



Conquering  
big challenges  
in small spaces

***ITW* Heartland**

*Gear up to precision  
manufacturing*

ITW Heartland is the only partner for custom gears, gearbox design, and precision manufacturing you'll ever need. For more than 40 years, our unique gearing solutions have served thousands of applications in dozens of industries. Our Spiroid®, Helicon®, Endicon®, and Concurve® gear designs featuring our High Torque to Space Ratio technology (HTSR™) is the solution for any gearing need.

# Solving *the* unsolvable

## HTSR™ Gearing

HTSR™ Gearing (High Torque to Space Ratio) is exclusive to ITW Heartland. Our designs and gears have been proven in military, aerospace, and industry applications for the past 50 years. HTSR Gearing is used in both right angle and inline applications. There are times when traditional gearing methods simply will not provide the power and torque needs required within space or weight limitations. And that is exactly where HTSR Gearing will shine.

HTSR Gearing is designed to meet difficult application requirements, rather than modifying the application to the limited capability of a gearing method. HTSR Gearing can be applied to all the ITW Spiroid trademarked designs.



## Spiroid® & Helicon® Gearing

The Spiroid family of gears consists of two trademarked brands, Spiroid® and Helicon®. This type of gearing, often referred to as “skew axis gearing”, operates on non-intersecting and non-parallel axes. Our designs are produced with contemporary software, tooling, and methods developed by ITW. The Spiroid family of gears is designed exclusively for right angle power transmission where high torque is required from a small gear set envelope. A variety of materials can be used including steel, brass, aluminum bronze, forgings, powder metal, and plastic (either molded or cut). Typical features include: high torque capability, high stiffness, quiet operation, compact and lightweight design, and easy assembly. Ratios are available ranging from 3:1 to more than 400:1.

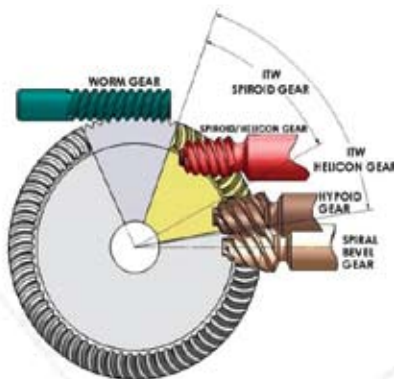


The offset from the gear centerline allows our gearing to maintain more tooth surface to be in contact at any time, thus increasing the contact ratio. By increasing the contact ratio, higher torque capacity is generated and motion transmission is smoother.

### Key Characteristics

- Simple and positive backlash control – zero backlash in certain cases
- Right or left-hand gear orientation
- Bi-directional driven gears
- Adjustable mounting distance based on assembly variation
- High accuracy for precise positioning or indexing and constant velocity
- High reduction ratios
- Superior shock strength
- High torque capability in relationship to gear set size
- Quiet operation
- Material options for the gear desired
- Compact and lightweight
- High stiffness
- Design flexibility to meet the application requirements rather than developing the application requirements to meet the gearing method

*This example contrasts Spiroid and Helicon gearing to traditional right angle power transmission methods (bevel gearing and worm gearing).*



Our high quality gearing is also available in standard spur, helical, and worm gearing. See our website for specific capabilities. [www.itwheartland.com](http://www.itwheartland.com)

## Concurve® Gearing

Concurve® gearing is an exclusive version of our HTSR™ gear technology. This innovative gear tooth design is not a typical involute form. The Concurve is a “spur gear” with stronger teeth created for the strength and life cycle duty requirements of the U.S. military and is now available to you. Its primary application is found in parallel axis gear and gearbox designs.

- 50% more running time hours at equivalent loads
- 50% more torque capacity in the same frame size
- 33% smaller frame size to achieve equivalent torque capacity
- 90% minimum efficiency
- Low backlash
- Greater shock resistance due to larger stronger teeth

The unique shape of the Concurve gear tooth is one reason why ITW Heartland achieves continuous torque ratings that are two to six times greater than gearboxes or gear sets using standard involute tooth form in most applications.



## Endicon® Couplings

Our Endicon® brand of indexing and face coupling rings are used for inline power transmission where zero backlash and precise location control are required. The two components are mirror images of each other and can transfer very high torque for inline applications.



- Self-centering
- Rigid and stiff coupling
- Very high load transfer capability
- Indexing calling out less than one degree of true position
- Accuracies within plus or minus three arc seconds
- Uniform tooth spacing with angular position repeatability of .000050 inch
- Variable tooth geometry for specific applications
- Material options for gear selected

## Custom Gearboxes

HTSR™ Gearing concepts and designs are used in customized gearboxes around the world. ITW Heartland can design the custom gearing or an entire gearbox for your application. Whether inline, planetary, or right angle, a custom solution can be achieved with our proven design and engineering services.



### Custom Gearbox Outcomes

- 30-50% more torque in the same or smaller work envelope
- High efficiency
- Wide range of gear ratios available during design
- Near zero backlash capability
- Application suitability and fit with custom designs
- Quiet operation
- Long life duty
- Lifetime lubrication
- Coolant exchange design options

### Typical Uses for ITW Heartland Gearboxes

- Actuators
- Pumps
- Fan drives
- Remote power generation
- Robotic arms
- Weapons systems
- Auger drives

## About ITW Heartland

ITW Heartland is a certified leader in precision engineered machines, parts, gears, and electro-mechanical products. Located in Alexandria, Minnesota, ITW Heartland has three distinct divisions: Spiroid Gearing, Manufactured Products, and Strategic Assembly Solutions. As an Illinois Tool Works company, ITW Heartland operates from a position of financial stability, engineering excellence, and refined manufacturing processes.

### SPIROID GEARING

Custom gears and gearboxes based on our Spiroid®, Helicon®, Endicon® and Concurve® gears in a high torque to space ratio (HTSR) gearing technology platform.

### MANUFACTURED PRODUCTS

Close tolerance and complex machine components from a wide variety of materials to meet custom requirements.

### STRATEGIC ASSEMBLY SOLUTIONS

Complete machine assembly services, specializing in mechanical, electrical, pneumatic, and material handling.

#### Our Quality Policy

*Delight our partners by exceeding their expectations.*



#### CERTIFICATIONS

ISO 9001

ISO 14001

AS9100

ITAR compliant



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[www.itwheartland.com](http://www.itwheartland.com)

ITW Heartland delivers economy, variety, complete service, and fast turnaround. We serve a variety of markets with specialty applications for:

- Aerospace
- Military & Defense
- Transportation
- Robotics
- Power Generation