

## DYNAMIC OFFSET SYSTEM

A winch-pulley system maintains a constant offset weight as the patient's height changes during training. A ball screw motor changes the position of a movable pulley to keep the tension in the rope constant.

### Key Design Features:

- Supports a load capacity of 350 lbs. (~159 kgs)
- Allows patient to move  $\pm 4$  inches vertically
- Achieves a cadence of 1 step/second
- Reduces winch load to be  $\frac{1}{2}$  of the patient's weight via the pulley system
- Employs a load sensor which allows the system to keep the offset weight constant throughout the person's full gain cycle

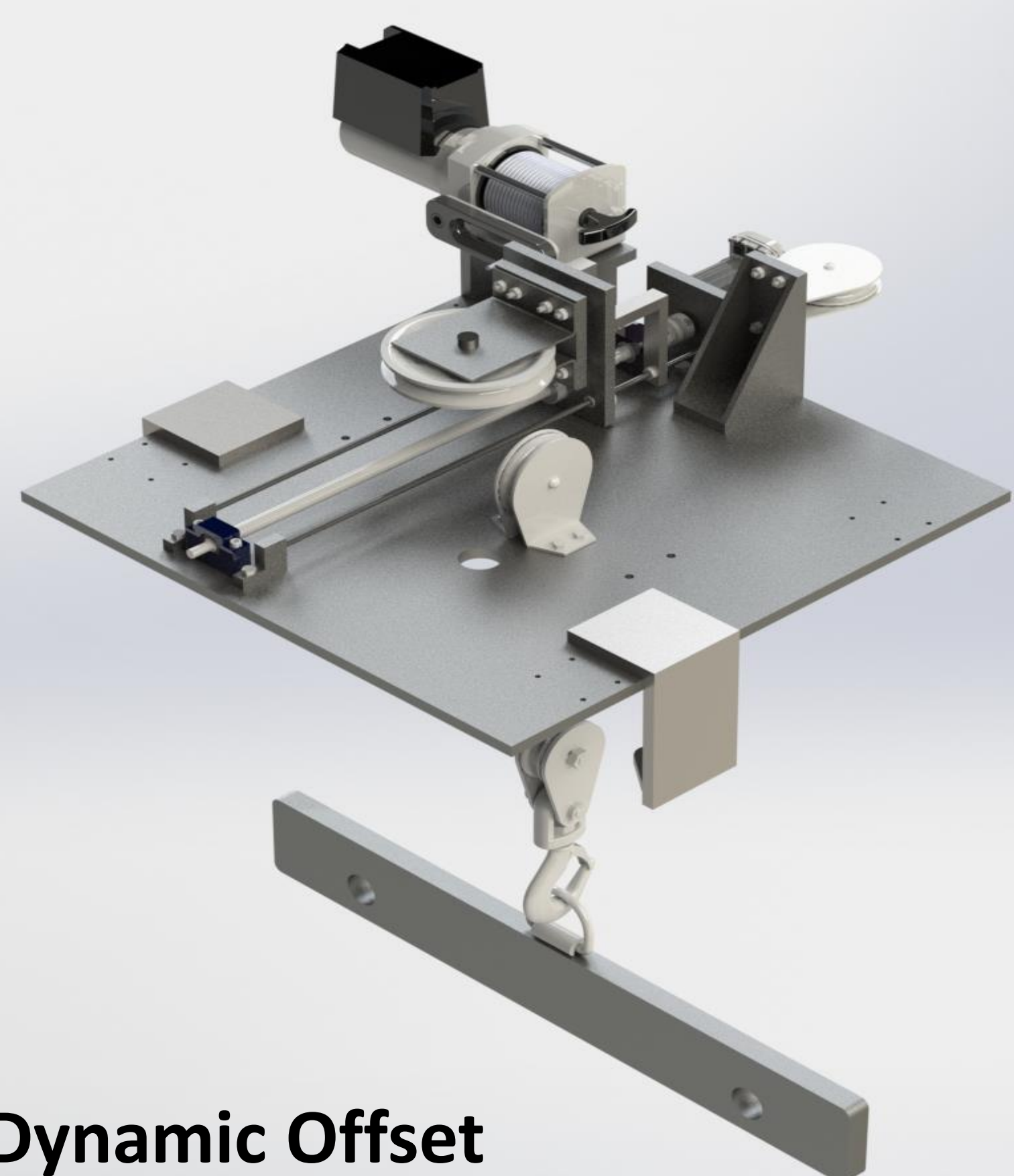


Fig. 1 Dynamic Offset

## PRODUCT OVERVIEW

The Assistive Lift Elliptical eXerciser (A.L.E.X) is a user-friendly body weight support system designed for both the patient and the assistant. The system features a winch-pulley subsystem that lifts the patient from a wheelchair and dynamically offsets the patient's weight. Additional features include a lead screw translation system, a removable push bar, and retractable caster wheels.

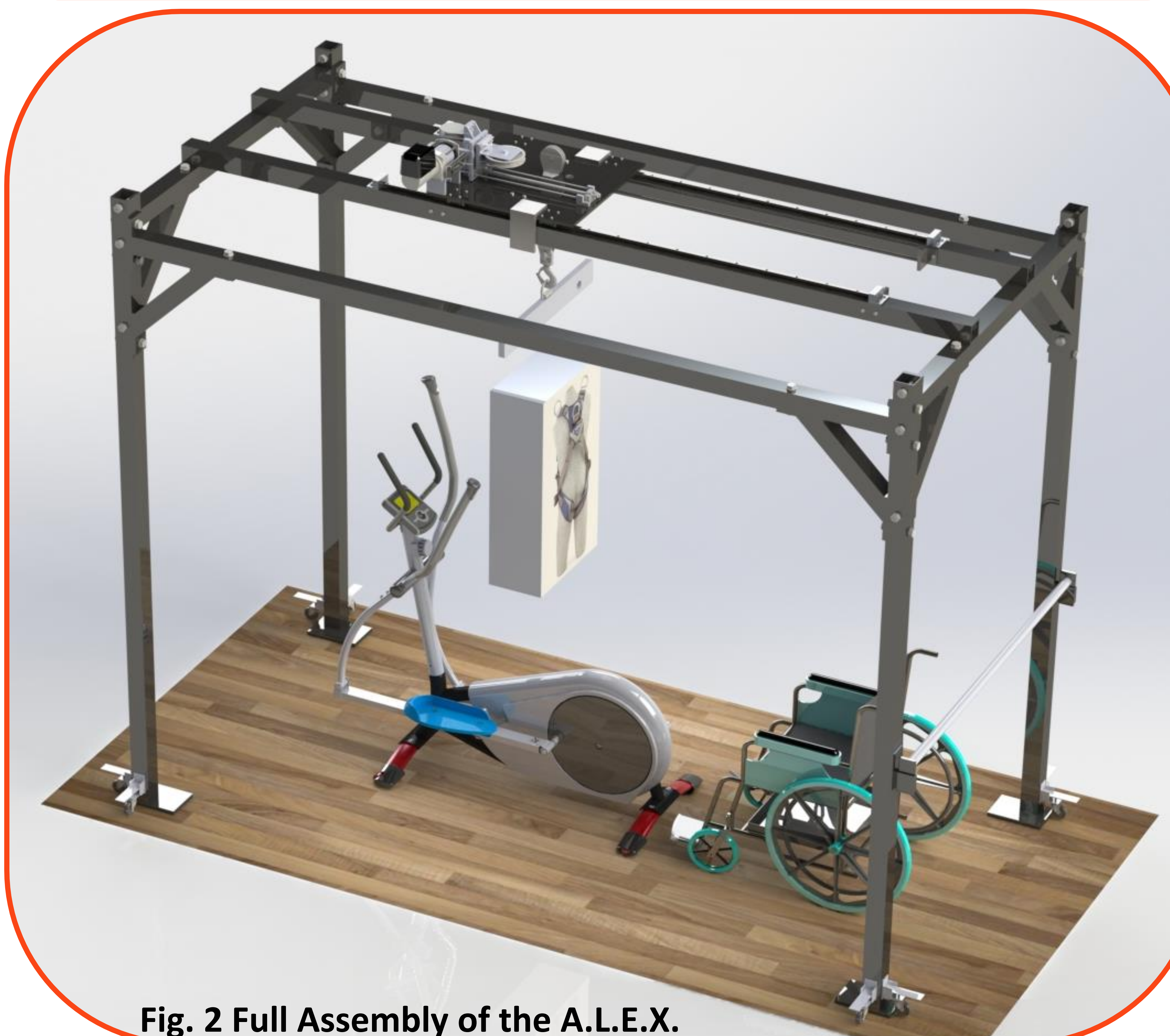


Fig. 2 Full Assembly of the A.L.E.X.

## COST OVERVIEW

OTS Parts	\$	3174.81
Raw Materials	\$	1314.53
Manufacturing + Labor	\$	12.03
Energy Consumption	\$	0.02
Assembly Labor	\$	146.67
<b>TOTAL</b>	<b>\$</b>	<b>4648.06</b>

## CUSTOMER NEEDS ADDRESSED

Requirement	Metric	System
Size	4.92' W x 10.17' L	Frame
Load Capacity	350 lbs.	Dynamic Offset
Lifting Height	51.8 in.	Lift Mechanism
Vertical Mobility	8 in.	Dynamic Offset
Frequency	1 step/s	Dynamic Offset
Translation	1 in/s	Patient Trans.

## PATIENT TRANSLATION

The patient translation system is comprised of a pair of lead screw motors that translate a carriage mounted on slide rails. Once the patient is safely lifted from the wheelchair, the carriage translates the patient over the elliptical. The lead screw motors have a variable translation speed which allows the patient to be moved at a safe speed of 1 in/s.

## TRANSPORTABILITY

The A.L.E.X is a mobile body weight support system that can be maneuvered and set up with only one assistant required.

### Key Design Features:

- 1) Removable Push Bar - enables the assistant to move the large frame alone and place it according to the elliptical location.
- 2) Retractable Caster Wheels - provides option to move BWS system easily but fix the system when ready for use.

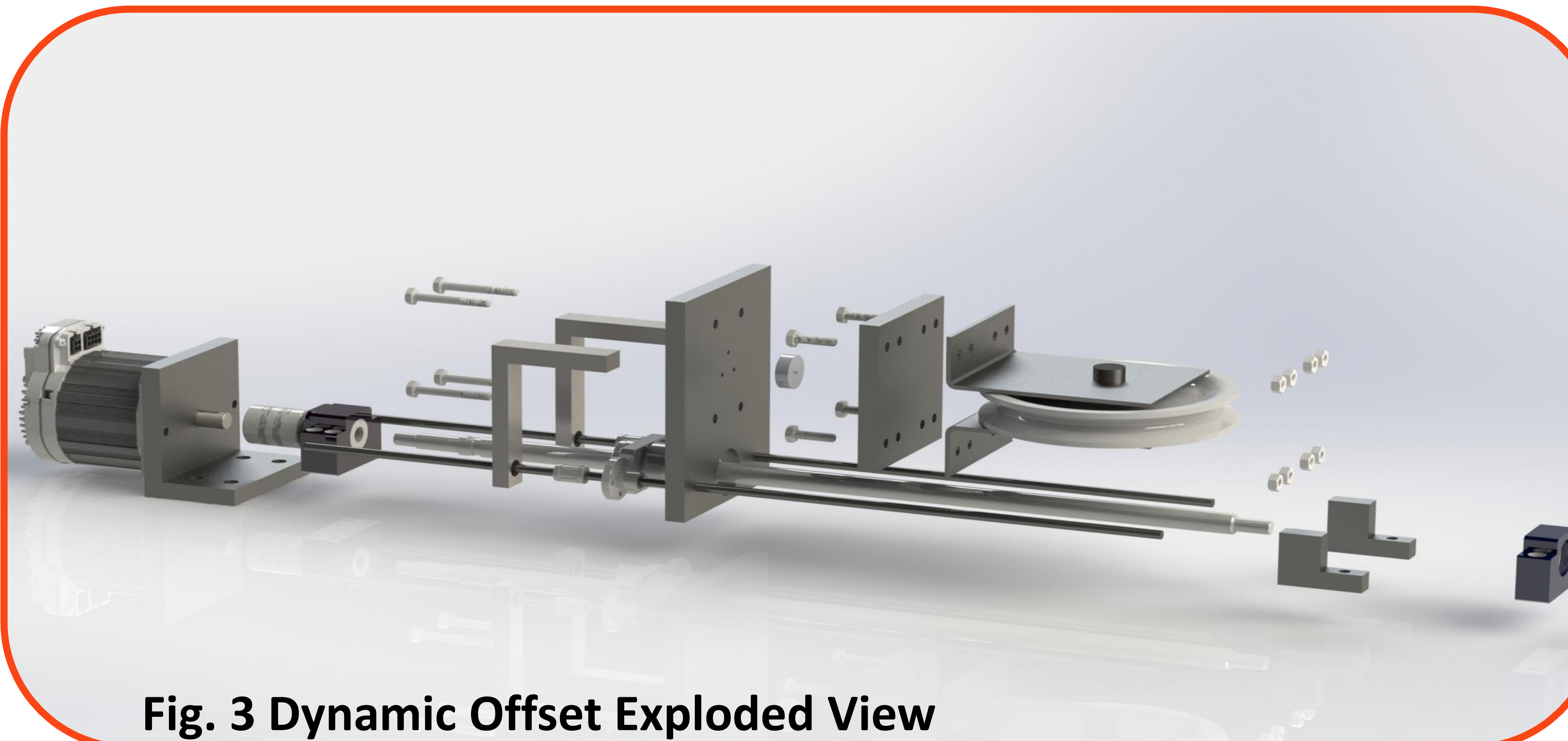


Fig. 3 Dynamic Offset Exploded View

## ACKNOWLEDGEMENTS

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