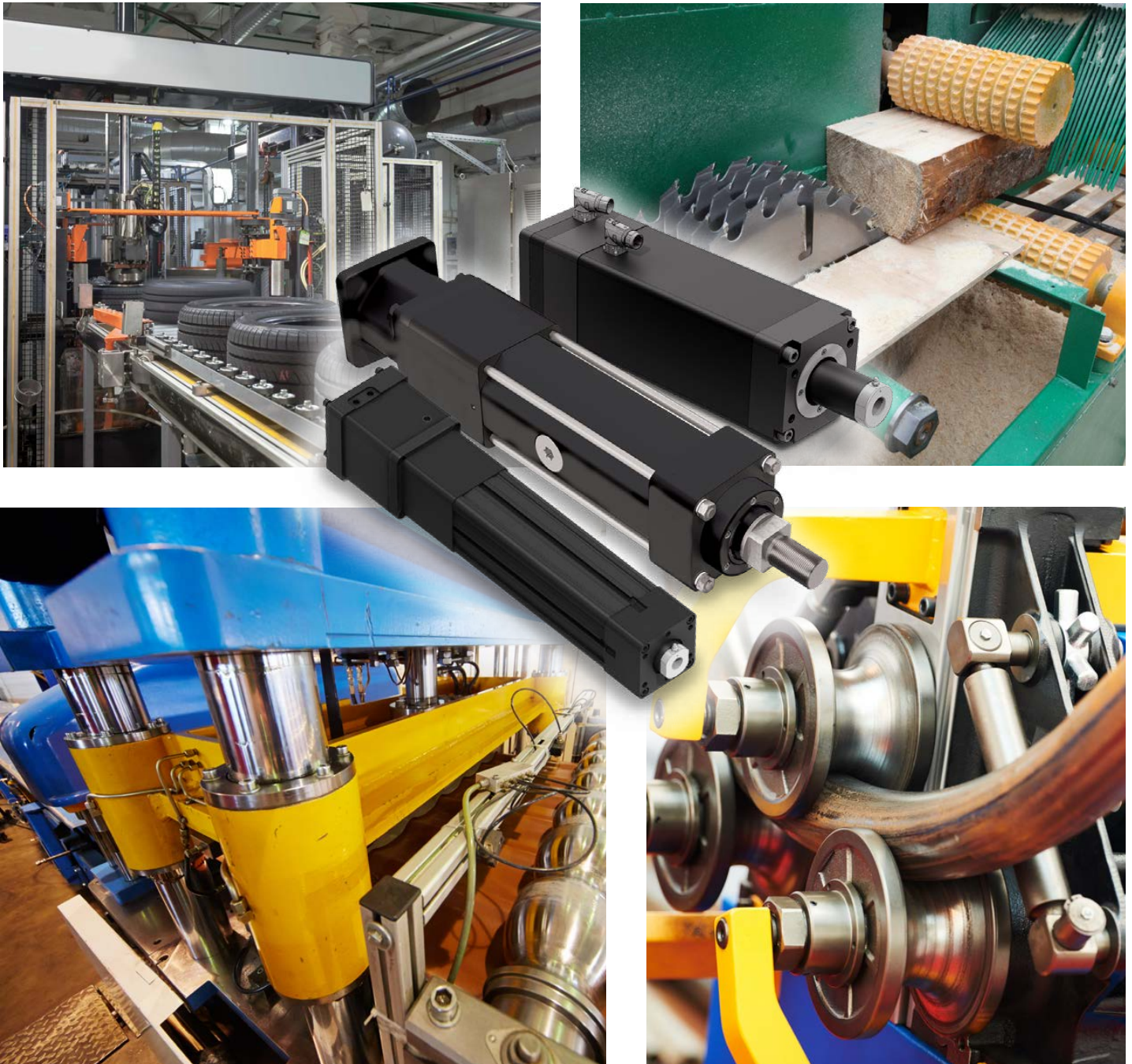
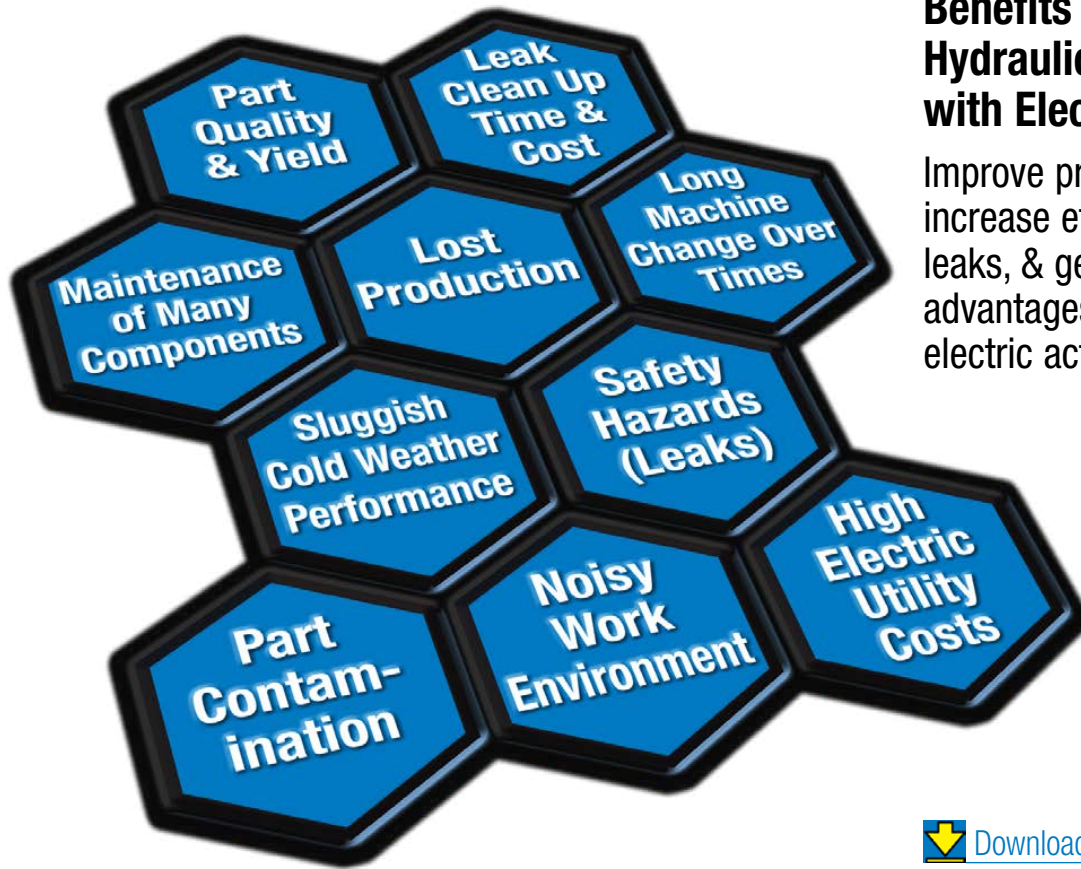


CONVERTING HYDRAULIC TO ELECTRIC ACTUATORS



Converting From Hydraulic to Electric Actuators



Benefits of Replacing Hydraulic Cylinders with Electric Actuators

Improve process control, increase efficiency, eliminate leaks, & get many other advantages by adopting electric actuator systems

[!\[\]\(0f848bbd71cef6b345273b16f905912a_img.jpg\) Download Tolomatic's paper on the pros & cons of Electric Actuator vs. Hydraulic cylinder systems.](#)



[!\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\) Link to: Advantages of Converting Hydraulic to Electric Linear Motion Information Video](#)

Converting From Hydraulic to Electric Actuators

1: EVALUATE POTENTIAL BENEFITS


Flexible Operation: would it be helpful to quickly and easily be able to adjust stroke lengths, forces, speed of movements?

Precise Movement: would it be helpful to improve your precision...so that every time you make a move you get exactly the same result?

Data Collection: would it be helpful to collect data from the motor and actuator so you could record how far the actuator moved, how much force was exerted and what speeds the actuator moved at?


Leaks and Environmental Concerns: would it be helpful to eliminate the potential for hydraulic fluid leaks in the manufacturing environment to improve safety and better insure product quality?

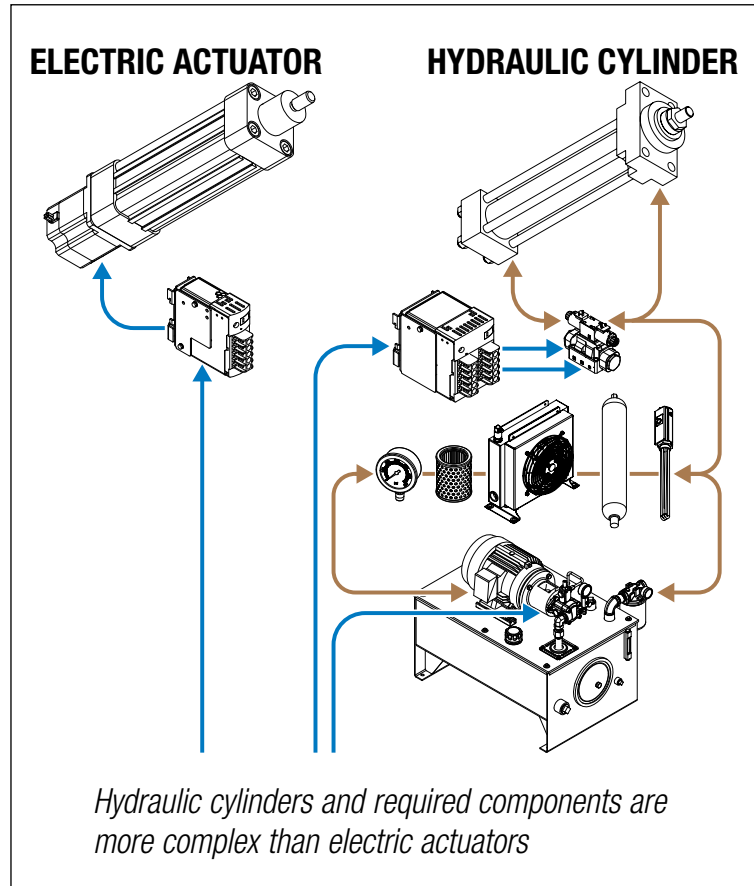
Maintenance: would it be helpful if you had a system with fewer moving parts, almost no on-going maintenance requirements and doesn't contain pressurized oil?

 [Download "Calculating Total Cost of Ownership" Infographic.](#)



Ambient Temperature: would it be helpful if you got the exact same performance regardless if the ambient temperature was below freezing or the hottest day of the summer?

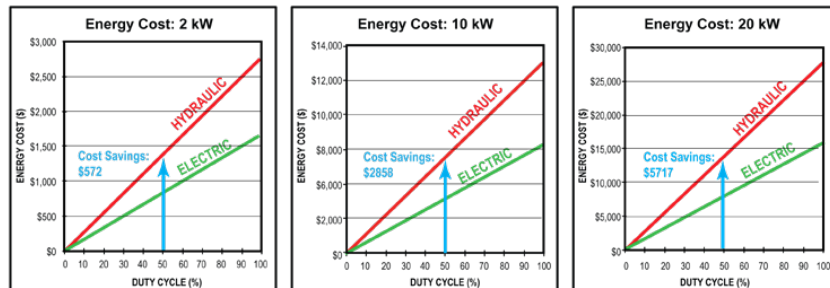
Other factors: Utility costs, Noise, Shock loads

 [Download "Electric vs. Servo-hydraulic vs. Hydraulic Actuators" Infographic.](#)



Electric vs. Hydraulic Power Costs

- 1 **POWER-OUT (kW)**  = Velocity (m/sec) x Force (N) ÷ 1,000 (converted to kN)
- 2 **POWER-IN (kW)**  = Power-Out (kW) ÷ Efficiency (%)
- 3 **COST OF APPLICATION \$** = (Power-In) x (Hours/year) x (Electricity Cost)

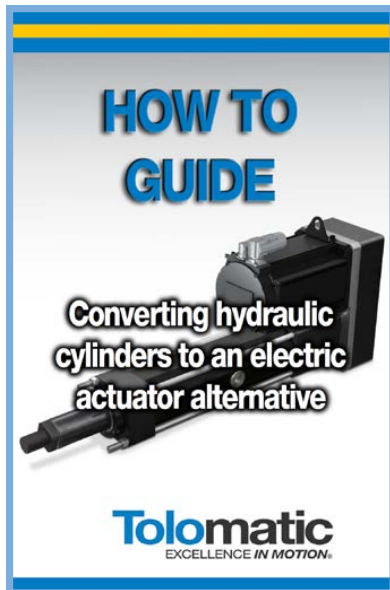


- 3 IN (80MM) BORE HYDRAULIC CYLINDER
 - POWER OUT: 2 kW
 - SPEED: 1.8 in/sec (45 mm/sec)
 - FORCE: 10,000 lbf (44.5 kN)
- 4 IN (100MM) BORE HYDRAULIC CYLINDER
 - POWER OUT: 10 kW
 - SPEED: 2.9 in/sec (75 mm/sec)
 - FORCE: 30,000 lbf (133.5 kN)
- 6 IN (160MM) BORE HYDRAULIC CYLINDER
 - POWER OUT: 20 kW
 - SPEED: 3.5 in.sec (90 mm/sec)
 - FORCE: 50,000 lbf (222.5 kN)

ASSUMPTIONS: Annual Power Consumption; Electric Efficiency 80%; Hydraulic Efficiency 45%; 2000 PSI; Cost kWhr \$0.07
BLUE ARROWS DESIGNATE COST SAVINGS SHOWN AT 50% DUTY CYCLE

Converting From Hydraulic to Electric Actuators

2: ACCURATELY SIZE ACTUATOR



Converting a hydraulic cylinder to an electric actuator system requires understanding **three key variables: force, motion profile and electric actuator technology.**

↓ Download [this guide](#) for examples and formulas to help you make the right selection.

↓ Online sizing at Sizit.Tolomatic.com



Most important sizing tip: Don't oversize the actuator.

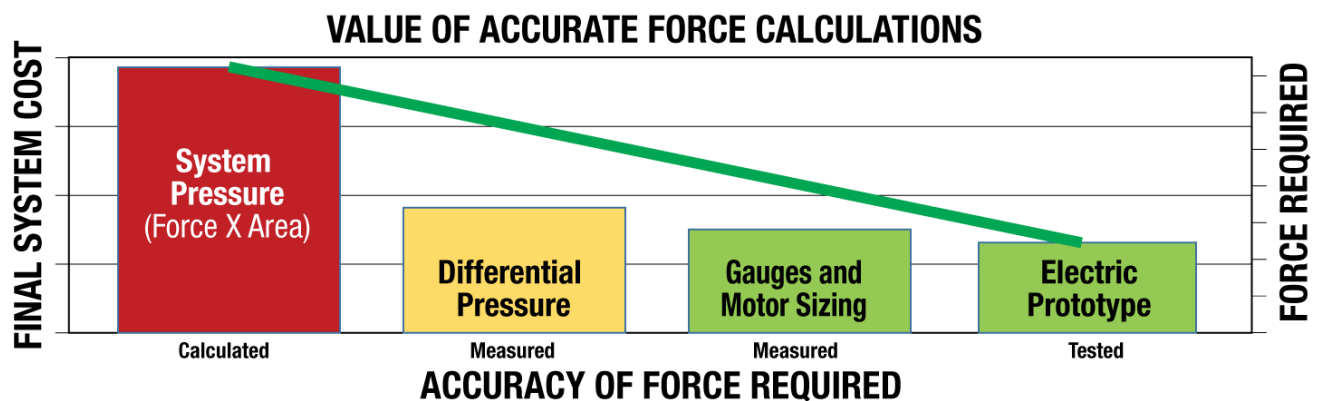
Measuring Pressure: At the cylinder

- Most accurate location for reading pressure → closest to work point

Tolomatic
EXCELLENCE IN MOTION

A costly mistake when converting to an electric system is oversizing the actuator.

↓ This video summarizes how to accurately size an actuator for hydraulic replacement.



Converting From Hydraulic to Electric Actuators

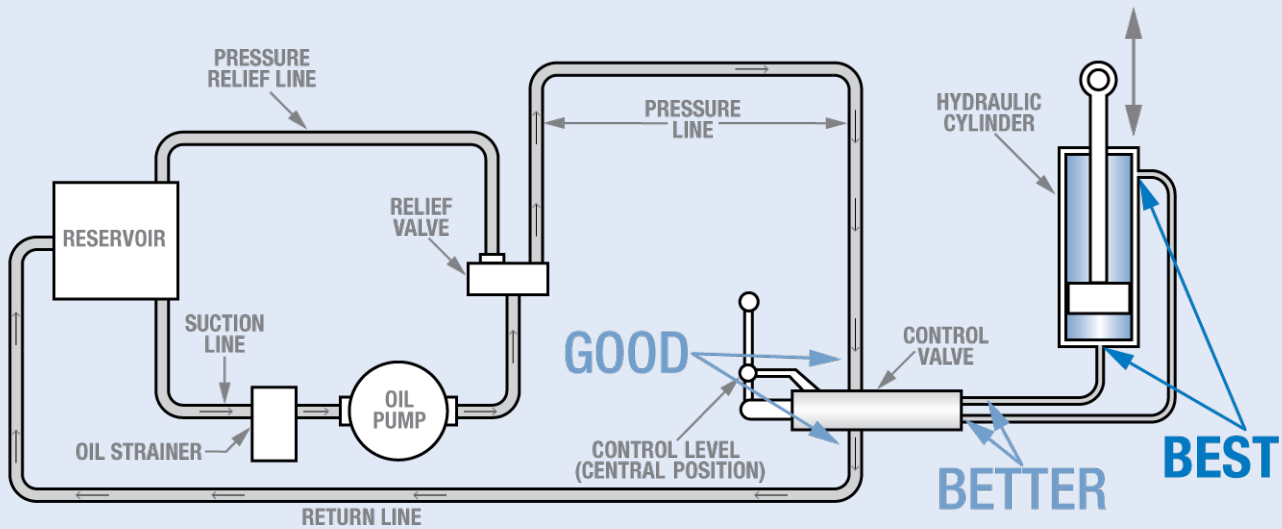


Apply High force actuators with confidence

Learn valuable tips for sizing and selecting high force actuators – from 50 lbf to 50,000 lbf (0.2 kN to 222.4 kN).

[View this webinar to help you define a solution that you can deploy with confidence.](#)

Make pressure measurements at the cylinder or valve in order to better determine accurate applications forces.

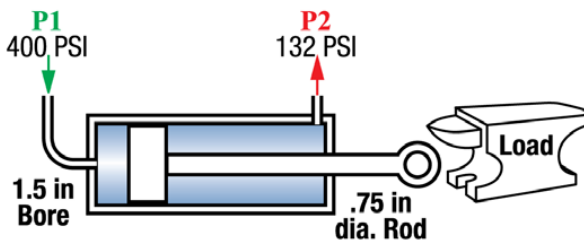


This diagram shows the preferred locations to measure pressure to accurately determine the actual force required in an existing application

Most Accurate Calculation Method!

- ✓ Force on each side of the cylinder is calculated
- ✓ Area of Rod side of Piston = bore area - rod area
- ✓ Application force = difference in force for each side

$$\text{Force} = (\text{Area1} (\pi r^2) \times P1) - (\text{Area2} (\pi r^2) \times P2)$$



Converting From Hydraulic to Electric Actuators

3: IMPLEMENTATION STEPS

A.) Research:

Tolomatic has gathered a wealth of informative and educational resources to help with this process:

 [Electric/hydraulic conversion info center](#)



APPLICATION DATA WORKSHEET

ORIENTATION

Horizontal Vertical Tilted

Load supported by actuator OR Load supported by other mechanism

MOVE PROFILE

EXTEND

Move Distance: _____ inches / _____ millimeters

Move Time: _____ sec

Max. Speed: _____ in/sec / _____ mm/sec

Dead Time After Move: _____ sec

RETRACT

Move Distance: _____ inches / _____ millimeters

Move Time: _____ sec

Max. Speed: _____ in/sec / _____ mm/sec

Dead Time After Move: _____ sec

STROKE LENGTH

_____ inches / _____ millimeters

PRECISION

Repeatability: _____ inches / _____ millimeters

OPERATING ENVIRONMENT

Temperature, Contamination, Water, etc.

MOTION PROFILE

NO. OF CYCLES: _____ per hour

HOLD POSITION? Required Not Required

After Move During Power Loss

LOAD

EXTEND **RETRACT**

FORCE: _____ lbf / _____ kgf / _____ N

CONTACT INFORMATION: Name, Phone, Email, Co. Name, Etc.

USE THE TOLOMATIC SIZING AND SELECTION SOFTWARE AVAILABLE ON-LINE AT www.tolomatic.com OR... CALL TOLOMATIC AT 1-800-328-2174. We will provide any assistance needed to determine the proper actuator for the job.

FAX 1-763-478-8080 EMAIL help@tolomatic.com

B.) Collect Application Details

Use Tolomatic's application worksheet as a guide: The product selection process can be complex. It is highly recommended that you contact Tolomatic or an authorized Tolomatic Distributor for selection assistance.

Fill out an Application Data Checklist Form and submit it to our sales department for assistance in selecting the best product for your application.

 [Online: Electric Rod-Style Actuator Application Checklist](#)

 [Online: Electric Rodless Actuator Application Checklist](#)

Online Sizing



Size and select Tolomatic electric actuators with our easy-to-use online software.

 sizeit.tolomatic.com

The image shows two screenshots of the Tolomatic online sizing software. The left screenshot displays the 'Product Selector' interface, where users can choose between 'Traditional Actuators' (RSA, ERD, REX, CSA) and 'Integrated Actuators' (DMA, DMA-ST Standard, DMA-SA Anti-Rotate). It includes fields for 'Select Sizes' and 'Lead Screw Selection'. The right screenshot shows the 'Motion Profiler' interface, which features a graph of velocity over time and a table for defining motion segments.

Item	Total Distance (ft)	Total Move Time (seconds)	Max. Acceleration (G's)	Max. Velocity (ft/min)
extend	12	12	0.38	
dwell	0	1	0	0
retract	12	12	0.38	
dwell	0	10	0	0

Converting From Hydraulic to Electric Actuators

C.) Contact Tolomatic for Expert Advice



Engage with Tolomatic to work through the process

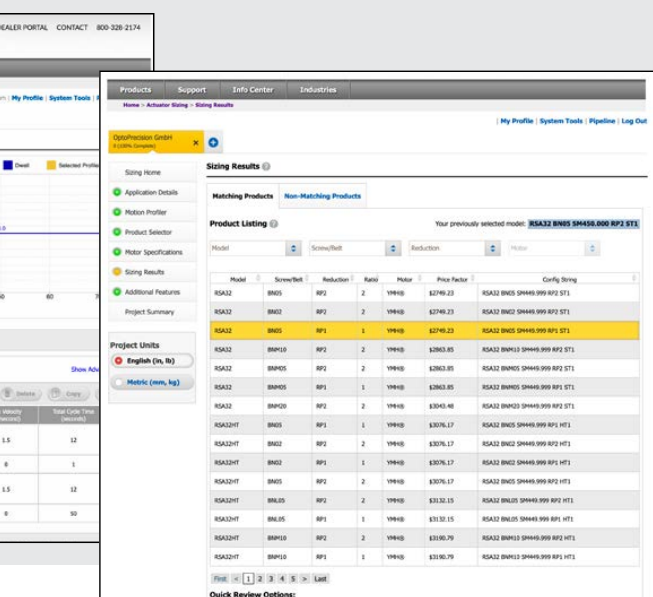
Expect prompt, courteous replies to all of your application and product questions. Call us at 1-800-328-2174

click on the  [Ask and Engineer](#) link
or email us at  sales@Tolomatic.com



D.) Comprehensive Pre-sale and Post-sale Tech Support

Factory application reviews to suit your preference (virtual, in person or at Tolomatic) with full support of our technical and engineering staff. We'll precisely integrate the perfect actuator for your machine/system. Support that gets quick results and ensures your system will continue to run effectively and efficiently.



Some Sizing Tips:

- Identify application loads and forces including tooling, reactive forces, press forces, drag, etc....
- Motion profiles and cycle rates
- Be as accurate as possible
- What is important: Speed, cycle time or both
- Don't forget dwells!

The Tolomatic Difference Expect More From the Industry Leader:



INNOVATIVE PRODUCTS

Unique linear actuator solutions with Endurance TechnologySM to solve your challenging application requirements.



FAST DELIVERY

The fastest delivery of catalog products... Built-to-order with configurable stroke lengths and flexible mounting options.



ACTUATOR SIZING

Online sizing that is easy to use, accurate and always up-to-date. Find a Tolomatic electric actuator to meet your requirements.



YOUR MOTOR HERE

Match your motor with compatible mounting plates that ship with any Tolomatic electric actuator.



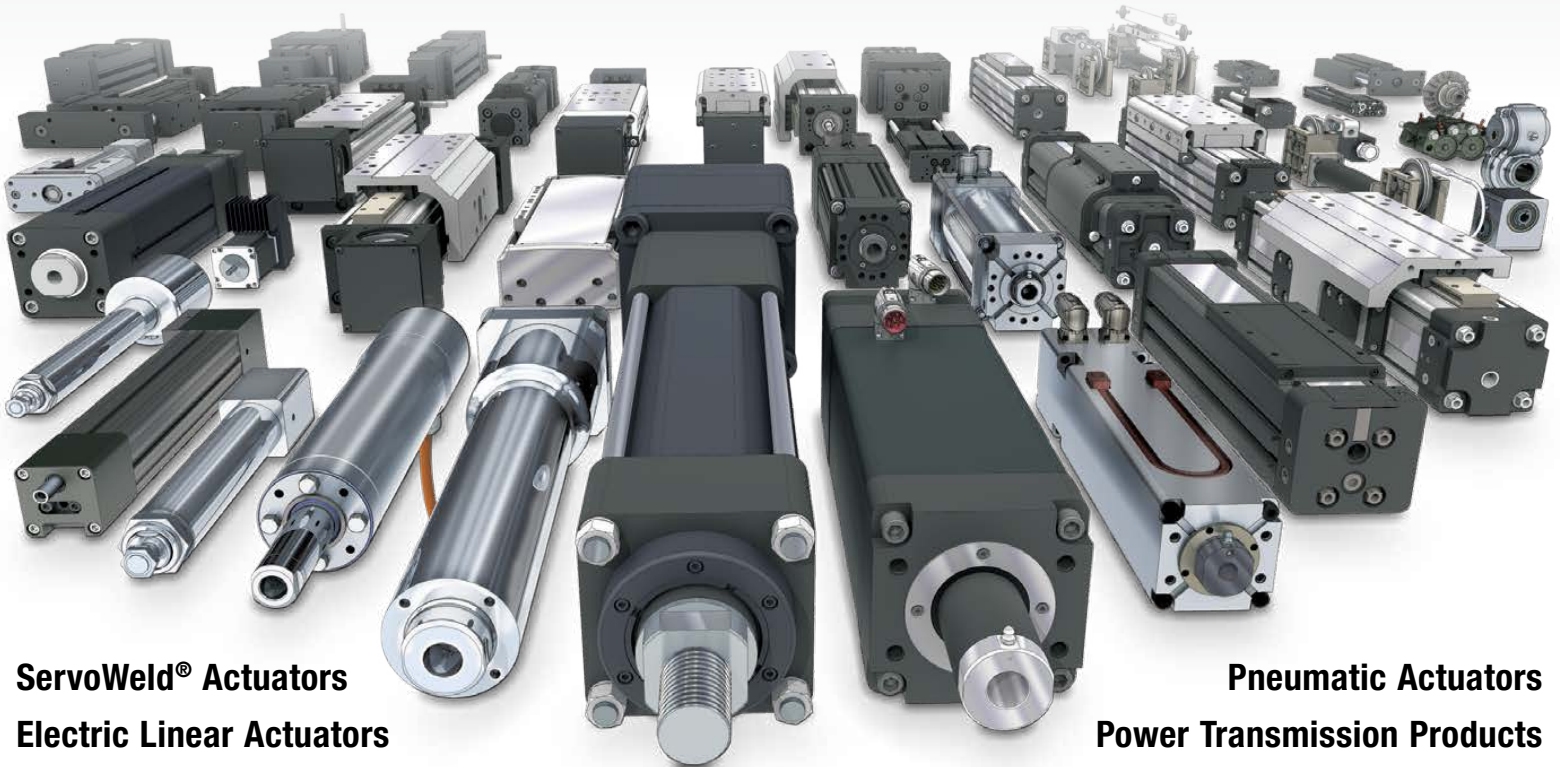
LIBRARY

Easy to access CAD files available in the most popular formats to place directly into your assembly.



TECHNICAL SUPPORT

Extensive motion control knowledge: Expect prompt, courteous replies to any application and product questions from Tolomatic's industry experts.



ServoWeld[®] Actuators
Electric Linear Actuators

Pneumatic Actuators
Power Transmission Products

TolomaticTM

EXCELLENCE *IN MOTION*

COMPANY WITH
QUALITY SYSTEM
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= ISO 9001 =
Certified site: Hamel, MN

USA - Headquarters

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