



KNIGHT

GLOBAL



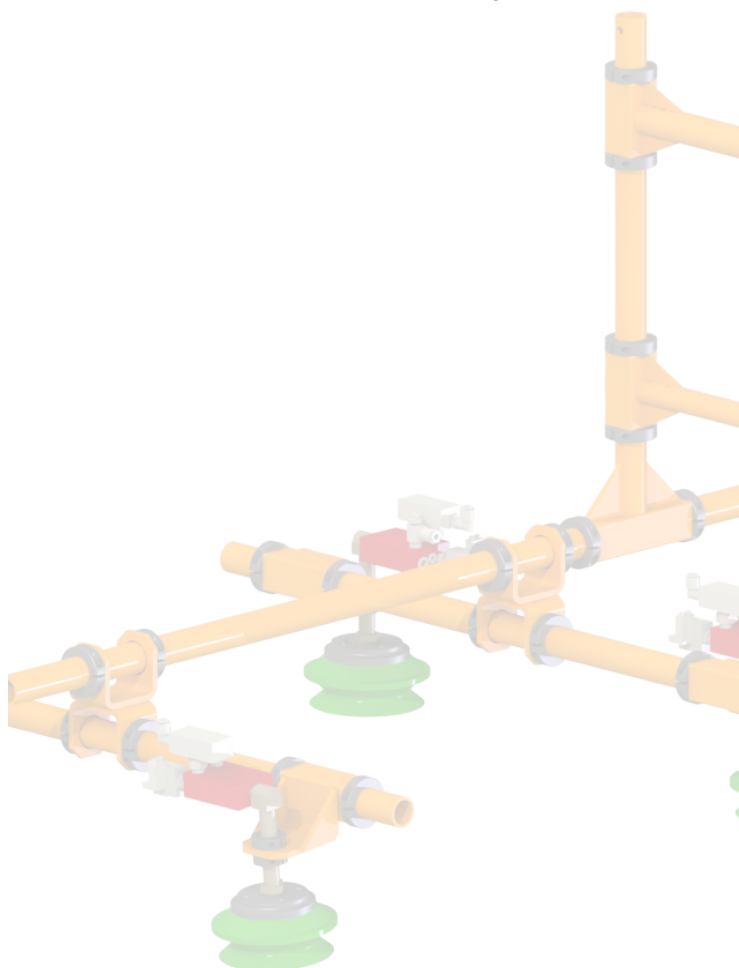
End Effectors and Lift Assists

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We are committed to
Total Customer Satisfaction
 through
 QUALITY, RELIABILITY and
 EMPLOYEE INVOLVEMENT.

Knight Global | Warranty Information

Knight warrants that its products and parts shall meet all applicable specifications, performance requirements, and be free from defects in material and workmanship for one year, (Servo Systems for two years, Pneumatic Lift Tables for 5 years), from the date of invoice, unless otherwise noted. One exclusion would include any purchased components not manufactured by Knight and their specific individual warranties. Paint defects, scratches and marring from shipping are also excluded.

This warranty shall not cover the failure or defective operation caused by inadequate training provided by customer regarding the operation and / or maintenance of the tool, misuse, negligence, misadjustment, or any alteration not approved by Knight. Knight's obligation is limited to the replacement or repair of Knight's products at a location designated by Knight. Buyer is responsible for all associated internal removal and reinstallation costs as well as freight charges to and from Knight Industries. Knight's maximum liability shall not in any case exceed the contract price for the products claimed to be defective.

Any field modification made to Knight Products or Systems without the written authorization by Knight Global shall void Knight's warranty obligation.

Knight warrants the Servo Hoist, Arms, and Tractors to be free from defects in material or workmanship for a period of two years or 6000 hours use from the date of shipment.

Knight Distributors/ Agents are not authorized to circumvent or change any of these terms and or conditions of this warranty unless prior approval is received in writing by Knight Global Management. Verbal statements made by Knight Distributors/ Agents do not constitute warranties.

On a design and build job, the customer is the owner of the equipment once they authorize shipment. The purchased equipment can not be returned for reimbursement or credit.

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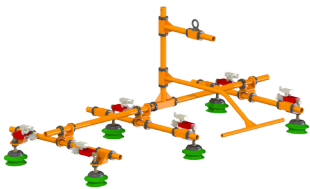
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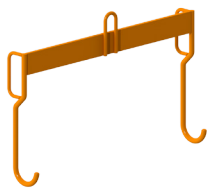
Overview

Knight End Effectors & Lift Assists

Knight Global designs and builds an assortment of custom End Effectors to fit any application. We specialize in custom lift assists and lifting devices for all of your ergonomic solutions. From simple applications to the most complicated, we'll assist you on choosing the correct end effector that is best suited for your application. There are (5) five design styles of End Effectors that include: Clamp, Hook, Magnet, Nest, and Vacuum. Each handling device is designed with an operators safety in mind. End Effectors can be operated manually, mechanically or powered to meet your application requirements.



Vacuum



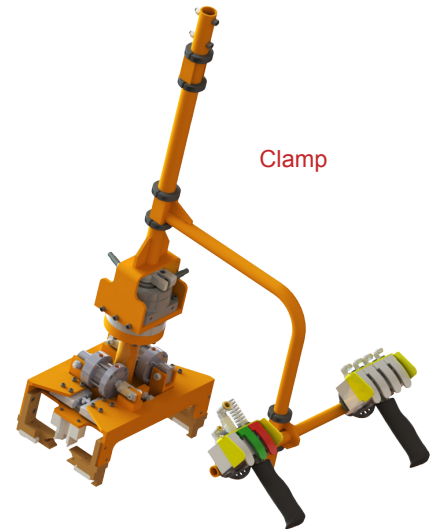
Hook



Magnet



Nest



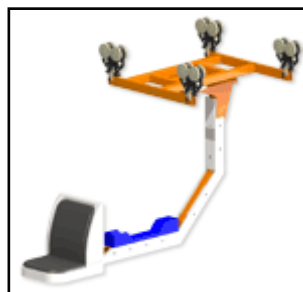
Clamp

Knight's ergonomic material handling fixture designers will create a detailed analysis of your material handling needs, which is the most important step in being able to suit you with the correct assist device. We factor in every aspect of your application, from the environment, desired operation, overall clearances, product materials and surfaces, clamp locations, required movements (angles/ tilt/ turn/ rotate), cycle times, to the set-down environment.

LIFT ASSISTS



Ergo Positioner



Ergo Seat Systems



Quick Build Connectors

Knight Global designs tools in accordance with our manufacturing partners. Our engineers work in unison with our customers, creating system layouts which conform to the specifications of each individual facility. We also create tools and adjust existing technology to fit the needs of our manufacturing clients. We specialize in custom lift assist and lifting devices for all of your ergonomic situations. For detailed information on specific Knight Global lift assists, please see the corresponding product brochures at www.knight-ind.com.

End Effectors

Clamp Series

Clamp End Effectors are available in an inner (I.S.) and outer surface (O.S.) clamp configuration, and an inner diameter (I.D.) or outer diameter (O.D.) configuration. Inner diameter clamp end effectors are most commonly used roll handling manipulators. Outer diameter clamp end effectors are used to handle a wide variety of applications. Clamp End Effectors apply inner or outer force to secure the product are designed specifically to each application.



O.S. Clamp Fixture



CLAMP STYLES



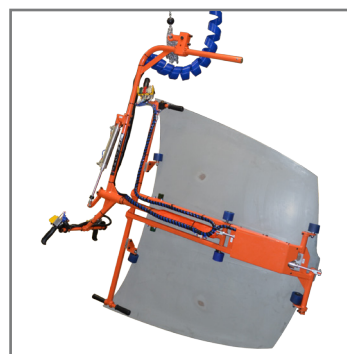
I.D. Clamp Fixture

Inside diameter clamp style fixture suspended by a Knight Pneumatic Balancer. Transfer large core pipe from mold machine to transfer cart.



O.D. Clamp Fixture

Outside diameter clamp style fixture with rotating feature. Transfers roll from rewind table to dunnage.



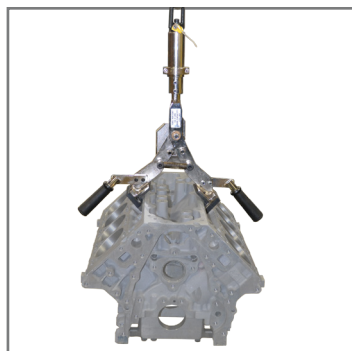
Nesting Clamp Fixture

Nesting clamp style fixture suspended by a Knight Pneumatic Balancer. Transfers the hood from dunnage to the vehicle for installation.

End Effectors

Hook Series

Hook End Effectors are designed to apply no force to the product and are available in multiple styles. Hook End Effectors quickly connect and disconnect to designated areas of the product or fixture. Most applications tend to be straight lift and transfer with no manipulation of the product. Some typical applications include: spare tire transfers, hood lifts, cylinder head lifts, axle lifts, and battery lifts.



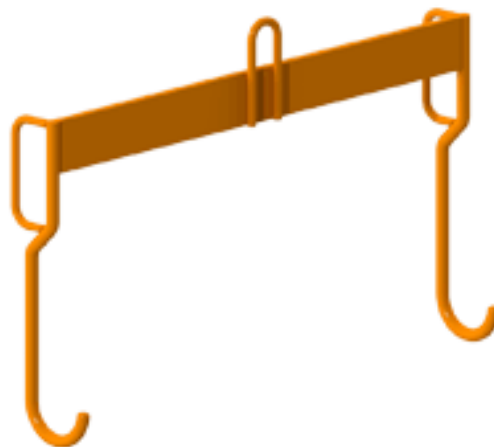
Scissor Hook Fixture

Scissor hook style fixture that is suspended by a Knight Pneumatic Balancer. Transfers engine block from assembly line to the inspection workstation.



Dual J-Hook Fixture

Dual J-hook style fixture operated by a Knight Servo System. Transfers engine from assembly line to the vehicle for installation.



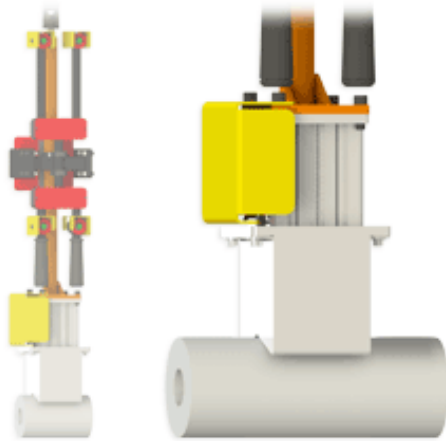
Nest Series

Nest End Effectors are designed to the specific application. These devices are used to handle a wide variety of applications. Nest End Effectors simply sit beneath the load using the weight of the object and gravity to support the load. Nest End Effectors are commonly used for picking up wire harnesses, rolled materials to automotive engines. The maximum capacity of Nest End Effectors varies per application.

End Effectors

Magnet Series

Standard Magnet End Effectors are available in Air Driven or Electromagnet configurations depending on your application. Magnet End Effectors are commonly used for picking up sheets of steel or cylindrical steel tube among many other types of applications. Magnet manipulators maximum capacities vary per application.

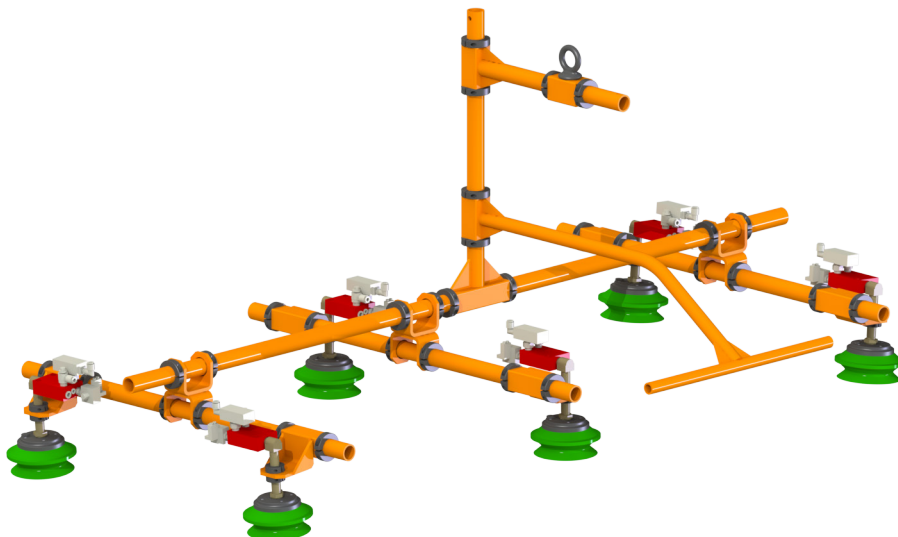


Magnetic Fixture

Magnetic style fixture operated by a Knight Servo System. Transfers large oil pipe from the dunnage to oil pipe testing area.

Vacuum Series

Vacuum Cup End Effectors are an ideal solution for handling non and low porous materials with flat or slightly curved surfaces such as metal sheets, glass, boxes, hoods, doors, body panels, etc. Vacuum End Effectors are available in multiple cup configurations depending on the application requirement. Vacuum manipulators are commonly used for straight and shear transfers. The maximum capacity of Vacuum End Effectors varies per application.



Multiple Vacuum Fixture

Multiple vacuum cup style fixture suspended by a Knight Pneumatic Balancer. Transfers the windshield from dunnage to the vehicle.

End Effector Applications

Knight's expertise in ergonomic material handling solutions transforms manufacturing concepts into load-responsive handling devices that provide precision, speed, quality and reliability. We design, manufacture and build every application in one location. While our team has considerable experience dealing with the automotive industry, the scope of our work spans to a wide variety of businesses and industries worldwide.



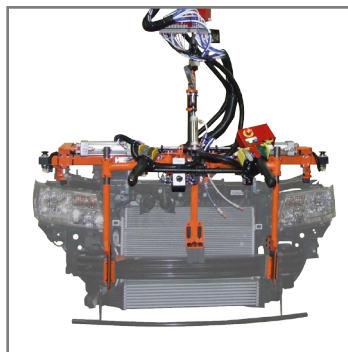
Cab Roof Install

(4) four cup vacuum fixture mounted on an Knight ATA4000 vertical mast using a Knight KBA Series Pneumatic Balancer.



Doors-On Install

Doors-on lift assist using a clamping fixture mounted to a Knight AAA6000 Articulating Pneumatic Arm.



FEM Transfer

Clamp style fixture suspended from a Knight KBA Pneumatic Balancer.



Large Tire Install

Clamp style fixture mounted from a Knight Servo Arm. Pneumatic rollers allow operator to power rotate tire to lugs on vehicle.



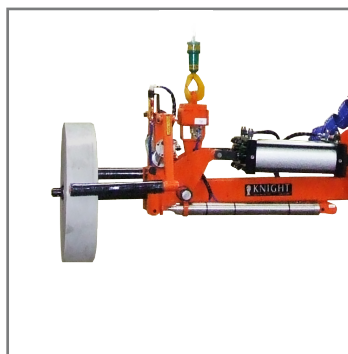
Large Hood Install

Vacuum cup fixture suspended from a Knight Servo Hoist. Wireless remote control allows operator to lift and lower hood.



Small Engine Transfer

A custom clamp style fixture mounted from a Knight KSHCA Articulating Servo Arm.



Roll Manipulator

O.D. clamping fixture mounted to a Knight ATA4000 Vertical Mast using a chain hoist to lift and lower rolls.



O.D. Barrel Transfer

Clamping fixture suspended from a Knight KBC Series Pneumatic Balancer.

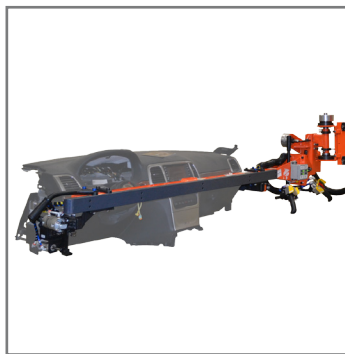
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End Effector Applications



Box Transfer

Clamping fixture mounted to a Knight AAA6000 Articulating Pneumatic Arm.



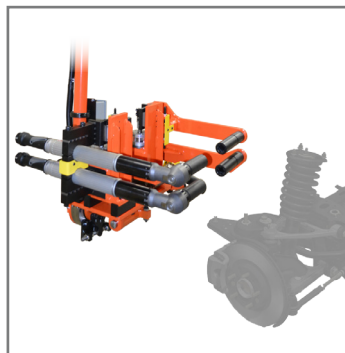
Instrument Panel Clamp

Clamping fixture mounted to a Knight AAA7000 Articulating Pneumatic Arm



Cannister Transfer

Vacuum cup fixture suspended from a Knight KBA Series Pneumatic Balancer.



Strut to Knuckle Secure

(4) Spindle Nut Runner mounted to a Knight AAA6000 Articulating Arm.