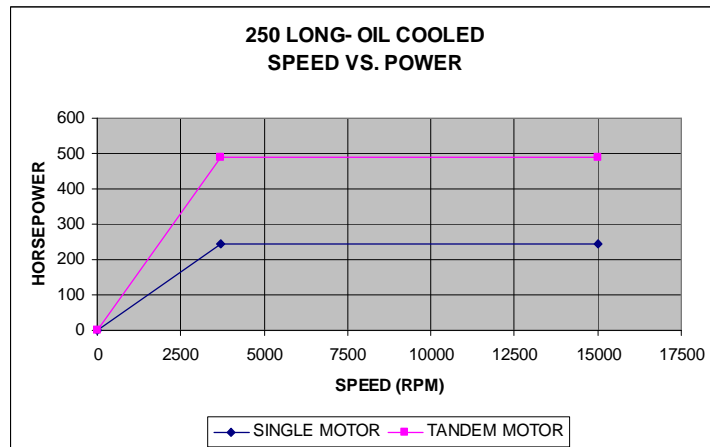
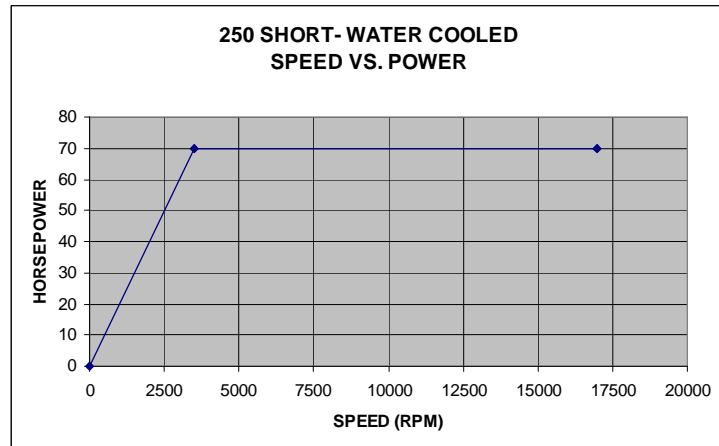
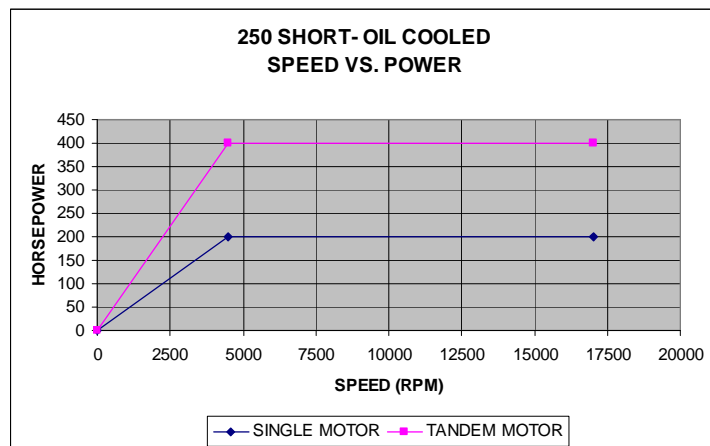
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Low Inertia Torque Pulse Simulation Test Stand Motor System



High Power 16,000 rpm EV Test Stand



Tilt and Roll Capable System

- 4. Air Cooling Problems:** Liquid cooling provides an alternative to air cooling in confined areas, high contamination areas, or areas with high ambient temperatures. Mining, atomizer systems, injection molding applications, and machines housed in enclosed areas are candidates for liquid cooling.
- 5. Low Noise Applications:** Liquid cooled machinery is much quieter. The cooling system can pump cooling fluid to the machine from a remote area, thus eliminating ambient noise pollution.
- 6. Environmental Control:** Hot air exits the machine in a typical air cooled system and is allowed to exhaust into the surrounding area. This is particularly undesirable in confined areas where additional ventilation may be required. The waste heat can be dissipated with a liquid cooled system by pumping the hot cooling fluid to a designated external area.
- 7. Precision Applications:** Process control standards are forcing facilities to control environmental temperatures. Liquid cooling provides superior temperature control to arrest thermal growth problems, control performance variations, and control ambient temperatures in sensitive processes.
- 8. Reliability:** Liquid cooled motors provide more reliable operation. This is due to, better lubrication, a reduction in operating temperature and reduction of temperature gradients in the motor. Temperature gradients result in differential expansion of components. This makes it difficult to hold tight tolerances in the machine construction and can result in high component stresses and increase wear rates.

**We supply AC motor systems for numerous custom applications including:**

- High speed pumps
- Atomizers
- Test stands
- Dynamometers
- Machine tools
- Blowers
- Propulsion systems
- Energy storage systems
- High speed generators
- Liquid cooled systems.
- Centrifuges
- Torque Pulse Simulation applications
- Inertia simulation applications

We can supply power and speed ratings in a range from fractional at speeds to 50,000 rpm to high power ratings above 1,000hp and up to 15,000 rpm.



## Control Systems

Burgi Engineers control systems monitor vital system operating parameters and offer local or remote verification of operating conditions. Our PLC based systems provide network monitoring capabilities. This allows centralized monitoring of your systems as well as remote trouble shooting and performance data gathering. Custom options are available to suit your application.



## Engineering

Burgi Engineers LLC provides machine design, documentation, and manufacturing services for customers in the US and abroad. We offer professional design in the areas of custom AC motor systems, fluid handling systems, degassing systems, and high speed rotating machines, Process equipment, test stands and dynamometers. We utilize the latest in Computer Aided Design software, including Solid Works, AutoCAD, and Algor FEA. We routinely do dynamics, stress and heat transfer analysis. We utilize modern, high speed data transfer capabilities to communicate in a timely manner with customers. We sincerely want to be a part of your company's growth and possess the engineering savvy to help you accomplish your goals. Please contact us with your design requirements.



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