



Belt Driven Actuators

Selecting the Proper Actuator for Your Application

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Selecting the Proper Actuator

Typically available in two primary drive-train configurations, belt driven and screw driven, linear actuators translate motor rotations into linear, straight line travel. While each drive train has its merits and limitations, determining which option is best suited to your application can be challenging.

This guide can help you understand the construction and materials used by Macron Dynamics to manufacture belt driven actuators and how to match the right belt drive actuator to your application.

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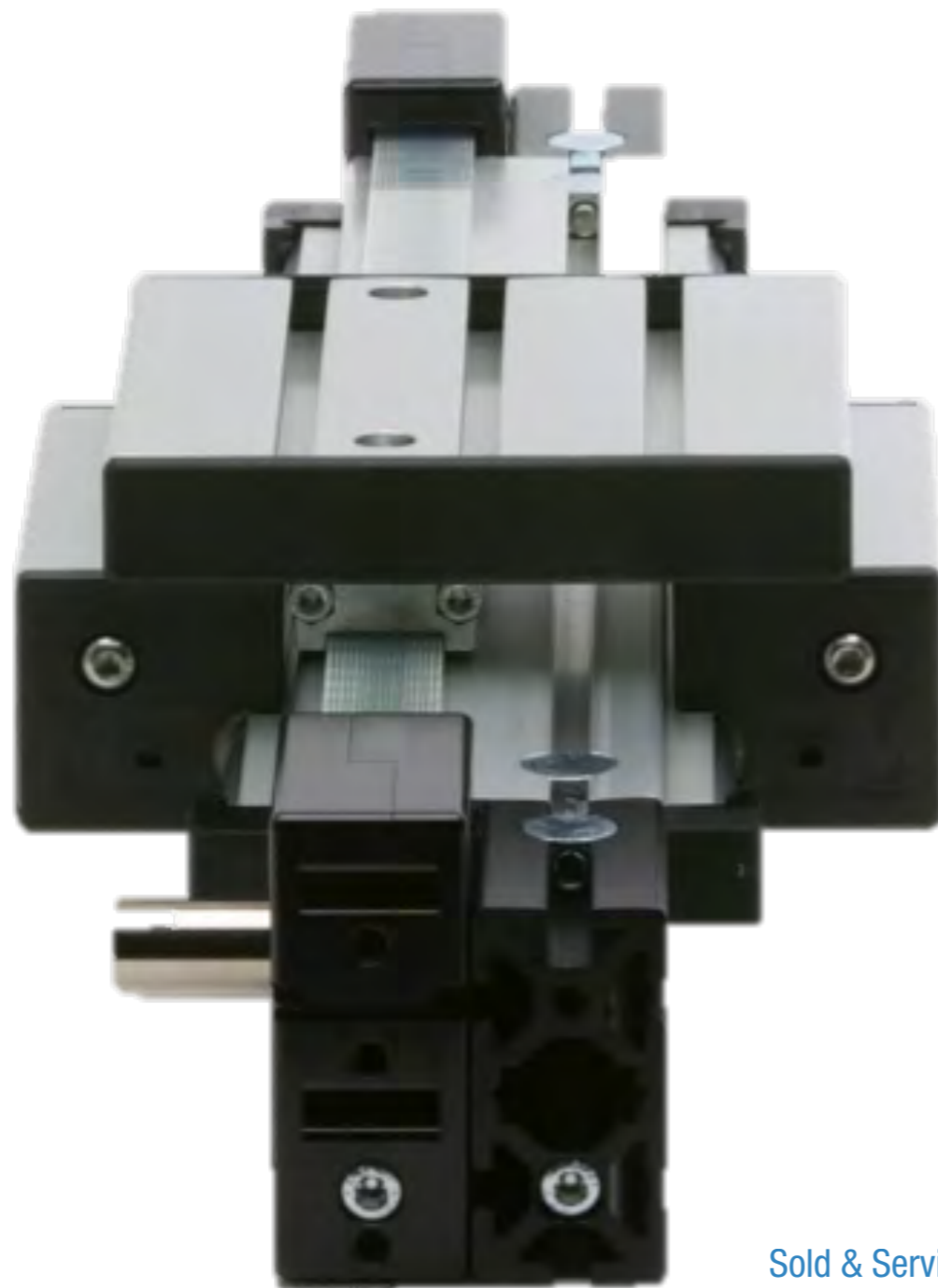
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Why Choose a Belt Driven Actuator?



Length of Travel

- Belt driven units are a better choice for longer travel applications

Speed & Acceleration

- Belt driven actuators have a permanent speed ratio based on the synchronous timing of belt to timing pulley.

Reliability

- Units are extremely reliable with fewer moving parts and operate at very high efficiency

Repeatability

- Because of the synchronous timing, motions are highly repeatable, with movement controlled to within +/- 0.025mm

Quiet

- Belt Driven units are quiet, making them a great choice where environmental factors are a concern

Capacity

- A wide variety of designs offer flexibility in handling any loads.

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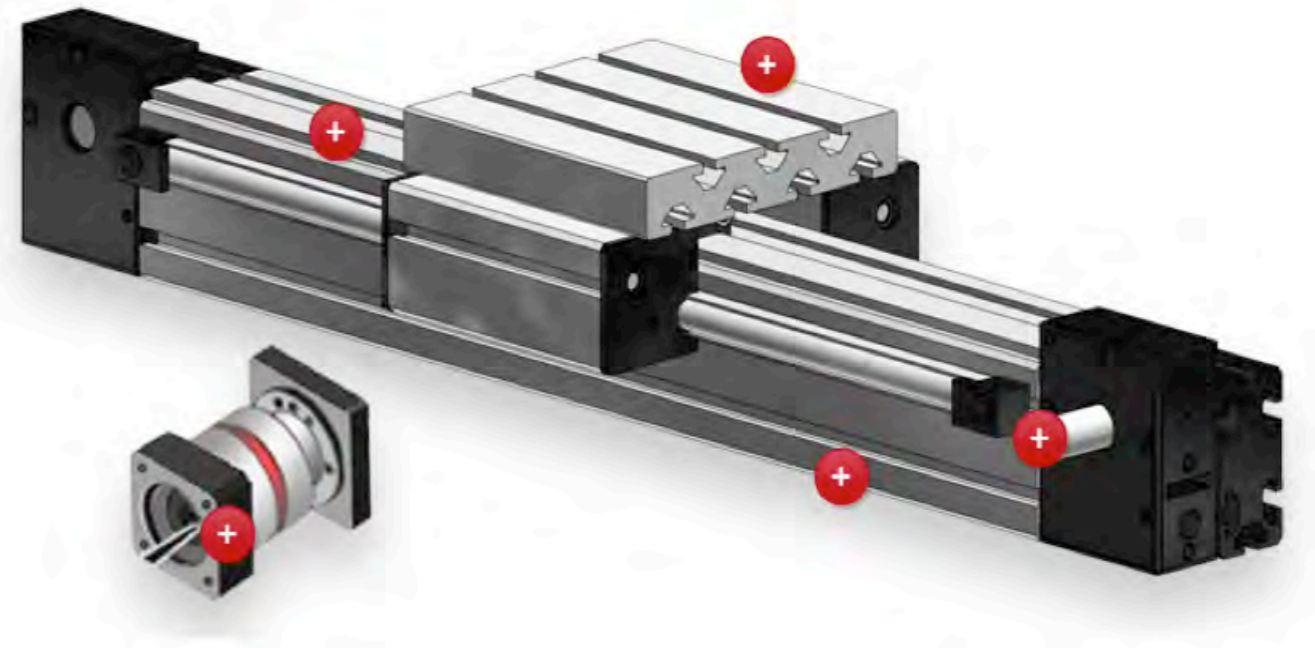
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Elements of a belt driven actuator

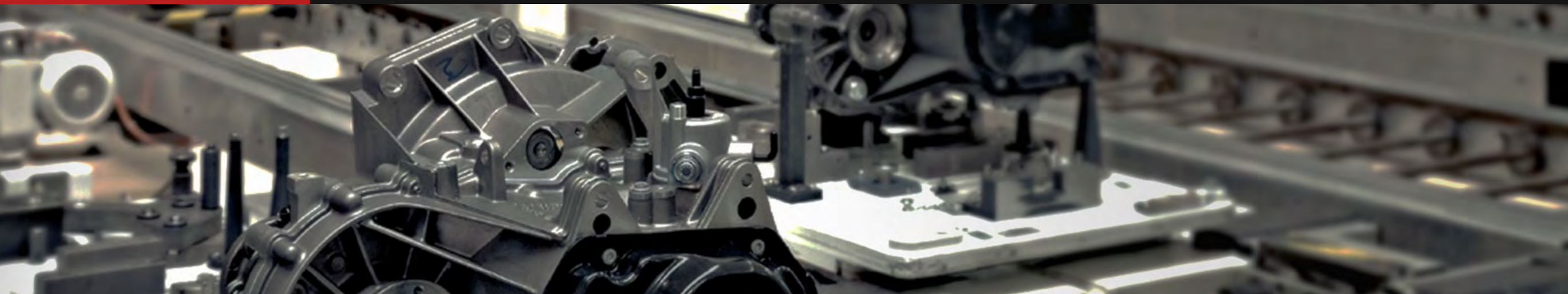
- The Drive system
 - A belt / a pulley / a tensioning system
 - Provides repeatability
- Structural beam member
- Guidance system
 - Provides accuracy of position and location
- The Cart
 - Coupled with the guidance and drive system: provides load carrying support
- Styles
 - Round rail & track rollers (angular contact bearings)
 - Plastic rollers w/ needle bearings
 - Profile rail w/ recirculating linear ball slide
 - Solid plastic block / extrusion profile matched economy glide
- Motor & Gearbox – typically end user provided and based on performance requirements



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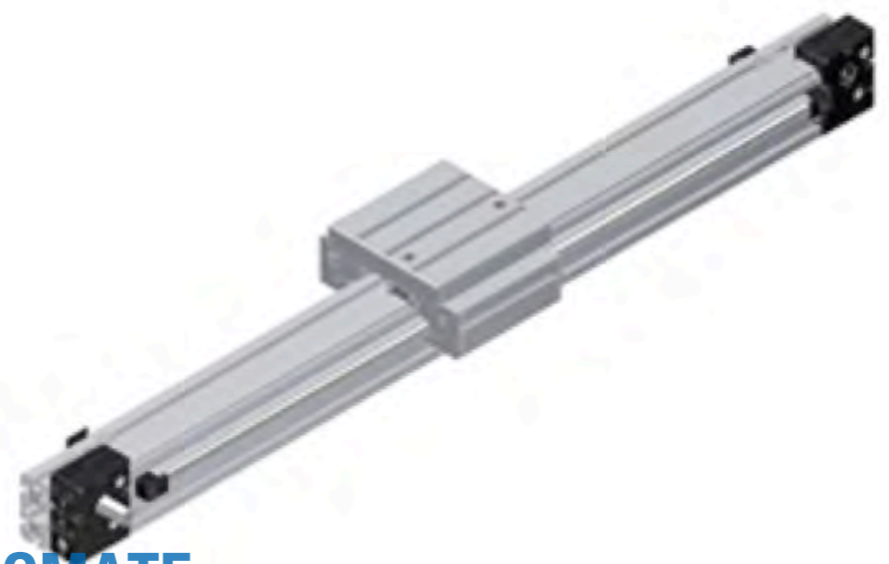
Actuator or Belt Drive

When deciding on your specific configuration, consider if you need on-board guidance in the actuator, or if your infrastructure can provide that.

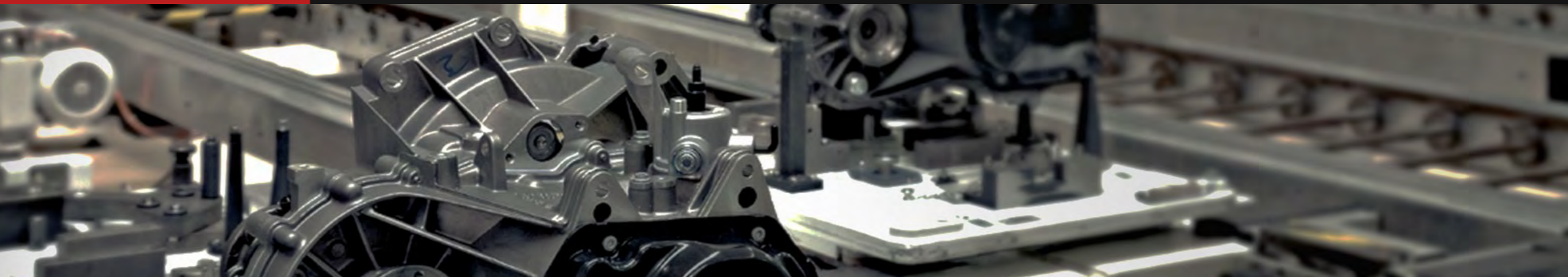
Belt Drive (guidance not included)



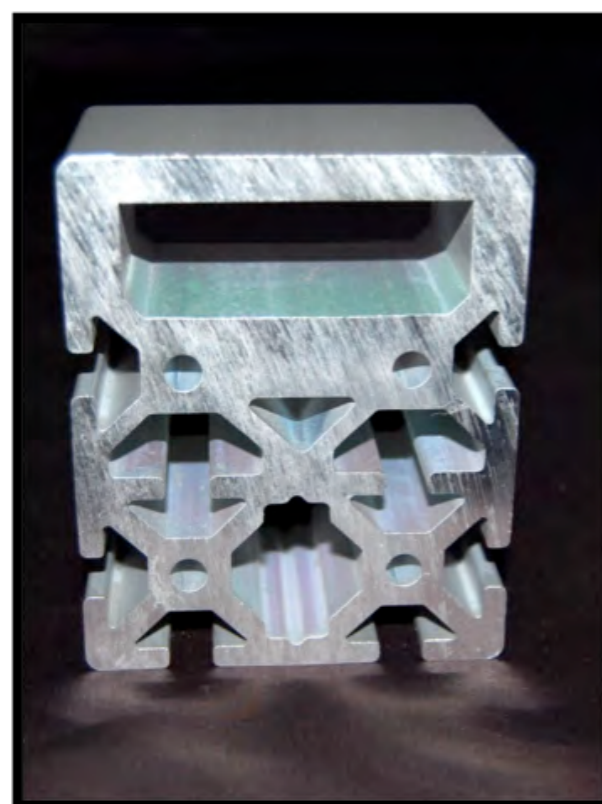
Actuator (includes built in guidance)



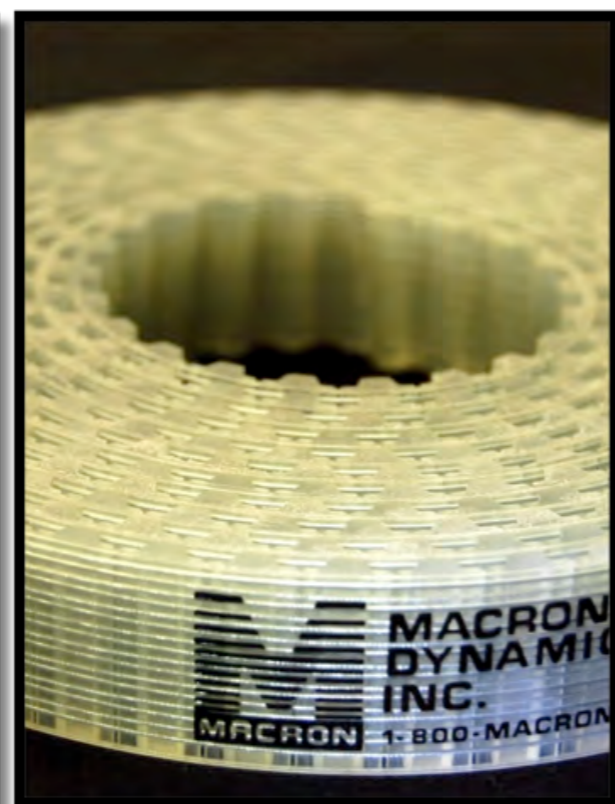
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Macron Products Construction and Materials



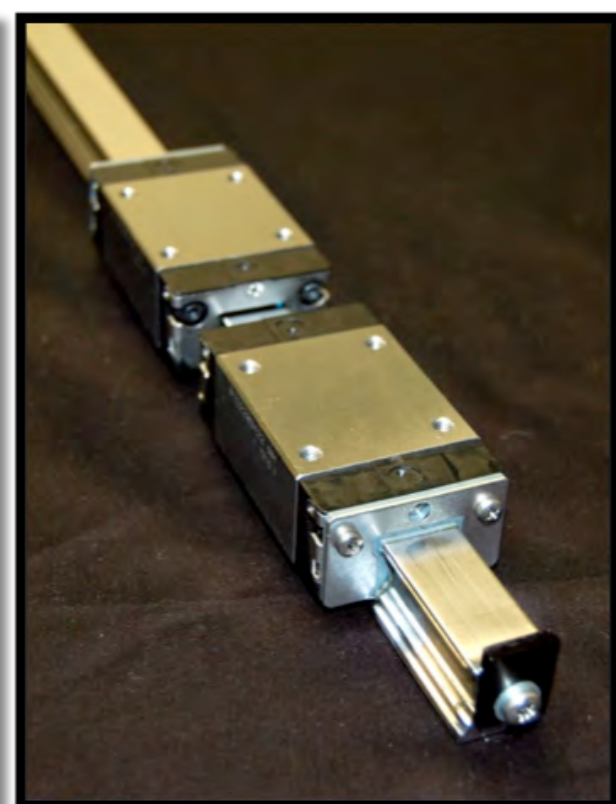
Structural Extrusions



Belts



Timing Pulleys



Carts & Guidance

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Extrusion

Aluminum alloy profiles manufactured to Macron rigid standards and design criteria. Extrusion profiles are designed for actuator purpose yet are easily adaptable to MacFRAME structural usage.

These extruded elements are:

- Strong
- Durable
- Lightweight
- Customized to exacting standards for your application
- T-slots facilitate actuator mounting to frames and structures or attach accessories

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Macron Belt

Specially wound steel cords encased in molded polyurethane provide high flex and optimum durability.

Key Belt Features include

- Industry leading tensile strength
- High flex rate for “back bending” situations
- Quiet and dependable operation
- Precise repeatability and near zero backlash performance with proper belt tension



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Timing Pulley

Precision machined one-piece steel construction nickel plated for durability and corrosion protection. One-piece integral shaft is a Macron unique design for strength and concentricity purpose.

Key Benefits of Macron Timing Pulleys

- Offers repeatable precision within +/- 0.025 mm
- Permanent speed ratio based on the synchronous timing of belt to timing pulley
- Single and double shaft configurations adaptable to gearbox or motor shaft mounting

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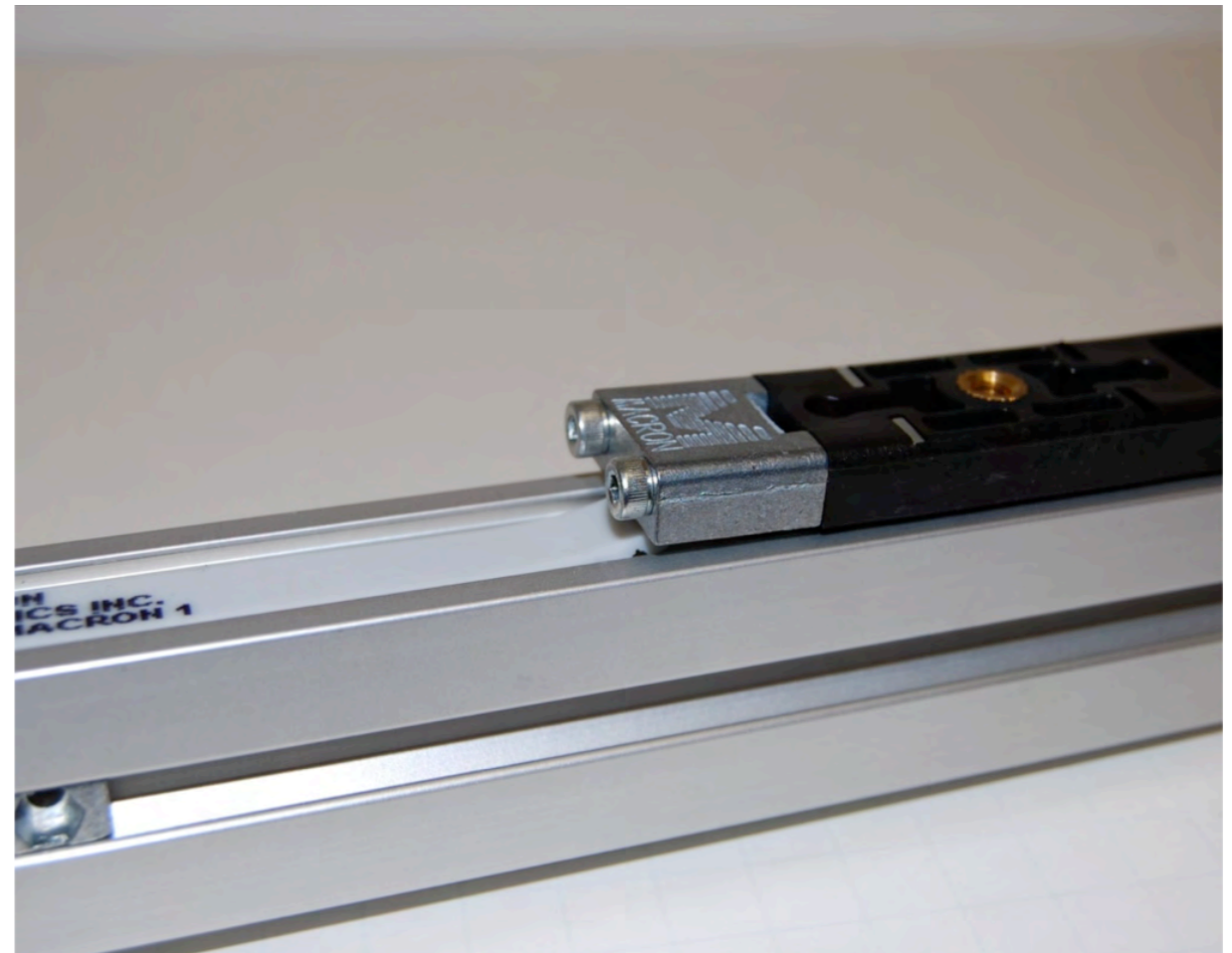
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Plastic Glide Cart

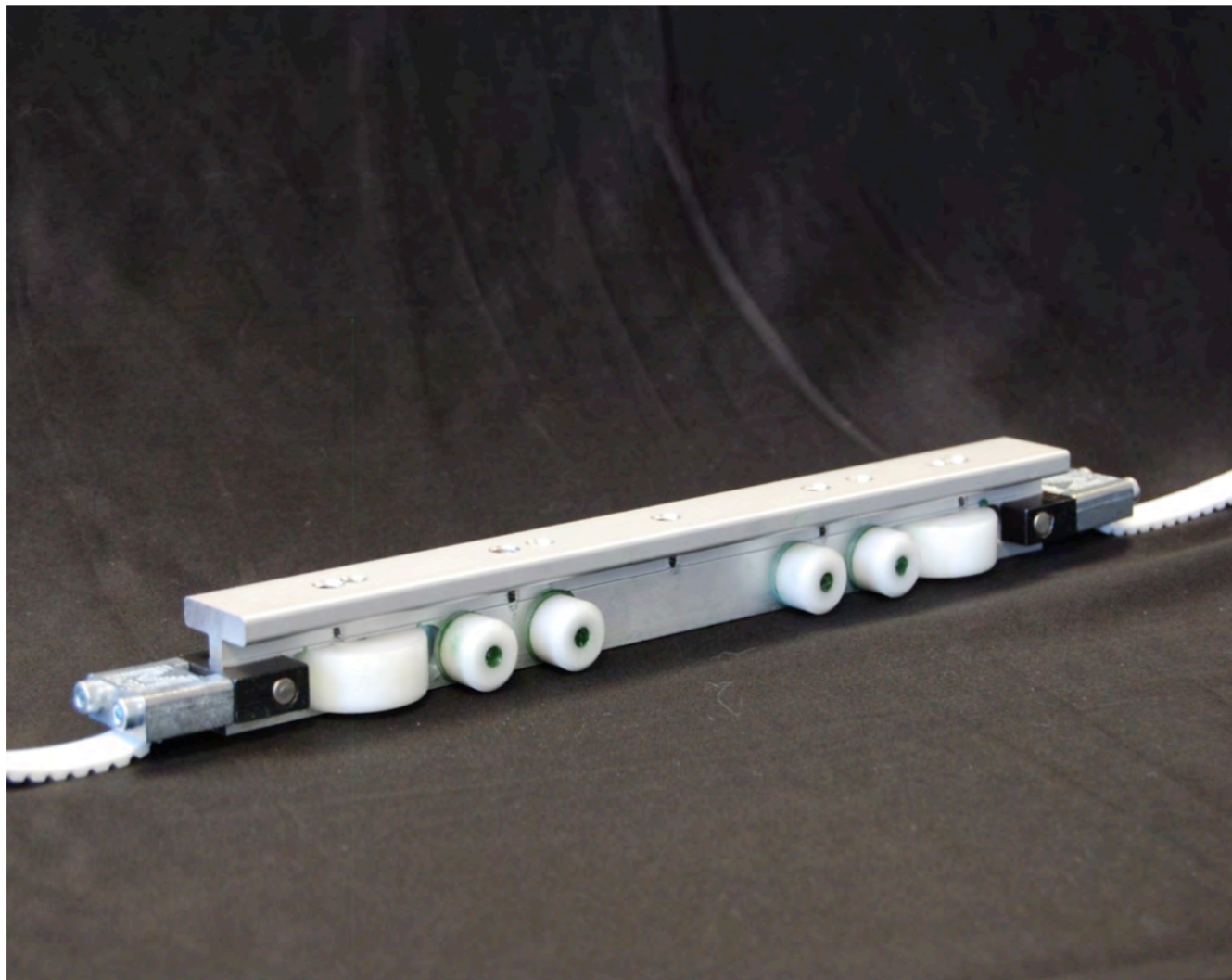
Our lightest duty and most economical cart option provides commercial accuracy in a one-piece style cart with a metal threaded insert mounting configuration.



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Roller Cart Assembly

Macron's roller style carts are made with durable plastic tires surrounding needle bearings for smooth operation in medium duty and accuracy applications. These carts can provide more load bearing capacity and offer a longer working lifetime than a solid plastic cart.

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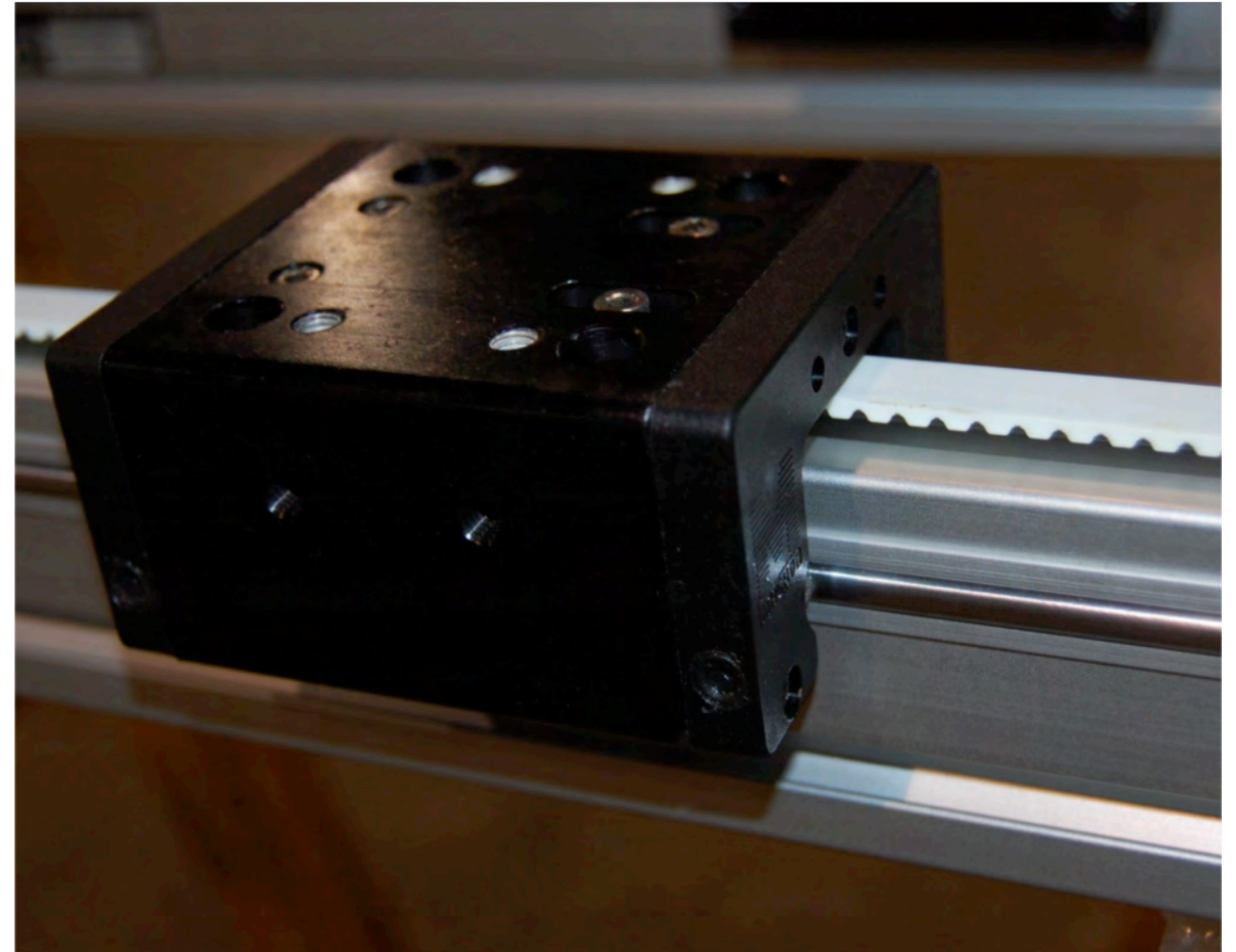
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Track Roller Cart

Economical track roller and hard chrome rail system handles light to medium loads while providing great accuracy and precision repeatability.

This style provides:

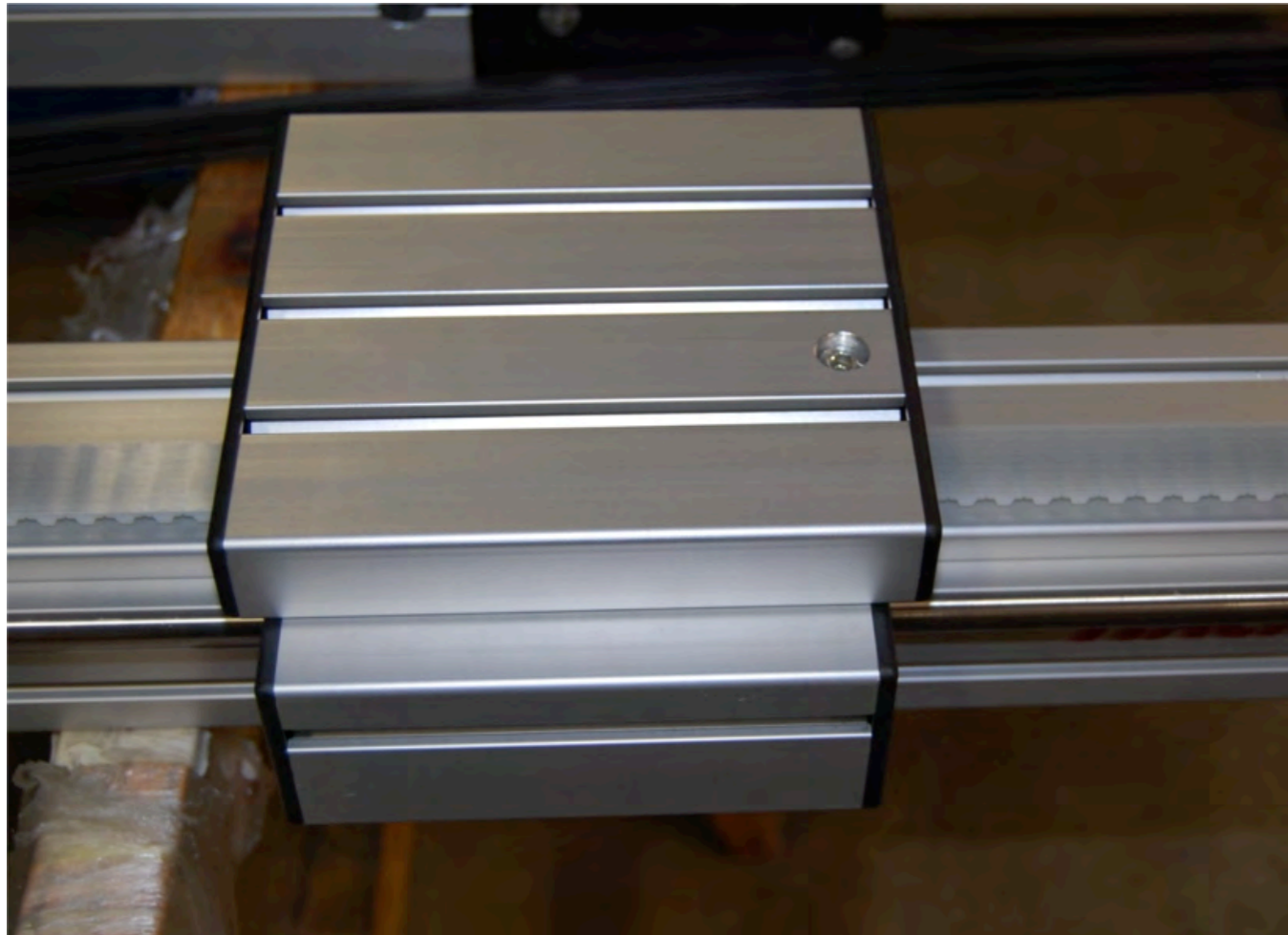
- Increased load carrying capacity
- Higher precision
- Long life
- Operates well in harsh environments



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Track Roller with Round Rail Cart

Macron's most widely used and versatile cart design features a cart carried on a round rail via track rollers.

These precision track rollers ride on hard chrome rails providing excellent accuracy and load carrying capacity, and increased resistance to debris and contaminants from harsh environments.

This cart design can be easily configured in lengths to suit your application.

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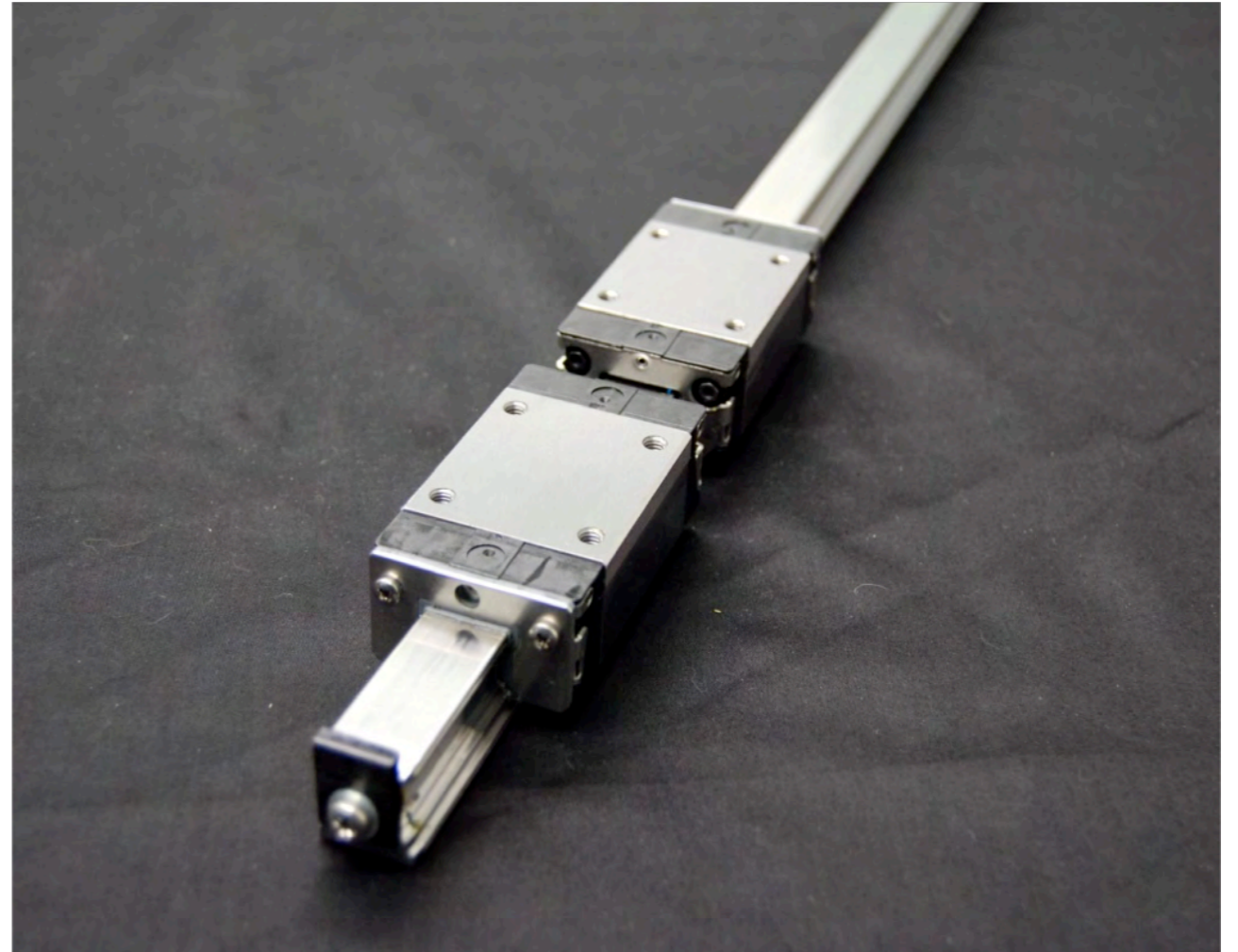
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Profile Rail Guidance

For applications that require the most robust load carrying capability and precision, Macron offers cart designs matched to linear ball rail guidance systems.

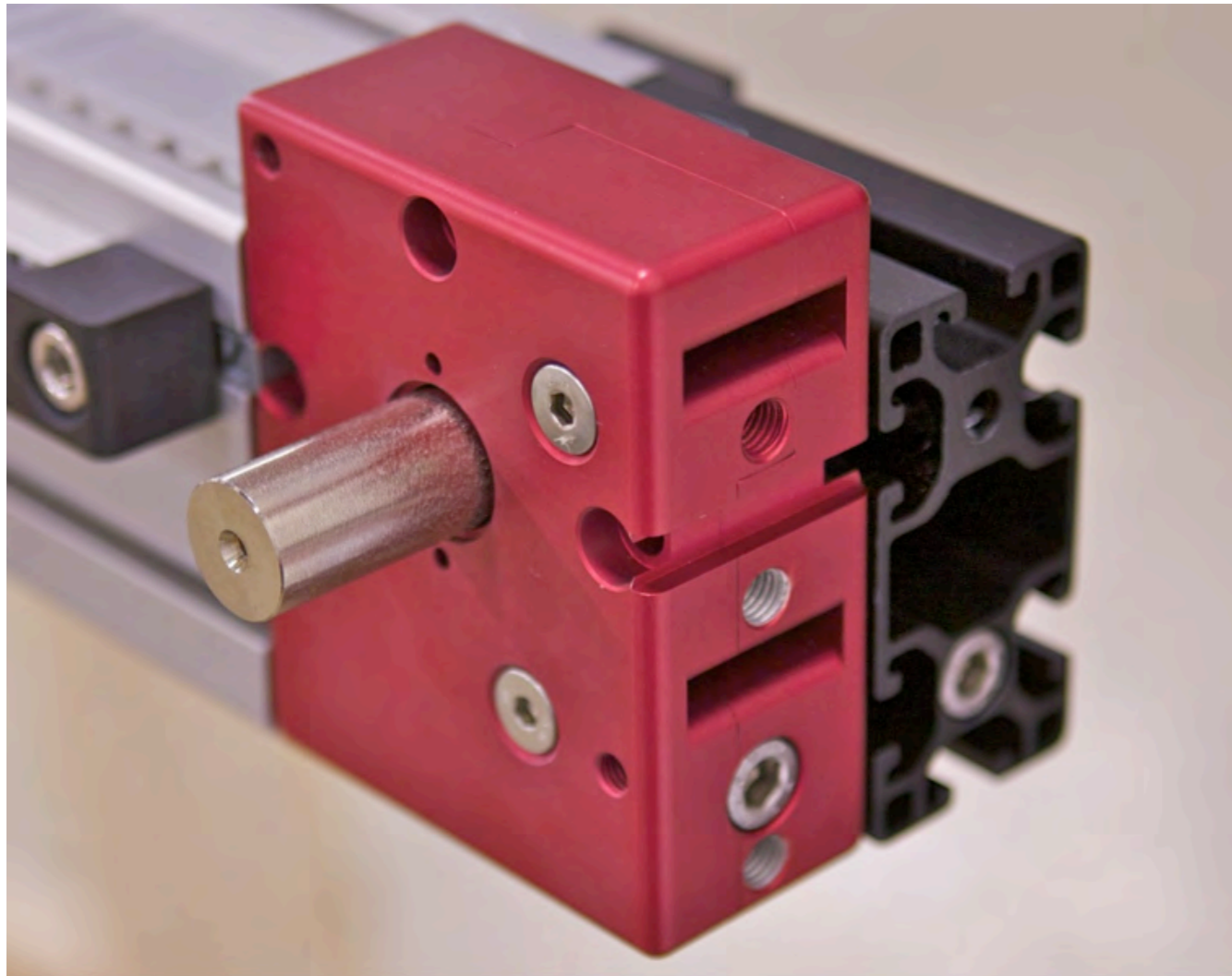
These cart configurations are available in both single rail and dual rail system designs.



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Pulley / Housing / Belt Matching

Macron's precision assembly ensures optimum belt tracking and "no-skip" near zero backlash functionality for exceptional repeatability.

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Actuator Specification selection criteria:

- **Travel and space constraints**
 - Design fit criteria – OA length or Travel priority
- **Orientation & Span**
 - Horizontal or Vertical & deflection
- **Duty cycle**
 - Frequency of use - often represented as % use
- **Load**
 - Weight to be carried, pushed, pulled or moved
- **Moment loading**
 - Where is the load relative to the cart
- **Speed – motion profile**
 - Acceleration / deceleration requirements
- **Environmental**
 - Wet, dry, hot, dirty, cold, clean etc.

[View our Online configuration tool](#)

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NARROW SELECTIONS

Orientation

Horizontal

Vertical

Is Load Supported By Other Slides/Guides? ?

Actuator (No)

Belt Drive (Yes)

Maximum Load
(lbs.)

25 400

50 500

100 1000

200 1250

250 2500

300

Maximum Speed
(mm/sec)

635 7620

1270 10160

2540 15240

5080

Simplified Moment Load (mm off CL) ?

0 100

5 200

10 250

25 300

50

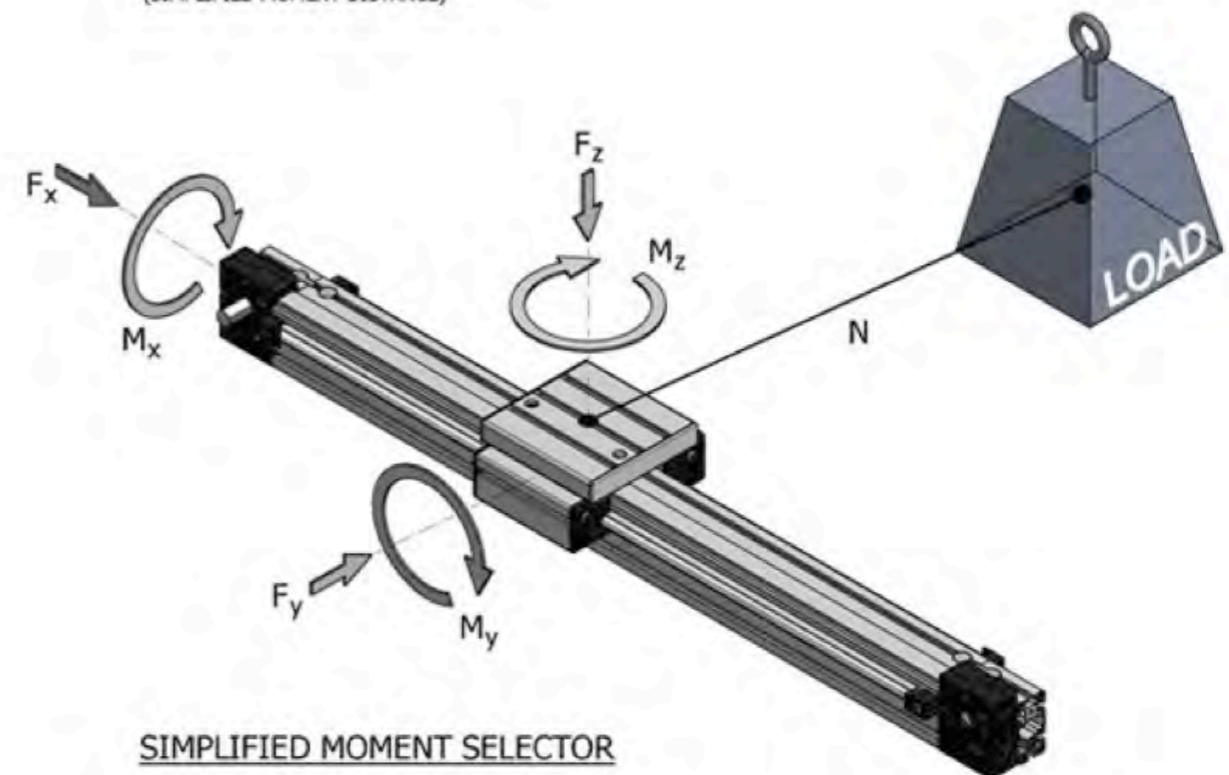
Loading

When sizing the specific automation solution for your application, be sure to carefully consider where the load being carried is relative to the mechanism and plane of travel.

- Load to be carried, moved, pushed, pulled
- Moment impact – distance of load from the actuator cart

Simplified Moment Load

N = DISTANCE FROM CART TOP CENTER TO LOAD CENTER IN X, Y, & Z PLANES. (SIMPLIFIED MOMENT DISTANCE)



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