

# STATE OF THE



# GEAR INDUSTRY

## Results of Research on Trends in Employment, Outsourcing, Machine Tool Investment and Other Gear Industry Business Practices

In October, Gear Technology conducted an anonymous survey of gear manufacturers. Invitations were sent by e-mail to thousands of individuals around the world. More than 300 individuals at gear industry locations responded to the online survey, answering questions about their manufacturing operations and current challenges facing their businesses.

The respondents considered here all work at locations where gears, splines, sprockets, worms and similar products

are manufactured. They work for gear manufacturing job shops (47 percent), captive shops at OEMs (50 percent) and shops manufacturing gears for maintenance, spares and their own use (3 percent).

The survey covers gear manufacturing around the world, with 58 percent of respondents working in the United States, and 42 percent outside the United States.

A full breakdown of respondents can be found at the end of this article.

continued

### What Factors Are Presenting Significant Challenges to Your Business?

*"Availability of capital."*

—Corporate executive at a U.S. manufacturer of replacement gearing

*"Available heat treatment capacity in the U.S. Collaborative supply chain partners that understand the alternative energy market and know how to support growth."*

—Purchasing professional at a U.S. gearbox assembly plant

*"Business insurance."*

—Corporate executive at a U.S. manufacturer of marine transmission units

*"Commercial viability of OEM customer(s)."*

—Chief engineer at a U.S. manufacturer of pump shafts for construction/off-road equipment

*"Congress. Stock market. Drugs."*

—Corporate executive at a U.S. manufacturer of oilfield gears

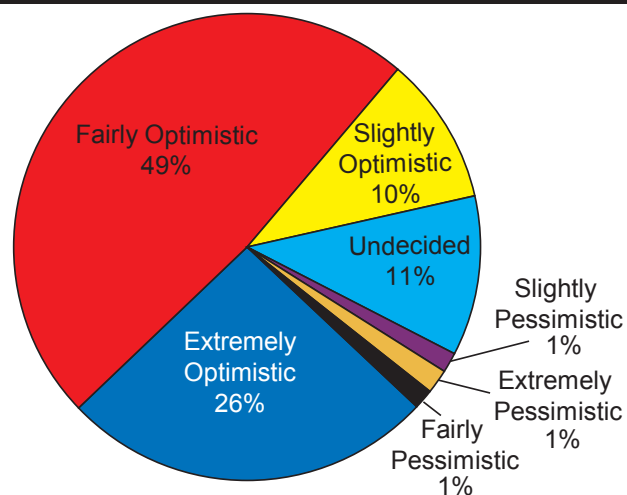
*"Continuous product updating."*

—R&D supervisor at an Italian speed reducer manufacturer

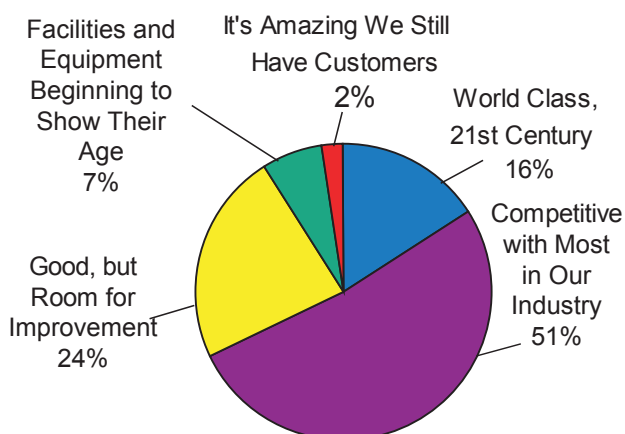
*"Cost reduction initiatives."*

—Production worker at an Indian automotive gearbox manufacturer)

### 85% of Gear Industry Respondents are Optimistic About their Ability to Compete over the Next Five Years



### How Do Respondents Describe Their Manufacturing Operations and Technology?





## Innovative Machine Tool Solutions

**New O.E.M. Machines**  
**BOURN & KOCH** Gear Hobbers & Gear Grinders  
**FELLOWS** Gear Shapers  
**ROTO-CHECK** Gear Inspection Systems  
**BOURN & KOCH** Hob & Shaper Cutter Inspection Systems  
**FELLOWS** Lead & Involute Masters  
**ROTO-GRIND** Precision Rotary Inspection Tables

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## What Factors Are Presenting Significant Challenges to Your Business?

*"Credit crunch and therefore sponsorship of race teams."*

—Engineering manager at a British motorsport transmission manufacturer

*"Customer inability to compare quality difference between low-cost Far East and domestic products."*

—Corporate executive at a Canadian manufacturer of workholding devices

*"Difficulty in finding training center for special gear technology (marine and wind turbine)."*

—Design engineer for a Korean manufacturer of speed reducers

*"Exchange rate fluctuations."*

—Sales manager at a British job shop

*"Financing facilities for wind parks and infrastructure projects."*

—Indian gear manufacturing consultant

*"Fuel cost."*

—Design engineer for a U.S. manufacturer of diesel engines

*"Good quality, better pricing, scheduled delivery on time. To become a continuous supplier."*

—Production worker at a Turkish manufacturer of gears and transmissions

*"High cost of materials, increase of fuel prices, decline of U.S.-based manufacturing."*

—Quality manager at a U.S. manufacturer of automotive gearboxes

*"Increasing currency U.S. Dollar against new Turkish Lira and Euro against new Turkish Lira."*

—Manufacturing engineer at a Turkish manufacturer of gear pumps

*"India."*

—Design engineer at a German manufacturer of forged bevel gears

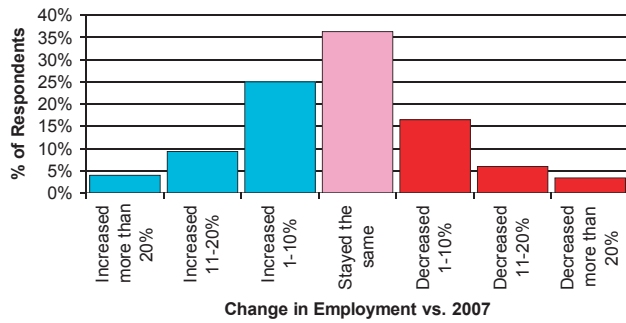
*"Internal logistical problems with one major foreign vendor."*

—Corporate executive at a U.S. gearbox repair shop

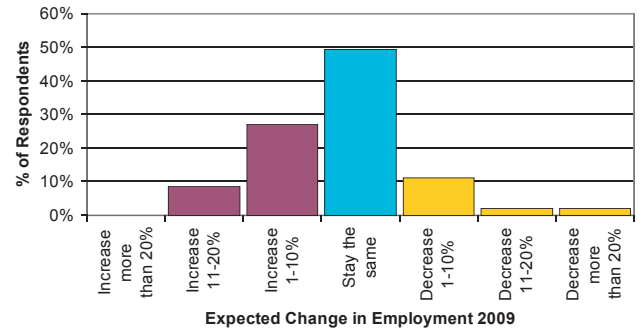
*"Lack of capital."*

—Manufacturing engineer at a U.S. manufacturer of rack and pinion steering

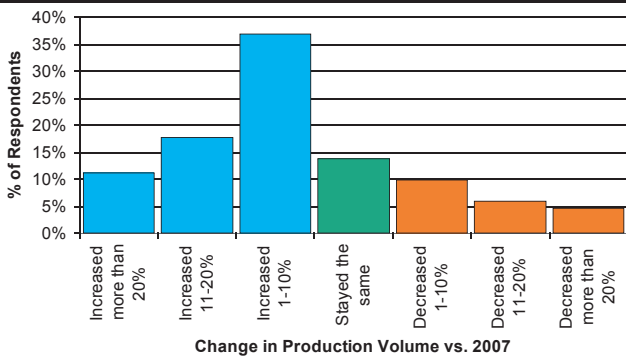
### 38% of Gear Industry Respondents Work at Locations where Employment Increased in 2008



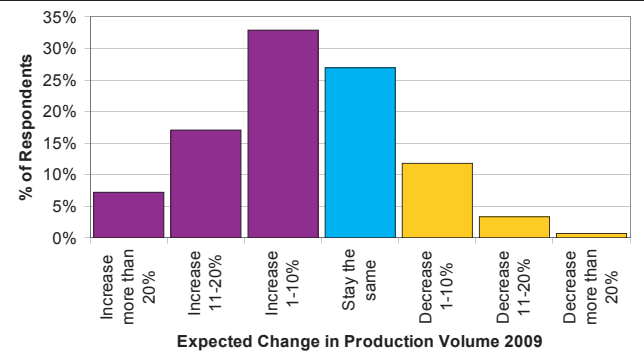
### 36% of Gear Industry Respondents Expect Employment at their Location to Increase in 2009



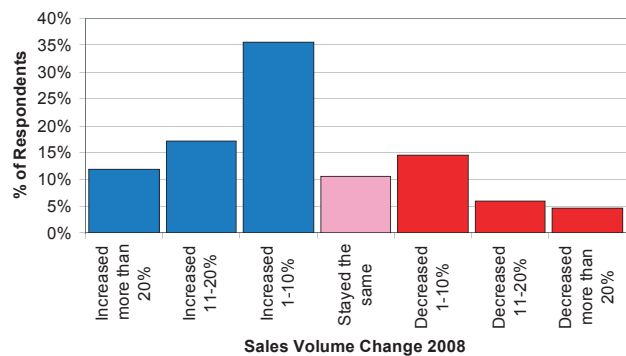
### 66% Saw Production Volumes Increase in 2008



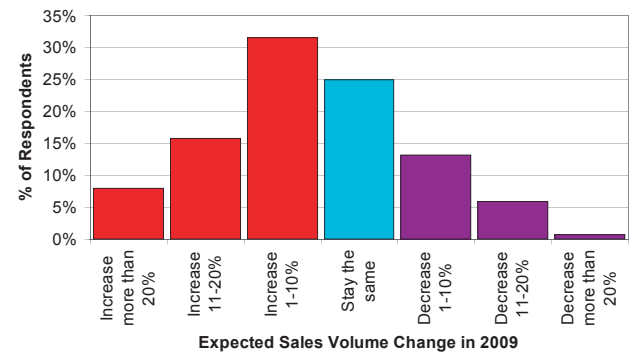
### 57% Expect Production Volume to Increase in 2009



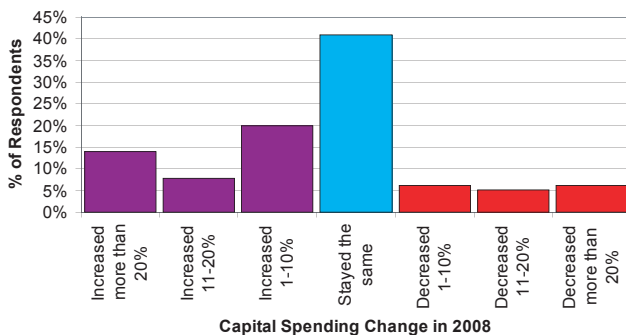
### 65% Saw Sales Volume Increase in 2008



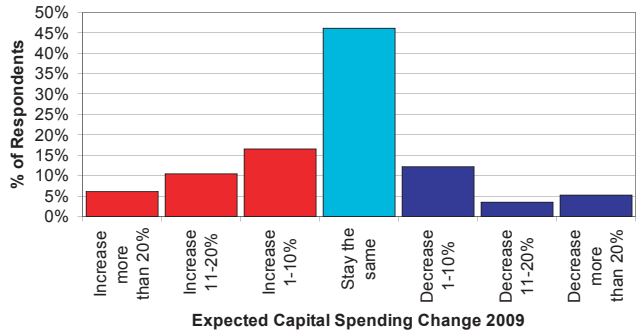
### 56% Expect Sales Volume to Increase in 2009



### 42% Work at Locations where Capital Spending Increased in 2008



### 33% Expect Capital Spending at their Locations to Increase in 2009





## What Factors Are Presenting Significant Challenges to Your Business?

*"Long development lead times; pre-financing of development costs."*

—Corporate executive at a German manufacturer of automotive actuators

*"Long lead times and limited supplier capacity for raw material such as large steel forgings, which is driven by worldwide demand in heavy industry. Finding domestic gear suppliers who have the capability to produce high quality, large gears and are willing to do so at low volumes."*

—Quality control worker at a U.S. manufacturer of diesel engines

*"Low prices from competitors. Rising technology requirement."*

—Sales manager at a U.S. powder metal gear manufacturer

*"Managed by sales and financial executives that have little to zero understanding in the manufacturing of high quality gears."*

—Manufacturing engineer at a U.S. manufacturer of enclosed gear drives

*"Mature market with minimal growth."*

—Design engineer at a U.S. manufacturer of water treatment drives

*"New (and old) management."*

—Production worker at a U.S. manufacturer of custom gears.

*"New competitors."*

—Design engineer at a U.S. manufacturer of manual transmissions

*"None."*

—Corporate executive at a U.S. manufacturer of precision gears

*"Not much, but there are chances of some depression in business due to poor condition in USA."*

—Manufacturing engineer at an Indian gear rack manufacturer

*"Power shortage, lack of availability of skilled labor."*

—Manufacturing engineer at an Indian manufacturer of automotive gears

## The AWEA Edge – Your Leading Resource for Wind Energy Education



### AWEA Wind Power Supply Chain Workshop

December 8 – 9, 2008 ▶ Cleveland, OH

There are many parts that go into making wind technology, getting that technology from one place to another, and maintaining every aspect of the turbine once installed. As the wind industry looks to further grow, a wider range of resources are needed to help foster wind energy development as well as supply and demand.

Over 600 representatives from a diverse range of industries, including foundries, tooling companies, gearbox manufacturers, transportation providers, electronics manufacturers and metal fabricators, as well as state economic development officers, attended the first Supply Chain Workshop and found opportunities to plug into this expanding market.

[www.awea.org/events/supplychain2](http://www.awea.org/events/supplychain2)

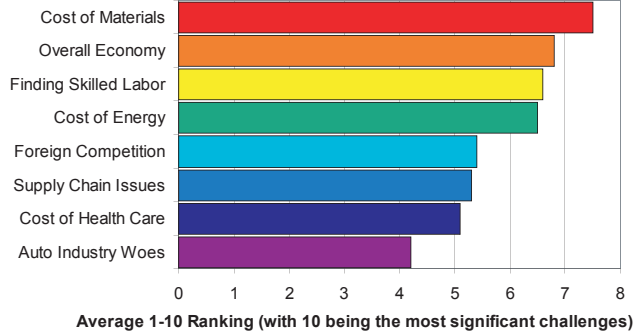
#### Part 1: 1/2 Day Pre-Conference Seminar

- ▶ The anatomy of a turbine
- ▶ A wind industry overview
- ▶ What makes up the wind industry supply chain
- ▶ Underground utilities and how wind is converted to energy

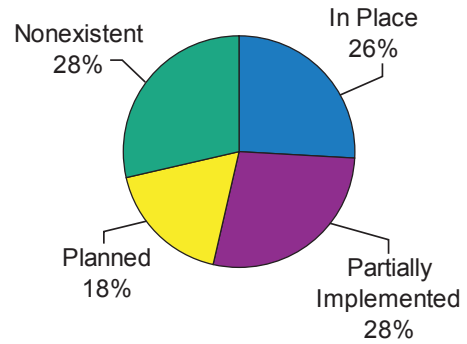
#### Part 2: Full-Day Conference Program

- ▶ AWEA Executive Report: the market, the trends, the drivers
- ▶ Status report on supply chain shortages and bottlenecks
- ▶ Focus on parts: Tower, Blades, Nacelle, Electronics
- ▶ The sourcing of wind turbines and components
- ▶ The top tiers of the supply chain defined
- ▶ Supply Chain successful case studies
- ▶ Networking opportunities with the companies you need to meet

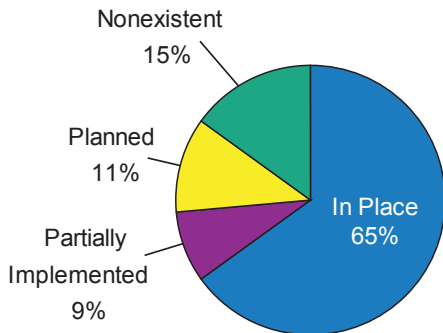
### What are the Most Significant Challenges Facing Gear Industry Companies?



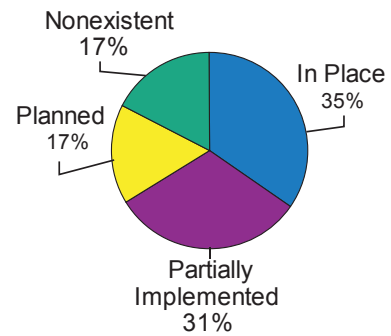
### Green or Sustainable Manufacturing Implementation



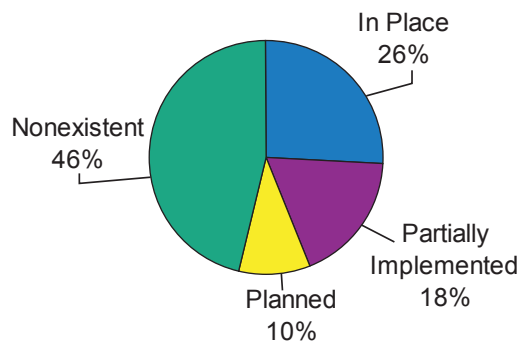
### ISO 9000 Implementation



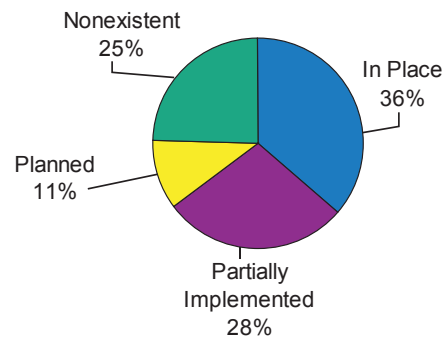
### Lean Manufacturing Implementation



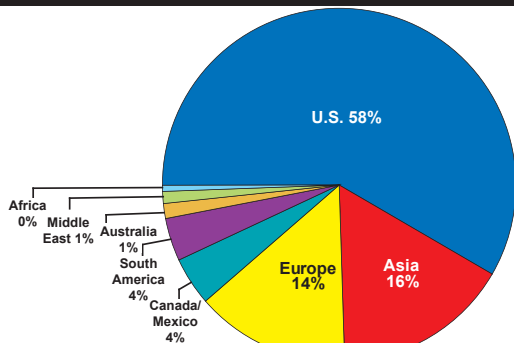
### Six Sigma Implementation



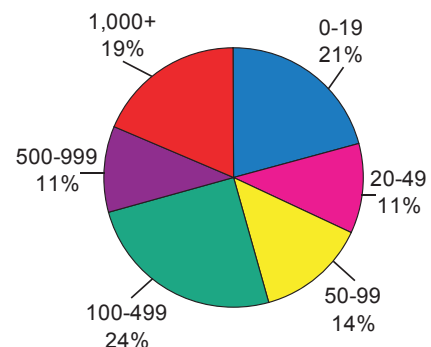
### Statistical Process Control (SPC) Implementation



### Location of Respondents



### Number of Employees



continued

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## What Factors Are Presenting Significant Challenges to Your Business?

*"Rise in raw material prices has resulted in unstable product cost, and it is a challenge to make the end user understand this unstable product cost."*

—Engineer at an Indian manufacturer of spiral bevel gears

*"Quality issues especially with regard to raw material inputs. Migration of skilled manpower to other industries."*

—Design engineer at an Indian manufacturer of gas turbines

*"R&D capital and expansion capital."*

—Corporate executive at a U.S. manufacturer of aircraft engines

*"Raw material delivery time and costs."*

—Design engineer at a U.S. manufacturer of custom equipment

*"Raw material for gears (steel grade)."*

—Engineer at an Indian engine and transmission assembly plant

*"Recession."*

—Engineer at a British gearbox manufacturer.

*"Rising cost of fuel and materials."*

—Design engineer at a job shop in the Philippines

*"Rising rates of raw material and non availability of gear making machines and equipment are major factors."*

—Engineer at an Indian gear manufacturing job shop

*"Skilled labor is the primary issue. Our current issue as of 10/11/08 is the uncertain economy. Current changes in the market are going to affect us. The question is when and how bad will the market affect the gear industry?"*

—Sales manager at a U.S. gear manufacturer

*"Skilled labor, skilled labor, skilled labor."*

—Design engineer at a U.S. manufacturer of aerospace gearing

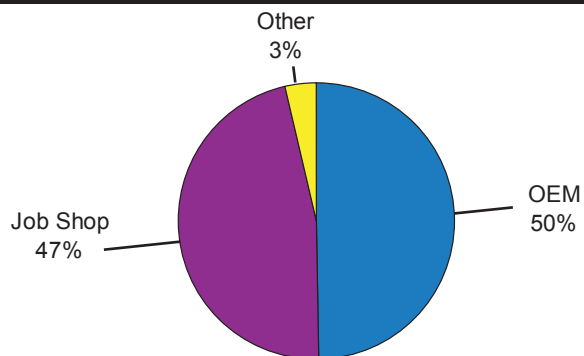
*"Starting up engineering in Asia."*

—Design engineer at a manufacturer of office equipment in the Netherlands

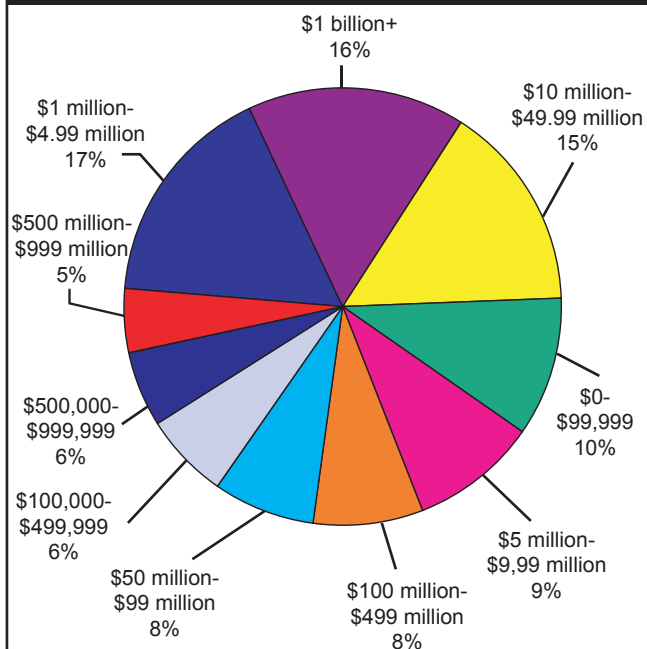
*"Steel cost."*

—Technical manager at a marine gear manufacturer in Colombia

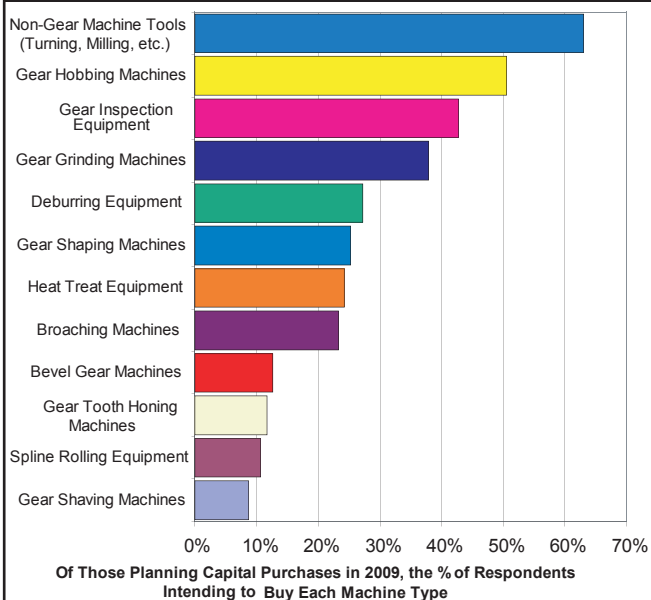
### Type of Operation



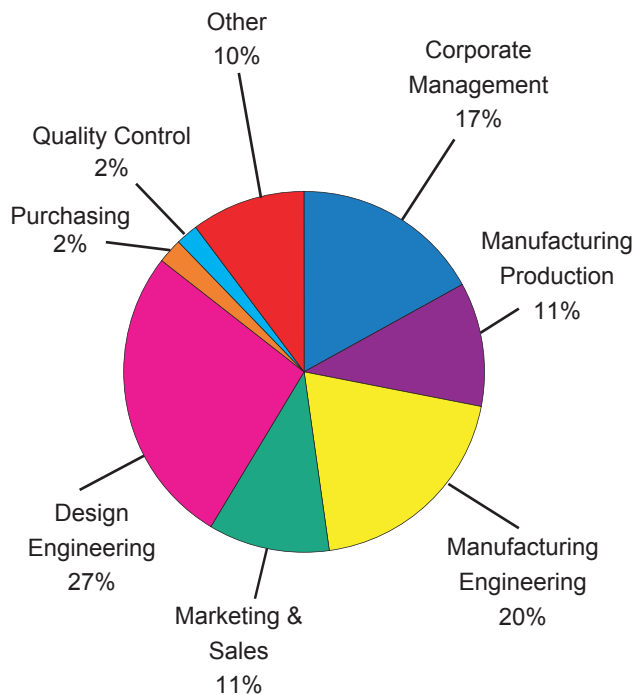
### Annual Sales Volume of Company



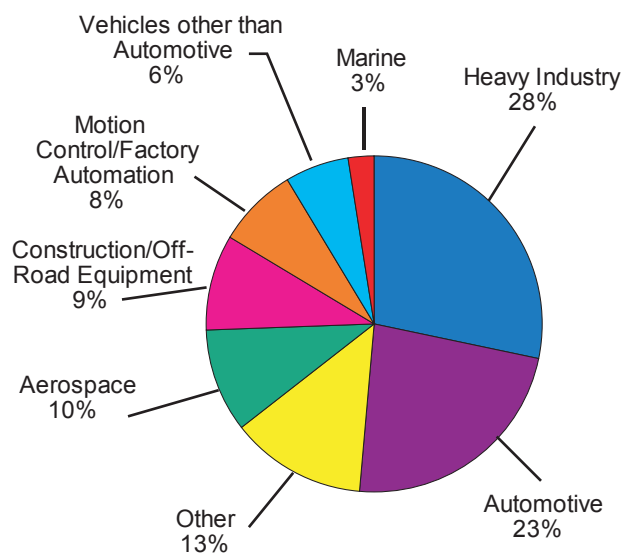
### Machine Tool Purchase Plans 2009



### Job Title/Function of Respondent



### Prime Industry of Respondent



continued



## Process inspection of gears and splines



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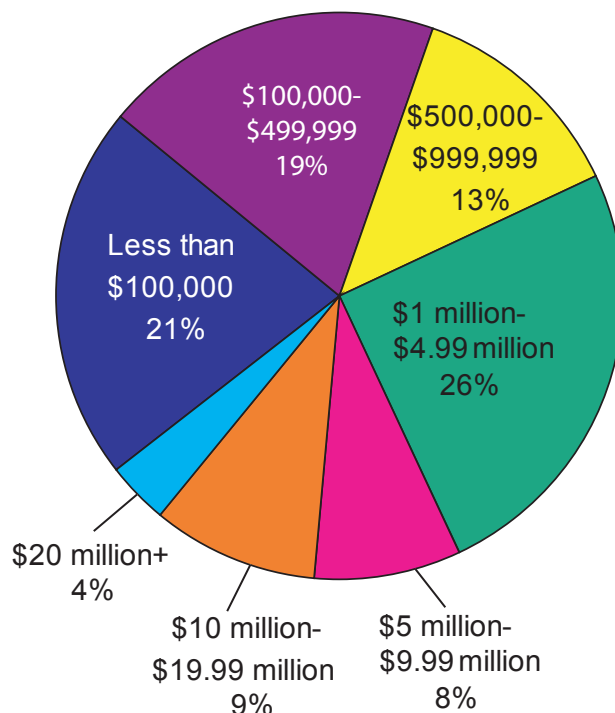
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## Capital Spending for 2008



## What Factors Are Presenting Significant Challenges to Your Business?

*"Supply of bearings."*

—Manufacturing engineer at a U.S. manufacturer of speed reducers

*"The basic challenge is the economic downturn of the industrial climate."*

—Corporate executive at an Indian gearbox manufacturer

*"The world economy."*

—Production worker at a Mexican manufacturer of gearboxes for heavy industry

*"To meet future fuel economy and emission targets."*

—Design engineer at an Indian manufacturer of two- and three-wheeled vehicles

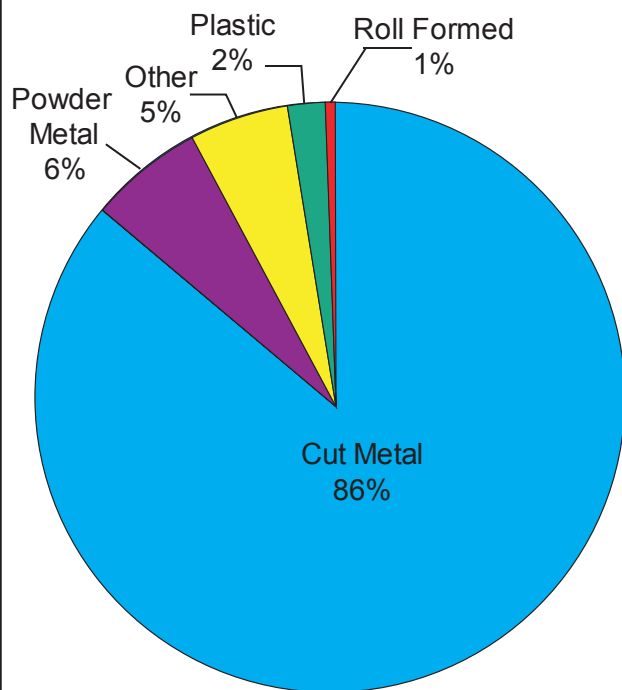
*"To minimize lead time for new component development."*

—Engineer at an Indian manufacturer of motorcycles

*"Unable to get cheaper gears with same performance. It may be done by raw material change, but no one is trying to do so, and we are losing lots of money due to increasing raw material costs day by day."*

—Purchasing agent at an Indian manufacturer of commercial vehicles

### Primary Method of Manufacture



### What Factors Are Presenting Significant Challenges to Your Business?

*"We have customers looking for 7-year, long-term contracts and others implementing PO specs that require us to either be compliant with ISO9000 or face a \$500.00 in-house inspection charge."*

—Corporate executive at a U.S. manufacturer of precision aerospace gears

### What are Your Company's Greatest Manufacturing/Engineering Challenges for 2009?

*"Accommodating volume fluctuations and adapting to lower volume work."*

—Chief engineer at a U.S. manufacturer of pump shafts

*"Aging workforce retiring, taking tribal knowledge away—lack of engineering manpower to capture tribal knowledge in work instructions."*

—Engineer at a U.S. manufacturer of speed reducers

*"Attempt to increase the efficiency and throughput of our engineering department."*

—Design engineer at a U.S. manufacturer of custom equipment

### What are Your Company's Greatest Manufacturing/Engineering Challenges for 2009?

*"Being able to stay competitive with pricing yet still being able to finance very expensive CNC gear cutting equipment. Also being able to find adequate skilled labor."*

—Corporate executive at a U.S. manufacturer of precision aerospace gears

*"Being capable of meeting the scheduled delivery of new mining shovels."*

—Manufacturing engineer at a U.S. manufacturer of mining equipment

*"Cash Flow."*

—Corporate executive at a U.S. gear manufacturing job shop

*"Competition."*

—Design engineer at a machine shop in the Philippines

*"Cost competitiveness without affecting the quality."*

—Purchasing agent at an Indian manufacturer of commercial vehicles

*"Cost pressures. Technology upgradation."*

—Purchasing agent at an Indian manufacturer of machinery

*"Cutting tools/hob availability in the USA. Rolled ring forgers with rolling mills large enough to forge ring gears with sizes greater than 63 inches OD."*

—Purchasing agent at a U.S. gearbox assembly plant

*"Defects below 100 ppm."*

—Design engineer at an Indian manufacturer of two- and three-wheel vehicles

*"Defining profitable markets with short-term business opportunities."*

—Corporate executive at a German manufacturer of automotive actuators

*"Developing engines with less fuel consumption."*

—Design engineer at a U.S. manufacturer of diesel engines

*"Energy costs."*

—Maintenance manager at a Croatian manufacturer of paper products

*"Engineering for lower cost and fewer parts, manufacturing and assembly in Asia. And also to start up engineering in Asia."*

—Design engineer for a manufacturer of office equipment in the Netherlands

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## What are Your Company's Greatest Manufacturing/Engineering Challenges for 2009?

*"Engineering help."*

—Corporate executive at a U.S. precision gear manufacturer

*"Euro to dollar conversion. Asian competition."*

—Design engineer at a U.S. manufacturer of planetary gearboxes

*"Expansion costs for going after large projects. Financing large new projects."*

—VP of engineering at a U.S. manufacturer of rotary dryers and kilns

*"Face new investments to commit with market demands."*

—Manufacturing engineer at a British gearbox manufacturer

*"Far East competition."*

—Corporate executive at a Canadian manufacturer of workholding

*"Finding new products."*

—Corporate executive at a German gearbox manufacturer

*"Finding qualified, highly technical employees who have experience in our technology."*

—Corporate executive at a U.S. manufacturer of PVD coating equipment

*"Finding skilled people."*

—Corporate executive at a U.S. manufacturer of mining equipment

*"Follow up new product lines."*

—Corporate executive at an Italian manufacturer of speed reducers

*"Gear tooth hard finish process implementation for most of our products."*

—Engineer at a U.S. manufacturer of automotive gearboxes

*"Get lean, improve quality."*

—Consultant to Indian gear manufacturers

*"Growing demand."*

—Quality control worker at a Polish manufacturer of locomotives

*"Hold our gain until the economy rises again."*

—Quality manager at a U.S. manufacturer of automotive gearboxes

*"Improvement of technologies and skills."*

—Design engineer at a French manufacturer of gas turbines

*"Improving manufacturing techniques to increase throughput."*

—Engineering manager at a British manufacturer of motorsport transmissions

*"Increase product efficiency and incorporating electronics."*

—Design engineer at a gearmotor manufacturer in the Netherlands

*"Insurance cost, taxes. Skilled employees. Drugs."*

—Corporate executive at a U.S. manufacturer of oilfield gears

*"Integrating additional new products into our existing facility and making all the product lines more productive."*

—Quality control worker at a U.S. manufacturer of diesel engines

*"Lack of skilled labor. Engineers that are able to adapt in a fast-paced job shop situation."*

—Sales manager at a U.S. gear manufacturer

*"Lean manufacturing implementation."*

—Manufacturing engineer at a U.S. manufacturer of aircraft

*"Long new equipment lead times."*

—Sales manager at U.S. gear manufacturing job shop

*"Developing low-cost, heavy rotary actuators."*

—Design engineer at a manufacturer of motion systems in Israel

*"Maintaining capital spending to meet future growth in a very challenging business climate."*

—Design engineer at a U.S. manufacturer of automotive chain drives

*"Maintaining turnover, fighting exchange rates, fighting rising energy costs, increasing UK turnover in particular."*

—Sales manager at a British gear manufacturing job shop

*"Material costs and product quality."*

—Design engineer at U.S. manufacturer of water treatment drives

continued

## What are Your Company's Greatest Manufacturing/Engineering Challenges for 2009?

*"New assembly line."*

—Engineer at an Indian engine and transmission assembly plant

*"None."*

—Production worker at an Indian manufacturer of defense equipment

*"Obtaining the money to improve the production and replace antiquated machines with more versatile and less 'skilled operator' machines."*

—Manufacturing engineer at a U.S. manufacturer of enclosed gear drives

*"Old equipment, no maintenance person, too much dead weight personnel-wise, management not earning their paycheck."*

—Production worker at a U.S. gear manufacturing job shop

*"Process improvement."*

—Design engineer at a German manufacturer of forged bevel gears

*"Productivity enhancement and reduce overhead."*

—Production worker at a Pakistani manufacturer of transmission shafts and gears

*"Reduce costs and adjust to new types of products."*

—Engineer at a U.S. manufacturer of rack-and-pinion steering

*"Revamping internal systems to meet customer demand for on-time delivery while dealing with rapid growth on an already strained scheduling system."*

—Design engineer at a U.S. aerospace gear manufacturer

*"Rising cost of material."*

—Design engineer at a Korean speed reducer manufacturer

*"Rising energy cost."*

—Engineer at an Indian gear manufacturing job shop

*"Becoming self-sufficient in design and development facilities."*

—Engineer for an Indian automobile manufacturer

*"Significant quality improvements in manufactured goods, expanding gear grinding capability."*

—Corporate executive at a U.S. manufacturer of replacement gearing

*"Start new projects in low-cost locations."*

—Process design manager at a Belgian manufacturer of engine timing gears

*"Staying competitive in technology."*

—Sales manager at a U.S. manufacturer of powder metal gears

*"The purchase of gear hobbing machines."*

—Production worker at a Mexican manufacturer of industrial gearboxes

*"To develop qualified alternative sources with a prime focus on cost reduction."*

—Design engineer at an Indian manufacturer of gas turbines

*"To find more abroad customers for complete gearboxes, transmissions for agricultural tractors, trucks and other off-road vehicles."*

—Production worker at a Turkish manufacturer of gears and transmissions

*"To keep inventory costs down and to increase productivity."*

—Production worker at an Indian automobile manufacturer

*"To manufacture products at the most economical price."*

—Corporate executive at an Indian gearbox manufacturer

*"Training and reduction of rework."*

—Engineer at a Canadian manufacturer of mechanical presses

*"Upgrade of machine tools and inspection equipment."*

—Production worker at a U.S. manufacturer of custom gears

*"We don't find any challenges."*

—Engineer at an Indian manufacturer of spiral bevel gears