

Exhibit

Waterblasting – 2013



Randall King, PhD, PE

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RANDALL K. KING, Ph.D., P. E.
Consulting Engineer, Mechanical

Professional Summary

Ph.D., Mechanical Engineering
Master of Engineering, Mechanical Engineering
Bachelor of Science, Mechanical Engineering
Licensed Professional Engineer

Primary Areas of Consultation

Failure investigations of mechanical systems involved with oilfield equipment, industrial devices, automotive components, agricultural equipment, and consumer products, including pumps, compressors, high-pressure vessels, clutches, seals, bearings, forgings, castings, and gear trains.

Evaluations involving mechanical design issues, operation and maintenance questions, stress/deflection analysis, material failure, metal fatigue, lubrication, heat treat issues, and product liability concerns.

Vehicular accident reconstruction: vehicle dynamics, heavy truck collisions, and failure/operational condition of vehicle systems, such as brakes, steering, tires, suspensions, and safety equipment.

Professional Experience

2011-present King Professional Engineering, Inc.
Dallas, Texas
Principal

Failure evaluations of mechanical systems, such as pumps, compressors, high-pressure vessels, clutches, seals, bearings, etc., involving mechanical design issues, stress/deflection analysis, material failure, metal fatigue, lubrication, molded plastic parts, heat treat issues, and product liability concerns. Analyses of oilfield, industrial, and agricultural equipment, automotive components, consumer products, and other mechanical devices.

Evaluations of consumer products and commercial, industrial, and agricultural equipment for products liability issues and patent disputes.

Accident reconstruction of vehicle collisions: vehicle dynamics, heavy truck collisions, and failure/operational condition of vehicle systems, such as brakes, steering, tires, suspensions, and safety equipment.

2002-2010 Bison Engineering, Inc.
Kingwood, Texas
Consulting Engineer

Responsible for failure evaluations of mechanical systems, such as pumps, compressors, high-pressure vessels, clutches, seals, bearings, etc., involving mechanical design issues, stress/deflection analysis, material failure, metal fatigue, lubrication, molded plastic parts, heat treat issues, and product liability concerns. Analyses of oilfield, industrial, and agricultural equipment, automotive components, consumer products, and other mechanical devices.

Accident reconstruction of vehicle collisions: vehicle dynamics, heavy truck collisions, and failure/operational condition of vehicle systems, such as brakes, steering, tires, suspensions, and safety equipment.

1995-2002 NTN Technical Center
Ann Arbor, MI
Sr. Research Engineer

Developed innovative automotive components and oversaw validation testing for Big 3 automobile manufacturers:

- Alternator pulley with integral overrunning clutch
- Two-speed alternator drive with dual drive belts
- Tailored compliance outer race for tapered roller bearing

Conducted extensive failure analyses of mechanical components, such as clutches, sliding wear surfaces, and ball bearings. Designed and developed high-volume machined metal and injection-molded plastic parts, low-pressure seals, springs, and stampings. Awarded twelve US patents.

1984-1994 Halliburton Energy Services
Duncan, OK
Research and Development Engineer

Developed large positive-displacement pumps for hydraulic fracturing of oil wells. Led design team for 1,500 HP, 15,000 psi triplex pump for sand slurry. Performed extensive failure analyses of pump components, such as high-pressure vessels and seals, journal (sleeve) and roller bearings, high-strength forgings, and castings. Conducted extensive linear and non-linear finite element stress and deflection analyses. Designed and developed pump fluid-ends and power ends, high-strength steel forgings, ductile iron castings, autofrettaged (prestressed) pressure vessels, and high-pressure seals. Awarded two US patents.

1989-1992 Private Consulting Services
Duncan, OK

Advised design and certification for high performance oilfield gate valves. Awarded one US patent.

1975-1984 Oklahoma State University
Stillwater, OK
Research Engineer

Led research projects at Fluid Power Research Center in fatigue, reliability, and noise control. Carried out noise and endurance testing of hydraulic gear and vane pumps and hydraulic accumulators. Conducted hydraulic filtration tests. Designed/built component test stands, acoustic impedance measurement device, and acoustic anechoic chamber.

Researched effect of temperature on liquid metal embrittlement of nickel alloys (dissertation topic).

1974-1975 The Boeing Company
Wichita, KS
Manufacturing R & D Engineer

Developed manufacturing processes for composites, plastics, and adhesive bonding. Designed reticulating machine for acoustic honeycomb sandwich material and investigated parameters for chemical milling of aluminum structural members.

1971-1978 U. S. Army
Oklahoma National Guard and California National Guard
Combat Engineer Company Commander - Captain

Education

1985 Ph.D., Mechanical Engineering
Oklahoma State University
1974 Master of Engineering, Mechanical Engineering
Oklahoma State University
1972 Bachelor of Science, Mechanical Engineering
Oklahoma State University
1992-1994 Master of Business Administration, 2 years of 3 year program
Oklahoma State University

Additional Training

MIT Summer Session
Tribology (40 hrs.)
SAE Professional Development
Lubrication, Friction, and Wear
Elastohydrodynamic Lubrication
Product Liability and The Engineer
Detroit Diesel Corporation
DDEC Data Extraction and Analysis
U. S. Army Corps of Engineers
Engineer Officer Basic Course
Halliburton Energy Institute
Sour Gas Fundamentals

Engineering Registration

Licensed Professional Engineer (by examination)
 Oklahoma No. 15071
 Texas No. 94387
 Arkansas No. 13021
 Ohio No. 74572

Publications

“Alternator Pulley with Integral Overrunning Clutch for Reduction of Belt Noise”, SAE 1999-01-0643, 1999 SAE World Congress, Detroit, MI
 9 papers for national journals and conferences,
 25+ papers in Basic Fluid Power Research Journal

Patents

7,191,880	Over-Running Clutch Pulley with Increased Surface Microhardness (2007)
7,052,420	Over-Running Clutch Pulley with Coating Material (2006)
6,923,303	Over-Running Clutch Pulley with Clutch and Bearing Lubricant (2005)
6,761,656	Over-Running Clutch Pulley with Clutch Cartridge (2004)
6,691,846	Over-Running Clutch Pulley w/ Shortened Depth (2004)
6,637,570	ORP with Composite Sealing Member (2003)
6,394,248	Compression Spring Compliant One-Way Over-Running Pulley (2002)
6,394,247	Compliant One-Way Over-Running Clutch Pulley (2002)
6,183,368	One-Way Over-Running Flex Coupling (2001)
6,071,206	Two-Speed Traction Drive Pulley System (2000)
5,928,083	One-Way Over-Running Flex Coupling (2000)
5,827,143	Two-Belt Over-Running Clutch Pulley (1998)
5,362,215	Pump Cylinder Head with Integral Overpressure Protection and Non-Cyclicly Loaded Threads (1994)
5,143,348	Easy-Operating Gate Valve (1992)
5,073,096	Front Discharge Fluid End for Reciprocating Pump (1991)
-	Foreign patents awarded based on above U.S patents

Professional Memberships

American Society of Mechanical Engineers
 Society of Automotive Engineers
 American Society for Metals