



**THE CINCINNATI GEAR  
CINCINNATI GEAR  
COMPANY**

# The Cincinnati Gear Company . . .



The Cincinnati Gear Company, founded in 1907, has grown up with American industry during the twentieth century. The growth of the company is directly related to a philosophy of open, free working level-to-level total customer satisfaction and mutual management by combining these key elements with the latest production facilities, technical systems and continual training programs. The Cincinnati Gear Company has established a position of respect in the marketplace.

The Cincinnati Gear Company is proud of its heritage and its accomplishments. During World War II Cincinnati Gear manufactured the "Y" turret. Today's contributions to programs such as the U.S. nuclear submarine program, the Union Pipeline and the Boeing 747 are but a few. Cincinnati Gear continues to work with you for quality and high reliability.

Since the 1930s, Cincinnati Gear has specialized in epicyclic

gearing. Its technical leadership led to engineering roles in the design, development and manufacture of epicyclic gearsets of low speed, high torque and high speed, high horsepower applications.

Several decades of experience allowed us to design Cincinnati Gear almost all the latest trend systems in the design and manufacture of gears and assemblies to solve your problem.

This knowledge, combined with the company's very active role in standard development and other activities of the American Gear Manufacturers Association, enables Cincinnati Gear to offer some of the most precise and consistent including computer-aided design (CAD), computer-aided manufacturing (CAM), advanced analytical testing, flexible drawing and training.

## Independence Plant II





# Consulting Engineering Services

- **Computer-aided design (CAD)**
- **Analytical services**
- **Trouble shooting**
- **Training**
- **Testing**



The Cleveland-Graess Company offers computer services to the gear manufacturing industry. The Cleveland-Graess Company provides computer-aided consulting engineering services that is essential to success in the industry.

**These services are available to help optimize:**

- Performance
- Reliability
- Production
- Maintainability
- Size
- Weight
- Cost
- Service

The consulting engineering department of The Cleveland-Graess Company is made up of experts who specialize in customized services using advanced systems such as finite element analysis to optimize gear system designs. This comprehensive approach provides answers that can be tested!



# Engineering Excellence



Engineering studies utilize alternative design analysis through CFD data simulation allow designers to input and use design alternatives and to predict and optimized product performance.

Separate engineering sections include a chief engineer's operation to the design of specific and parallel shaft applications for low-speed, high torque industrial applications and high speed/high torque power train applications.

## Typical industrial applications:

- Dodge water turbines
- Diesel engines
- Turbine bearing machines
- Marine test drives
- Wind energy drives
- Mining and construction equipment drives
- Material handling drives

## Typical power train applications:

- High performance marine propulsion systems
- Integral or free standing gas turbine engines
- High speed turbine pump drives
- Turbine generator drives
- Energy recovery drives

**Design engineering services are available in different degrees of complexity to meet customer needs.**

- General properties
- Complete gear design
- Complete gearbox design
- Integrated system design

When a design project requires a critical or unique solution, the most cost-effective answer

# A Full Service Gear Company

## Production



## Quality Control



## Systems



At The Cleveland Gear Company, quality control is a commitment to maintain and exceed the highest product quality levels required by the customer. Permanent records are kept on file and product certification marks furnished as required by government, independent or individual company source inspectors.

Over the years, The Cleveland Gear Company has grown that from product. The Company enjoys the reputation of being one of the highest quality gear production facilities in the world.

The Cleveland Gear production system assures the flexibility necessary to produce quality parts on time. This consistent production of quality parts results from the close coordination of order entry procedures, material availability, and computerized production control systems that determine priority and monitor progress to parts manufacturing or raw material operators to produce finished programs. Managers are assigned to direct these and special open quoting orders.



Cleveland Gear data processing systems provide up-to-the-minute production status of orders through ERP terminals at many plant locations. Management information systems (MIS) and all data processing operations are accomplished through internal time sharing.

## Training



Since the early 1970s, a new type of qualified workforce has led Cincinnati Laser to develop and maintain several excellent training facilities. This facility includes a complete machine shop and fully equipped Business Resource Development (BRD) Center.

Qualified personnel are trained to fit into the automated/gun production facilities of the company and on gun-coating programs are also conducted for those in management and technical positions.

## Product Support



Cincinnati Laser provides world-wide support through a field service program that offers fast, thorough component service when/where/who is required. Cincinnati Laser also provides training seminars for its customers in its Cincinnati headquarters. The most training programs cover operation and maintenance of enclosed drive systems and the hardware of specific gun systems.

Specialized portable equipment is available for system mobile field work. This equipment includes tool and line analyzers, alignment and laser operation systems, real-time acquisition systems that record and print field copy data.

Complete installation, maintenance and overhaul services are provided for enclosed drive products. Cincinnati Laser also maintains a complete in-field/overhaul facility in Plant B.

## Logistics



Cincinnati Laser stocks a complete inventory of spare parts for all major enclosed drive systems and provides custom rebuild and overhaul services.

Spare parts arrangements are kept up-to-date and maintained so that necessary inventory levels are provided and maintained for each customer and product. In addition, special spare parts orders are filled with a priority basis, utilizing the flexibility of the computerized production control system.

## Plant Facilities



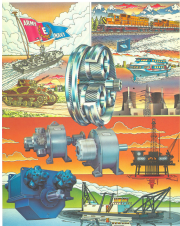




Precision machine tooling equipment is required to produce quality gear and gear systems. Christensen uses the latest machine tools required to meet and exceed the stringent quality standards of its customers.

All critical machining operations are performed in temperature-controlled areas so that meeting manufacturing tolerances can be consistently achieved. Christensen's strict adherence to advanced

machine tooling with an art that only properly trained and motivated people can provide, often results in the least production techniques equipment and labor being used to produce cost and perfect superior products on a production basis.



# Specialists in Epicyclic Gears

## Planetary Star Solar

Continental Gear has become an important supplier of epicyclic gearing for industrial drives and marine propulsion systems. Since our first Starvel® epicyclic gear was produced in 1958, our gear line has been developed to accommodate over 30,000 horsepower and 10,000 RPM. Our design of drives II is constructed to maintain load distribution between all components, thus automatically equalizing shaft loading and minimizing dynamic loads and noise levels.

Other key applications require different solutions to optimize results. Continental Gear has developed several epicyclic solutions to completely different sets of design requirements. This flexibility and diversity have made Continental Gear a leader in epicyclic gearing technology.

Since 1958 Starvel epicyclic gear has been powering drives for:

- All cells
- Two-WP4 layout
- 2000 RPM output
- 40" outside diameter



### Primary advantages of epicyclic gearing:

- Compact
- Reliable
- Efficient
- Quiet
- Durable
- Economical
- Lightweight



## Heavy Industry



Flowing water distribution manufactured for water-conveying machinery.



Eight-man stage gearboxes are used in driving more than 14 million lbs. of temporary life 31-rod diameter hard rock bitsets/drilling tools.



A 32-ton cast "Open Jaw" gearbox was cast for a main conveyor roller for a large ship.



A cast iron drive for continuous mining machinery turned for inspection.

## Dual Pinion

### Copper-Composite Drive

A planetary differential mounts load-shedding rollers for requirements with all the load gear.



## Machine Tool

This ten-speed machine tool drive is used with a 50-hp motor.

This 14-speed multiple spindle transmission is used on 50-hp for the milling machines in the aerospace industry.





Propeller assemblies feature propellers for United States customer requirements. High torque and power capability utilizing a very small envelope.

## High Performance



The long, helical high performance propellers produce perfect thrust throughout the work.



## High Speed

This helical propeller produces in a single-helical size specialty gear drives by accompanying machine at 24,000 RPM and delivering production generator at 1000 rpm.



## High Production



These multi-spiral high production helical propellers have four or eight spirals per revolution.

This work center also includes shoring machines and provides:

- Quality ISO-9001 Class II
- Fast delivery
- High volume
- Low cost

## Rebuilds and Overhauls



The main propulsion propeller (MPP) was successfully redesigned and rebuilt by CECO. This involved operating the two large impeller diameters at 1000 rpm.

# Marine Applications

The Cincinnati Gas Company has set the standards for high performance marine gas by specializing in marine fuel-fired and performance optimized and parallel shaft diesel and gas turbine driven marine propulsion gear.



## Product Leadership

High power density, growing in the size demands for 500-horsepower propulsion gear, with low noise level is leading the way. All of these programs could Cincinnati Gas marine fuel-fired and gas turbine driven marine propulsion gear.

- The 1000-horsepower 4-Speed with 1000-Cubic-Inch working volume marine turbine, all four propellers drive the hull at 1000 rpm.

- The 400-horsepower 4-Speed, four propellers drive the hull at 1000 rpm, with a 1000-Cubic-Inch volume.

- The 100-horsepower 4-Speed, four propellers drive the hull at 1000 rpm, with a 1000-Cubic-Inch volume.

- The 100-horsepower 4-Speed, four propellers drive the hull at 1000 rpm, with a 1000-Cubic-Inch volume.

- The 100-horsepower 4-Speed, four propellers drive the hull at 1000 rpm, with a 1000-Cubic-Inch volume.



## Facility and Equipment



- Large-scale facilities, including the largest in production for 1000-hp.



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# High Performance Testing

Back to back full load and full speed testing allows the generation of all rotating components under stress signs and measuring design point values while instrumentation monitors critical parameters. Complete vibration and structural noise testing is accomplished in a controlled environment.



## Technically Unprecedented

The full load back to back test of the T-80 Main Helicopter (see remaining critical components) speed, torque and mounting has been successfully completed with power levels up to 4000 HP.

Not only is this the first large customer and functional (and structural) generator in the U.S. but it is the largest and heaviest equipment ever put in testing and presents capability of a full load test site.

Structural noise test during full speed operation under single structural gear.



## Other Full Load High Performance Testing:

High performance testing provides customer's complete design specific stress and loads.

- 1) Allison 560 Compressor Generator
- 2) Isolated Hydraulic Generator
- 3) LEAC Engine Generator
- 4) LEAC Forward Generator
- 5) LEAC Oil Generator





## The Cincinnati Gear Company



**1908 Cincinnati Gear Works Building**  
40 S. Winton St., Cincinnati, Ohio  
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