

# CURRICULUM VITAE

HAL I. DUNHAM, P.E.  
MECHANICAL ENGINEER

## BUSINESS ADDRESS

CTL Engineering, Inc.  
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## EDUCATION

Purdue University, West Lafayette, Indiana  
BSME, 1974

### **Seminars and Training Courses**

Lincoln Electric, "Design of Weldments," 1978

SAE/University of Iowa, "Fatigue Concepts in Design," 1982

Columbus State Community College, "Geo-Metrics, Dimensioning & Tolerancing,"  
1985

SAE Course, "Product Liability and the Engineer," 1989

SAE International Congress Technical Sessions on Accident Reconstruction, 1990 –  
2000 & 2002 - 2014

SAE International Course "Overview of Automotive Vehicle Dynamics Before and  
After a Collision," 1992

SAE International Course "Brake Design and Safety," 1993

Accident Reconstruction Specialists Seminar "Collision Dynamics: Issues and  
Answers," 1993

Collision Safety Institute, Inc. Specialist Course "Crash Data Retrieval (CDR) System  
Operator" Certification Received October, 2004

SAE International Course: "Modern Fluids for Crankcase Engines," 2007



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EDUCATION (continued)

Anderson Engineering: "Vibration Analysis in the 21<sup>st</sup> Century," 2008

AIA Columbus: "Building Skins Importance of the Thermal Envelope," 2011

Ohio Northern University: "Ohio Shale Oil & Gas Seminar," 2013

National Insurance Crime Bureau: "Insurance Fraud Seminar" 2014

PROFESSIONAL AFFILIATIONS

Professional Engineer: Ohio State Board, August 1979  
Registration Number E-044530

American Society of Mechanical Engineers

Society of Automotive Engineers

PATENT

Co-Inventor of Mining Method & System for Cross Pit  
Reclamation of Various Soil Strata

EXPERIENCE

A. July 1988 to present  
CTL Engineering, Inc.

Mechanical Engineer – Accident Investigations, Product Testing, and  
Design consultations

Responsibilities include forensic engineering, failure analysis, accident investigation, product testing, and design consultations. Investigative projects include analysis of design or manufacturing defects, alternative designs, warnings, instructions, maintenance procedures, and patent infringements. Product testing projects include the development of testing methods, specifying the test apparatus to be used, and procedures to be followed to obtain the test data. Design consultations include changes to eliminate failures, new equipment, and product cost reduction.

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- B. May 1985 to July 1988 - AMF Bowling Companies, Div. of Commonwealth Venture Partners, Inc., Westerville, Ohio  
Senior Mechanical Engineer

Bowling Products Research and Design. Project Engineer for the ball return product line plus technical support to other projects.

Responsible for mechanical/structural design, including several plastic parts made from RIM urethane, castable urethane, extrusions, injection molding and vacuum forming.

- C. October 1984 to May 1985 - Galion Manufacturing Division, Dresser Industries, Inc., Galion, Ohio  
Senior Design Specialist in the Grader and Crane Development Group.

Duties varied as required covering structural, mechanical, and hydraulic components. Design and prototype testing.

Mechanical structural design of rear axles, differentials, drive shafts and operator cabs. Free body analysis of applied forces and reactions of graders.

- D. November 1976 to October 1984 - Marion Power Shovel Division, Dresser Industries, Inc., Marion, Ohio  
Mechanical and Structural Design Engineer for the Walking Dragline Engineering Department.

Conception and calculations of new designs, preparation of design layouts, and trouble-shooting previous designs. Communicating designs to detailing, review of drawings and vendor components, coordinating of support groups such as electrical, lubrication, and shop review. Field trips and machine trouble shooting when field service required assistance.

## ACHIEVEMENTS

### Design

#### Mechanical

- Hoist machinery design and trouble-shooting with rope pulls of 571,000 lbs. and rope speeds of 700 ft./min.
- Shaft design including splines, bearings and seals.
- Gear box design and trouble-shooting.



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- Wire rope sheaves and reeving layout.
- Computer design methods of various mechanical components.
- Main rotating bearings 40 ft. to 55 ft. in diameter.
- Checking total machine stability.
- Handling of mechanical field problems

Structural

- Familiar with computer structural design.
- Dragline boom design 400 ft. in length and a maximum load of over 1,500,000 lbs. (at the time the world's longest).
- Machinery frame design including weld specification and casting design.
- Structural and sheet metal designs for machinery house.
- Boom support members masts and gantrys.
- New product development including feasibility and development of models for Engineering and Marketing purposes.

E. June 1974 to November 1976 - Dravo Corporation,  
Engineering Works Division, Pittsburgh, Pa.  
Design Engineer

Job responsibilities included execution of design and mechanical components for various contracts.

Contracts included stacker reclaimers, conveyor systems, ship and barge loader unloaders and iron ore processing equipment. Design function included conceptual design and communication of design to detailing groups. Review of details, review of vendor approval prints, handling shop and field problems, customer and vendor correspondence.

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### ACHIEVEMENTS

#### Design

- Conveyor design consisting of development of profiles, tensions, idlers, pulleys, take-ups, drives, and trippers.
- Hoists and winch design consisting of wire rope reeving systems, mechanical analysis and design of all components from base through drum.
- Design of heavy industrial gear drives ranging in ratios from 50:1 to 6000:1 and horsepower up to 500 HP.

#### Field Engineering Experience

- Five months as a supervisor in Canada working with customers overhauling iron ore process mechanical equipment. This included running a work crew and checking all areas of machine alignment and wear.
- Trips to inspect material handling machinery mechanical equipment and trouble shoot conveyors and gear drives.
- Prototype of a mobile rubber tired mounted bucket wheel reclaiming machine, with diesel electric drives. Work involved trouble shooting, field modifications, setting up operation procedures, operator training and demonstration to customers.

### RESEARCH PAPER

"Test Procedure for Drive Posts;" FHWA/OH-90/010; Ohio Department of Transportation and Federal Highway Administration; Osama Abdulshafi, Ph.D.; Bjorn Kvammen, Ph.D., and Hal Dunham, P.E.; 12/90