TRUE Planetary™ Gearheads

MICRON

THOMSON®

Linear Motion. **Optimized.**™

Thomson -
Linear Motion. *Optimized.*

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

Thomson is best positioned to help you most quickly configure the optimal linear motion solution for your application.

- **Thomson invented anti-friction linear bearing technology. We own the broadest standard product offering of mechanical motion technologies in the industry.**
- **Modified versions of standard product are routine. White sheet design solutions available across our entire portfolio.**
- **Choose Thomson and gain access to over 70 years of global application experience in diverse industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.**
- **As part of Danaher Motion, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.**

Thomson is the name you can trust for quality, innovation, on-time delivery, controlled costs, and reduced risk.

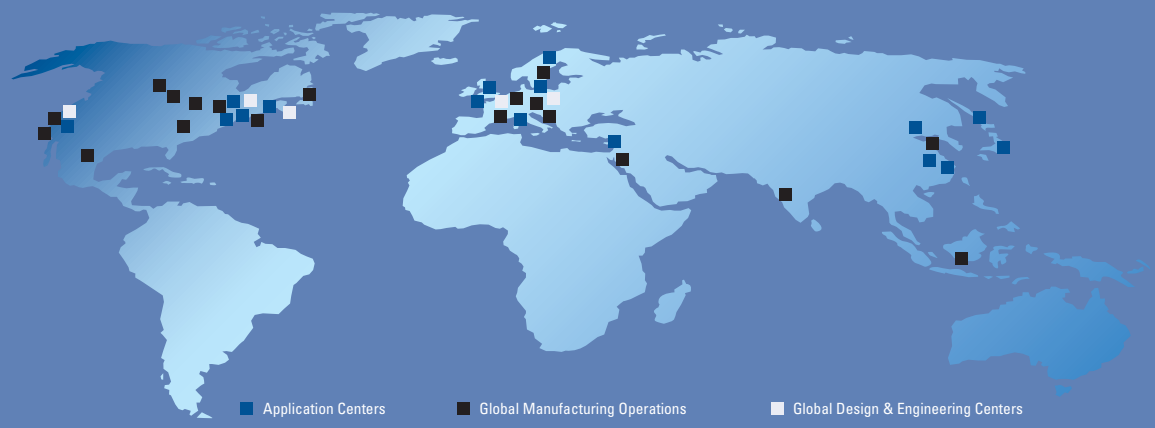
In addition to the information contained in this document, a wealth of product and application information is available online at www.thomsonlinear.com. Also online are downloadable 3D models, software tools, our distributor locator and global contact information for Thomson. For immediate assistance in North America contact us at 1-540-633-3549 or email us at Thomson@danahermotion.com.

Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

The Danaher Business System -
Building sustainable competitive advantage into your business

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe
Application Centers Global Manufacturing Operations Global Design & Engineering Centers



Micron True Planetary™ Gearheads shipped within 24 hours!

Need it fast? Go to the back cover of the catalog for details.

AquaTRUE™

Features

- Precision: 13 arc-minutes
- Frame Sizes: 60mm, 80mm, 120mm and 160mm
- Torque Capacity: up to 876 Nm
- Ratio Availability: 3:1 thru 10:1
- Radial Load Capacity: up to 3730 N

XTRUE™

Features

- Precision: 13 arc-minutes
- Frame Sizes: 40mm, 60mm, 80mm,120mm and 160mm
- Torque Capacity: up to 876 Nm
- Ratio Availability: 3:1 thru 100:1
- Radial Load Capacity: up to 3730 N

NemaTRUE™

Features

- Precision: 13 arc-minutes
- Frame Sizes: 60mm, 90mm and 115mm
- Torque Capacity: up to 180 Nm
- Ratio Availability: 3:1 thru 100:1
- Radial Load Capacity: up to 3730 N

NemaTRUE 90™ Right Angle

Features

- Precision: 13 arc-minutes
- Frame Sizes: 23mm, 34mm and 42mm
- Torque Capacity: up to 255 Nm
- Ratio Availability: 1:1 thru 500:1
- Radial Load Capacity: up to 2900 N

DuraTRUE™

Features

- Precision: 8 arc-minutes
- Frame Sizes: 60mm, 90mm, 115mm and 142mm
- Torque Capacity: up to 834 Nm
- Ratio Availability: 3:1 thru 100:1
- Radial Load Capacity: up to 11150 N

DuraTRUE 90™ Right Angle

Features

- Precision: 8 arc-minutes
- Frame Sizes: 60mm, 90mm, 115mm and 142mm
- Torque Capacity: up to 842 Nm
- Ratio Availability: 1:1 thru 500:1
- Radial Load Capacity: up to 11150 N

DuraTRUE 90™ Hollow Shaft

Features

- Precision: 8 arc-minutes
- Frame Sizes: 90mm, 115mm and 142mm
- Torque Capacity: up to 865 Nm
- Ratio Availability: 1:1 thru 500:1
- Radial Load Capacity: up to 11150 N

DuraTRUE 90™ Dual Shaft

Features

- Precision: 8 arc-minutes
- Frame Sizes: 60mm, 90mm, 115mm and 142mm
- Torque Capacity: up to 865 Nm
- Ratio Availability: 1:1 thru 500:1
- Radial Load Capacity: up to 11150 N

ValueTRUE™

Features

- Precision: 4 arc-minutes
- Frame Sizes: 60, 75, 90, 100, 115, 140, 180 and 220mm
- Torque Capacity: up to 2969 Nm
- Ratio Availability: 4:1 thru 100:1
- Radial Load Capacity: up to 37910 N

ValueTRUE 90™ Right Angle

Features

- Precision: 4 arc-minutes
- Frame Sizes: 60, 75, 90, 100, 115, 140 and 180mm
- Torque Capacity: up to 2800 Nm
- Ratio Availability: 1:1 thru 50:1
- Radial Load Capacity: up to 37910 N

UltraTRUE™

Features

- Precision: 4 arc-minutes
- Frame Sizes: 60mm, 75mm, 90mm, 100mm, 115mm, 140mm, 180mm and 220mm
- Torque Capacity: up to 3300 Nm
- Ratio Availability: 4:1 thru 100:1
- Radial Load Capacity: up to 37910 N

UltraTRUE 90™ Right Angle

Features

- Precision: 4 arc-minutes
- Frame Sizes: 60mm, 75mm, 90mm, 100mm, 115mm, 140mm and 180mm
- Torque Capacity: up to 3111 Nm
- Ratio Availability: 1:1 thru 50:1
- Radial Load Capacity: up to 37910 N

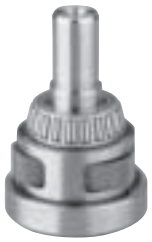
EverTRUE™ Continuous Duty

Features

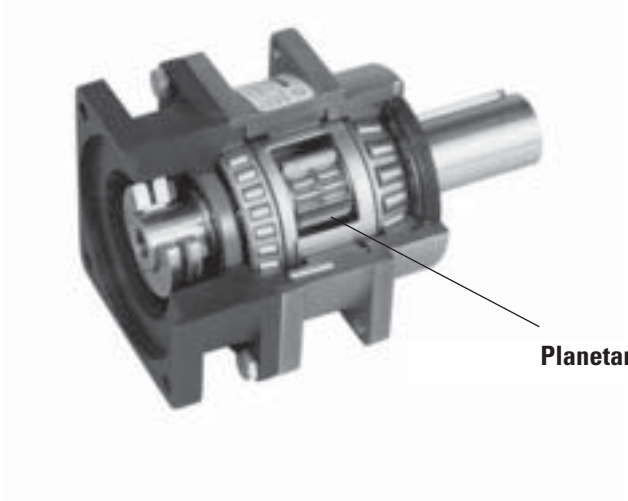
- Precision: 4 arc-minutes
- Frame Sizes: 100, 140 and 180mm
- Torque Capacity: up to 1010 Nm
- Ratio Availability: 4:1 thru 100:1
- Radial Load Capacity: up to 44600 N

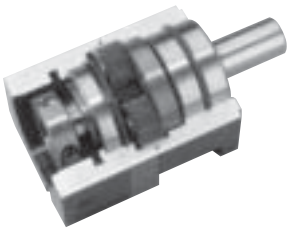
True Planetary™ Gearheads offer…

- High Torque to Size Ratio - allows compact design
- Low Backlash - eliminates positioning errors due to lost motion
- Inertia Matching - keeps servo system stable and in control
- High Rigidity - optimizes system response
- Self Re-lubrication - eliminates costly maintenance and downtime
- High Radial Load Capacity - mount pulleys and pinions directly on the output shaft

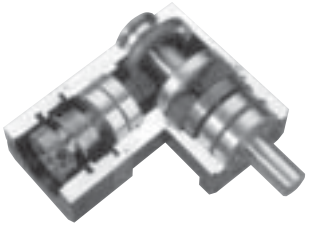


UltraTRUE™ output cage assembly

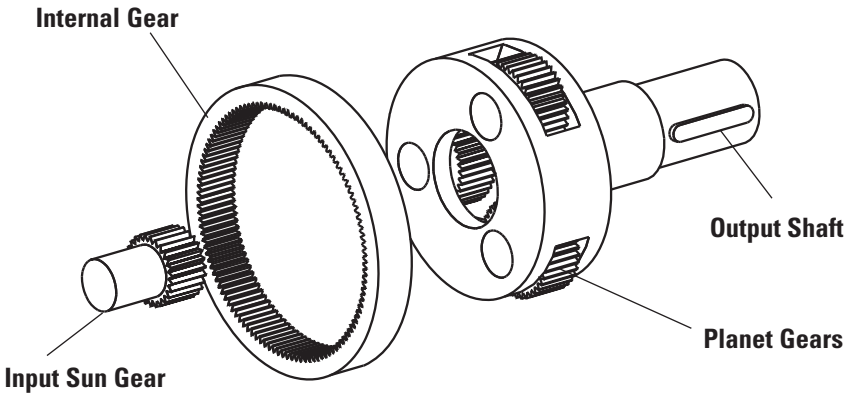




DuraTRUE™ in-line planetary gearhead



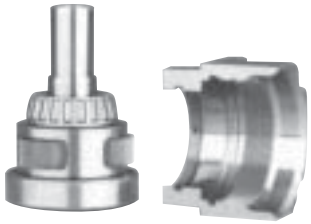
DuraTRUE 90™ right angle planetary gearhead



Gearhead	True Planetary gearing
AquaTRUE™	•
XTRUE™	•
NemaTRUE™	•
NemaTRUE 90™	•
DuraTRUE™	•
DuraTRUE 90™	•
UltraTRUE™	•
UltraTRUE 90™	•
ValueTRUE™	•
ValueTRUE 90™	•
EverTRUE™	

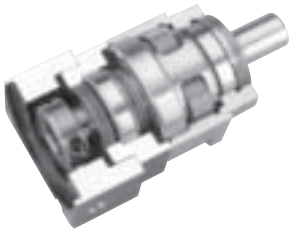
Helical Crowned True Planetary™ Gearing offers…

- High Torque Capacity
- Low Backlash
- Smooth Operation
- Greater Load Sharing
- Whisper Quiet



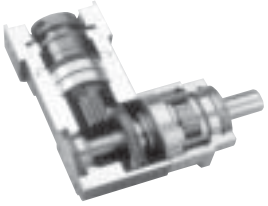
Output housing and helical internal gear are machined from a single piece of high strength steel

Helical gears are known for their quiet and smooth operation along with their ability to transmit higher loads than spur gears. Both of these features of helical gearing result from the improved contact ratio (effective teeth in mesh) over spur gears. Crowning is a modification to the gear tooth profile which optimizes gear mesh alignment. It also enhances distribution of loading on the tooth flank, thereby reducing high stress regions which can result in surface pitting.



UltraTRUE™ in-line planetary gearhead

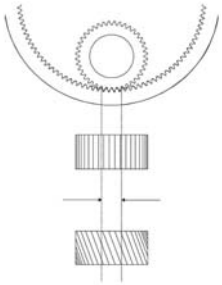
Planetary gearheads are often selected for high precision motion control applications which require a high torque to volume ratio, high torsonial stiffness and low backlash. Until now, these attributes have been sufficient to meet the requirements of the market. Thomson has designed a high torque, whisper quiet helical gearhead to meet the recent improvements in servo motor technology.



UltraTRUE 90™ right angle planetary gearhead

Thomson engineers accomplished this by combining the positive attributes of gear crowning and helical gearing with the planetary construction to create the smoothest operating gearhead on the market.

Spur vs. Helical Gearing

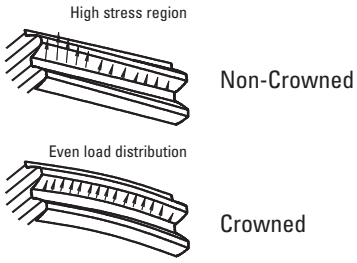


Typical contact ratio is 1.5 for spur gearing.

Contact ratio for equivalent helical gear is 3.3...more than double the contact ratio.

The Contact ratio is defined as the number of teeth in mesh at any given time. The higher the contact ratio, the higher the torque rating of the gearing. **Helical gearing has more than 2X the contact ratio of spur gearing.**

Crowned vs. Non-crowned

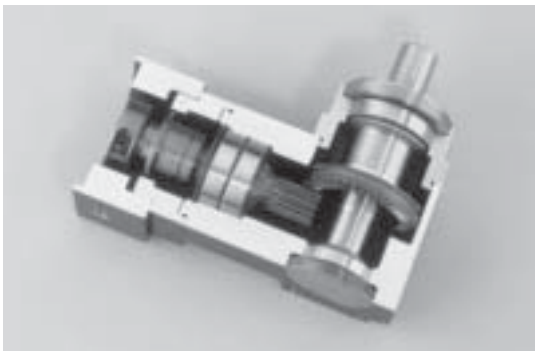


Crowning optimizes the gear mesh alignment within a gear train to increase the torque capacity and reduce noise. It also enhances load distribution on the tooth flank to reduce high stress regions.

Gearhead	Helical Crowned True Planetary gearing
AquaTRUE™	
XTRUE™	
NemaTRUE™	
NemaTRUE 90™	
DuraTRUE™	
DuraTRUE 90™	
UltraTRUE™	•
UltraTRUE 90™	•
ValueTRUE™	•
ValueTRUE 90™	•
EverTRUE™	•

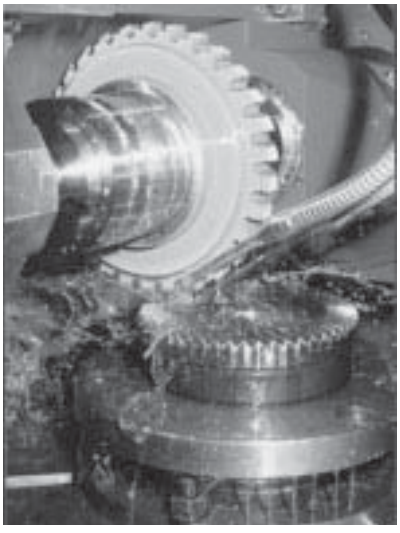
PowerTRUE™ Right Angle Gearheads offer…

- Lower backlash accomplished through single axis mesh adjustment
- A compact right angle design utilizing a high-tech face gear
- Whisper quiet operation due to high contact ratio
- Mesh ratios from 1:1 to 5:1
- 98% efficiency



PowerTRUE™ Gear

Computerized mapping of gear tooth profile

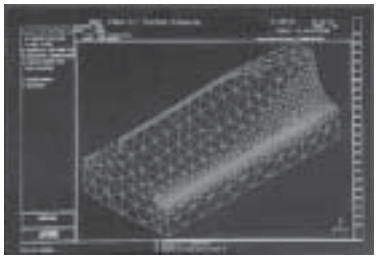


CNC Machining of a PowerTRUE™ right angle gear

PowerTRUE™ right angle gearset

Right angle gear meshes are typically limited to ratios from 1:1 to 3:1 when using standard bevel gears. Compared to these designs, the PowerTRUE 90 gear increases the ratio range to 5:1.

The key to higher torque density is a unique tooth design, created by complex machining made practical with advanced CNC equipment and software. In the design,multiple teeth in the face gear simultaneously mesh with a standard involute pinion. The continuous tooth engagement yields a high contact ratio between the gear and the pinion, boosting torques to new levels and efficiency to 98%.



Advanced software enables stress analysis of PowerTRUE tooth profile

Gearhead	PowerTRUE gearing
AquaTRUE™	
XTRUE™	
NemaTRUE™	
NemaTRUE 90™	•
DuraTRUE™	
DuraTRUE 90™	•
UltraTRUE™	
UltraTRUE 90™	•
ValueTRUE™	
ValueTRUE 90™	•
EverTRUE™	

RediMount™ Motor Mounting System

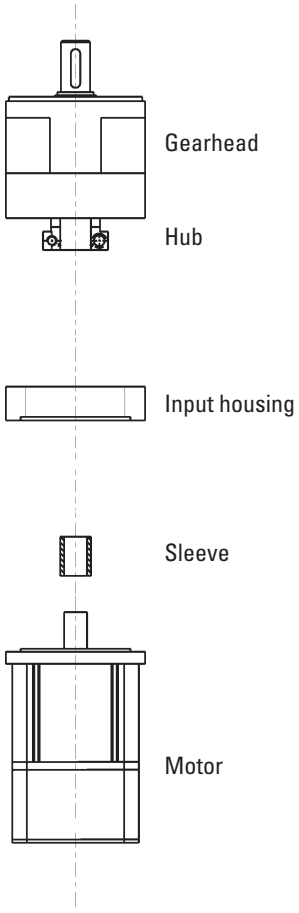
Mounting Instructions

1. Slide the provided sleeve into the hub and align the slot in the bushing with the slot in the hub.
2. Set the motor on a work surface or hold fixture with the output shaft facing straight up. If there is a key on the motor, remove it and align the keyway with the slot in the hub. Slide the gearhead down onto the motor shaft.
3. Rotate the hub to align the input housing access holes with the hub clamping bolts.
4. Using a torque wrench tighten the hub bolts to the pre-torque value indicated in the table.
5. Bolt the motor to the gearhead with the bolts provided.
6. Gradually tighten the hub bolts in three steps, increasing the torque each time until reaching the final tightening torque in the table.

Hub Bolt Tightening Torques

Gearhead Model	Gearhead Frame Size	Pre-Tightening Torque		Final Tightening Torque	
		in-lb	[Nm]	in-lb	[Nm]
XTRUE™	60	2	0.2	39	4.4
	80	4	0.4	76	8.5
	120	16	1.8	316	36.0
	160	32	3.6	636	72.0
NemaTRUE™ NemaTRUE 90™	23/60	2	0.2	39	4.4
	34/90	4	0.4	76	8.5
	42/115	16	1.8	316	36.0
DuraTRUE™ DuraTRUE 90™	60	2	0.2	39	4.4
	90	4	0.4	76	8.5
	115	16	1.8	316	36.0
	142	32	3.6	636	72.0
UltraTRUE™ UltraTRUE 90™ ValueTRUE™ ValueTRUE90™ EverTRUE™	60	2	0.2	39	4.4
	75/90	4	0.4	76	8.5
	100/115	16	1.8	316	36.0
	140	32	3.6	636	72.0
	180	55	6.3	1104	125.0

Gearhead must be mounted in vertical orientation.

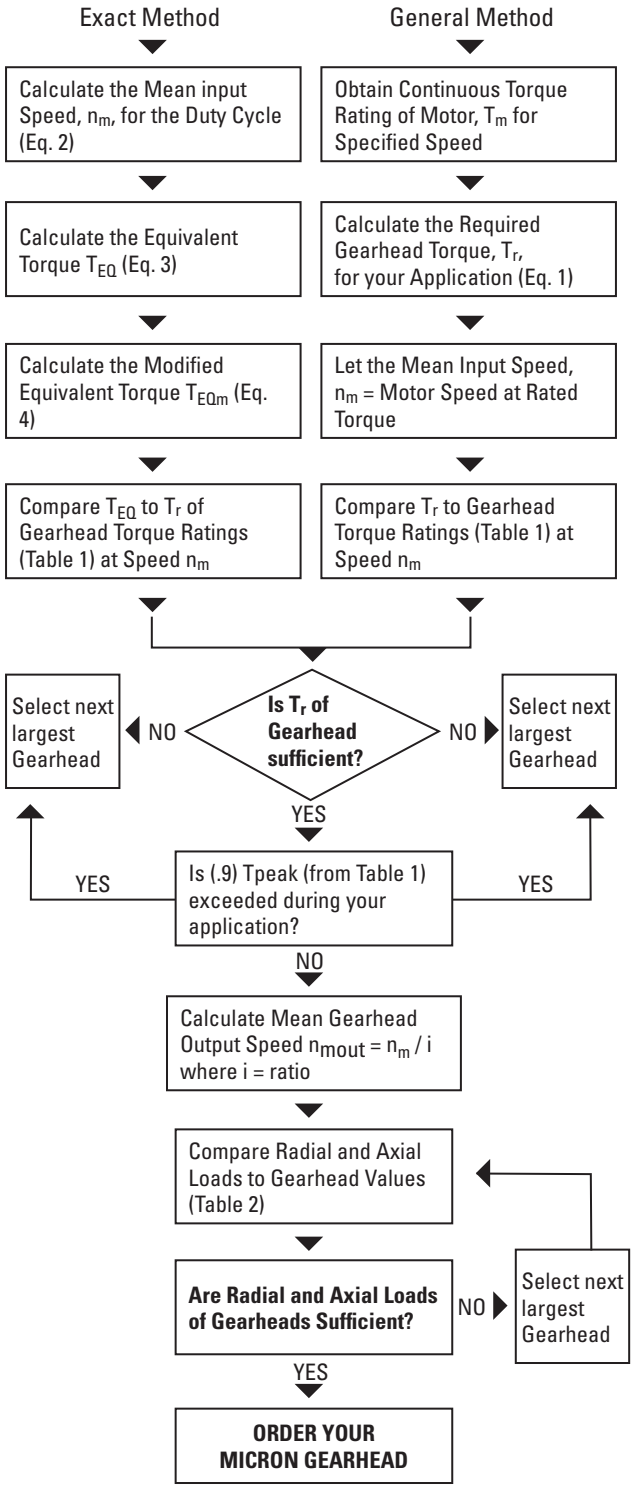


Selection

Step 1: Select the required precision class and gearhead configuration (in-line or right angle).

Step 2: Select the proper gearhead using exact or general method.

For continuous duty applications, please contact Applications Engineering.



General Method:

Required Gearhead Torque(T_r)

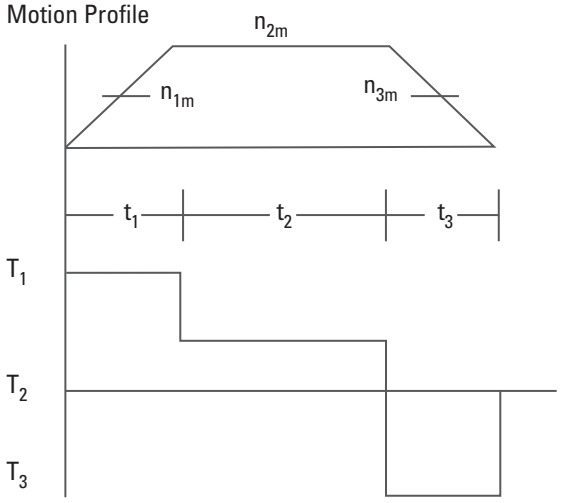
(1) $T_r = T_M * x\ i\ x\ e$

where: T_{M*} = continuous torque of motor
i = Gearhead ratio
e = efficiency of Gearhead

* Since many motors are capable of exceeding their continuous torque rating for extended lengths of time, the value for T_M will only provide a starting point for Gearhead selection. Only use the general method if the continuous motor rating is not exceeded in the application.

Exact Method

Motion Profile



t_n = time period n

n_{nm} = mean speed during time period t_n

T_n = torque during time period t_n

Mean input speed (n_m)

(2) $$n_m = \frac{n_{1m}t_1 + n_{2m}t_2 + n_{3m}t_3 + ... + n_{nm}t_n}{t_t}$$

where $t_t = t_1 + t_2 + t_3 + ... + t_n$

Equivalent torque (T_{EQ})

(3) $$T_{EQ} = \sqrt[8,7]{T_1^{8,7}\frac{n_{1m}t_1}{n_m t_t} + T_2^{8,7}\frac{n_{2m}t_2}{n_m t_t} + T_3^{8,7}\frac{n_{3m}t_3}{n_m t_t} + ... + T_n^{8,7}\frac{n_{nm}t_n}{n_m t_t}}$$

Modified equivalent torque (T_{EQm})

(4) $T_{EQm} = (T_{EQ})/Q$

where Q is:

Q	# of cycles/hr
1,0	>0
0,9	>1000
0,7	>2500
0,5	>5000

For applications > 10,000 cycles/hour or for continuous duty operation, please contact application engineering.

Micron MOTIONEERING®

The new web based sizing tool for Micron TRUE Planetary® Gearheads

Have Micron MOTIONEERING® do the application engineering work for you!

A new way to optimize your machine design, save time and, ultimately, help you build a better machine, faster. Easy to use and it's free at www.MicronMOTIONEERING. com

Micron MOTIONEERING has two different modes of functionality:

1. Sizing and Selection
   Enter your application requirements in just a few easy steps to find the right gearhead for your application in the "Sizing and Selection" section.

2. Select Gearheads by Model Number
   Search by product line, model number and ratio in the "Select Gearheads by Model Number" section. The tool quickly provides an orderable part number, pricing and delivery information.

Choose the selection mode that works best for you - "Select by Model Number" or "Sizing and Selection."

Select Gearheads by Model Number

If you know which gearhead you want, simply select the gearhead product line, frame size, ratio and RediMount*. Micron MOTIONEERING will provide the complete part number, pricing and delivery. Also available immediately are 3D models and a wealth of related catalog specifications.

- Don't know your RediMount? Choose from hundreds of the most popular motors on the market today or enter in your motor dimensions manually.
- Not sure if your motor fits on a specific gearhead? The tool will let you know if you have chosen a combination that is outside of the standard guidelines.

"Select Gearheads by Model Number" is quick and easy when you are familiar with Micron Gearheads and know what you're looking for.

Need a Gearhead in 24 hours? Use Gearhead Express!

The Micron MOTIONEERING tool lists all of the size and ratio combinations available to ship in 24 hours with the Gearhead Express Program.

*All Micron gearheads use the innovative RediMount™ system, the most flexible mounting system available today. This mounting system allows easy and error free mounting to any motor on the market in just three easy steps - simply align, mount and tighten.

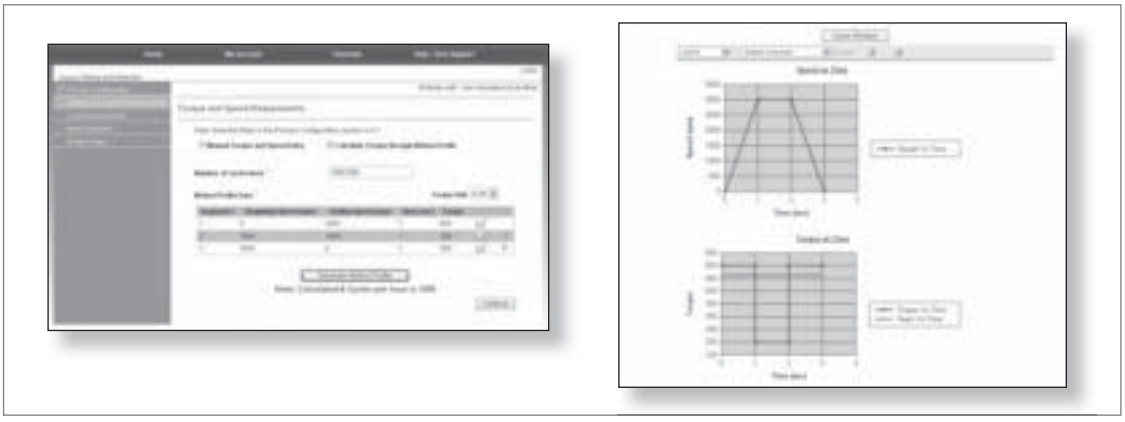
Micron MOTIONEERING®

Web-based sizing and selection tool for Micron TRUE Planetary® Gearheads

Gearhead Sizing and Selection

Follow these easy steps for sizing and selection:

- Select orientation (in-line or right angle).
- Select backlash requirement.
- Select from all of the ratios available for that combination.
- If needed, you may account for radial and axial loads on the output shaft.
- Select a specific torque and speed requirement or build an entire motion profile.
- The tool will calculate your T_{eq} (equivalent torque) and display only solutions that will work in your application.
- If you do not know your RediMount, you can choose from a list of the most popular motors on the market today or enter your motor dimensions manually.
- Double check your configuration on the "Review Page." Click any parameter to quickly edit if needed then submit to reveal a list available solutions, sorted by price.
- The torque safety factor will also be listed for each solution to help maximize the gearhead life.
- The final output delivers pricing, a printable summary of the design solution, and the ability to save it for future use.
- Also available are 3D models of your unique solution in neutral file formats or native CAD files for all major software packages (25+ formats available).



Use the Micron MOTIONEERING tool to help you build your motion profile.

Get started with Micron MOTIONEERING today!

- The Micron MOTIONEERING tool is very easy to use and is the fastest way to accurately size and select your next gearhead.
- Save money by seeing all the possible choices.
- Automatic calculations ensure the correct solution to fit your requirements.
- It does all of the work for you and gives you the correct solution to fit your requirements.