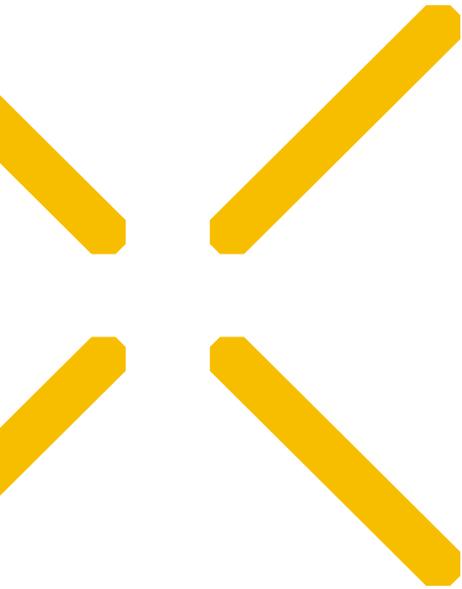


**EWELLIX**

MAKERS IN MOTION



# Solutions for mobile machinery



# The heritage of innovation

Ewellix is a global innovator and manufacturer of linear motion and actuation solutions. Today, our state-of-the-art linear solutions are designed to increase machine performance, maximise uptime, reduce maintenance, improve safety and save energy.

## Technology leadership

Our journey began **over 50 years** ago as part of the SKF Group, and our history with SKF provided us with the **expertise to continuously develop new technologies** and use them to create cutting edge products that offer our customers a competitive advantage.

In 2019, we became independent from SKF and changed our name to Ewellix. We are proud of our heritage. This gives us a unique foundation on which to build an agile business with engineering excellence and innovation as our core strengths.

## Global presence and local support

With our **global** presence, we are uniquely positioned to deliver **standard components and custom-engineered solutions**, with full technical and applications support around the world. Long standing relationships with our distributor partners allow us to support customers in a variety of different industries. At Ewellix, we don't just provide products; **we engineer integrated solutions** that help customers realise their ambitions.



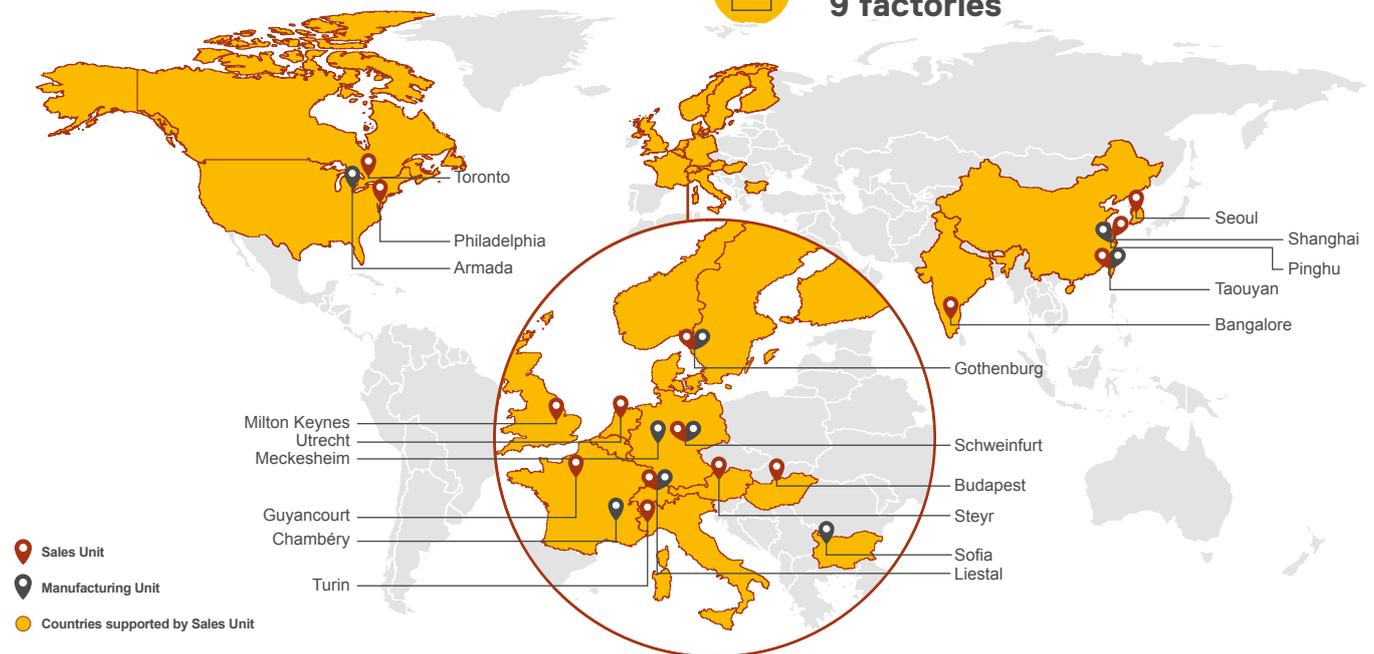
**1 200 employees**



**16 sales units**



**9 factories**



# More benefits with fluid power replacement

Ewellix has a clear strategy to support our customers in developing better mobile machines for tomorrow.

Electrification is a macro-trend across all mobile machines. Electromechanical actuators have already replaced hydraulic cylinders in many auxiliary adjustment or steering functions. This brochure will guide you through the benefits of using oil-free technologies in linear motion for a wide variety of applications, including aerial work platforms, agriculture machinery, construction equipment, material handling truck, and many more.

You will learn about linear actuators with improved lifting capabilities designed to enhance productivity with more energy efficiency, safety and reliability. High precision adjustment, smooth movement and exceptional stability are just some of the benefits which, together with a lower total cost of ownership, make these solutions increasingly competitive.

Discover how oil-free solutions can be a sustainable alternative for the linear motion of the future.



A recent survey in mobile machinery showed that over 86% of the industry agrees that electrification is an essential topic in their organisations.

Machine manufacturers recognise that even partial electrification of equipment can potentially deliver high benefits in cost, reliability and operations.

Electromechanical actuators are increasingly becoming alternatives to hydraulic systems that have dominated the mobile machinery sector for decades.

## Critical drivers for electrification in mobile machinery industries

- Legislation to reduce CO<sub>2</sub> emissions
- Noise emission limits in inner-city operations
- Increased sustainability targets driving energy efficiency improvements

# Electromechanical advantages compared to hydraulics

How environmental constraints of mobile machinery are driving electrification trends ‘end to end’ without compromising performance.

The automotive market has seen a fast ramping-up in electrification through a combination of disruptive new technologies (Battery Electric Vehicle) and mixed models (Hybrid EV). The same trend is also driving a transformation in trucks and buses, construction equipment, material handling and other vehicle types.

How is electrification related to fluid power replacement?

A car engine exceeds 100 kW but has limited electric power available to drive electric auxiliary adjustment functions, electric power steering or electric parking brake.

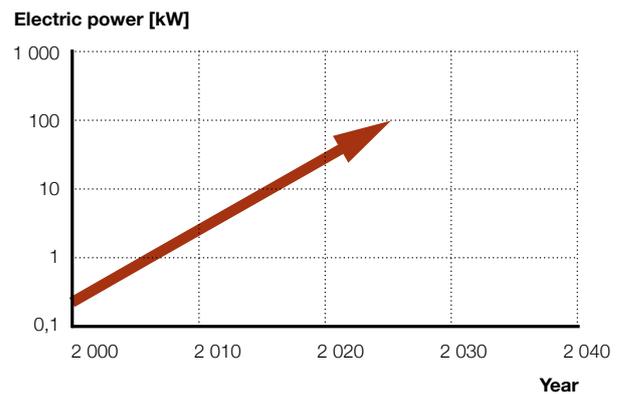
In mobile machinery, the first step was taken when electro-mechanical actuators replaced hydraulic cylinders to improve auxiliary adjustments with position feedback and good stability, increasing safety.

The next step was the electrification of the vehicle drive functions, with electric drive trains and more auxiliary functions such as electric steering units.

Now, higher capacity electric power sources allow replacing fluid power used for work functions with electromechanical actuators. With greater efficiency and electrical power recuperation from the regenerative lowering system, electromechanical actuators optimise the cost of batteries by increasing their uptime. Better motion control and feedback will achieve greater productivity. Oil-free operation drastically reduces maintenance effort and eliminates the risk of oil leaks. Finally, a machine equipped with electromechanical actuators will offer a lower Total Cost of Ownership (TCO).

**Diagram. 1**

*Increase of the electric power available on the mobile equipment*



### Benefits

- Energy recuperation capability
- Smaller battery
- Quick recharge for less downtime
- Higher productivity
- More data for On-board diagnostic and telematics

## System complexity

Pneumatic systems require many components, including hoses, pumps, valves, regulators, lubricators and air filters. Hydraulic systems, as well, require a complex setup, along with noise-reduction equipment. Commissioning time is also longer since technicians need to fine-tune several parts.

Electromechanical systems only require a motor, electric cables and a driver connected by a CANBus to the ECU of the vehicle.

This system allows for a much smaller system footprint and simple mechanical layout, reducing the equipment's installation significantly and the commissioning time needed (**Fig. 1**).

## Control, positioning accuracy & stability

Capability to control motion and position while ensuring stability is limited with fluid power and requires costly additional sensors and servo valves.

The position and motion are easy to control with an electro-mechanical actuator, with cost-effective position feedback integrated as standard. The force chain through mechanical components offers stability and safety. Systems are less complex to design, ensuring adequate reliability and performance.

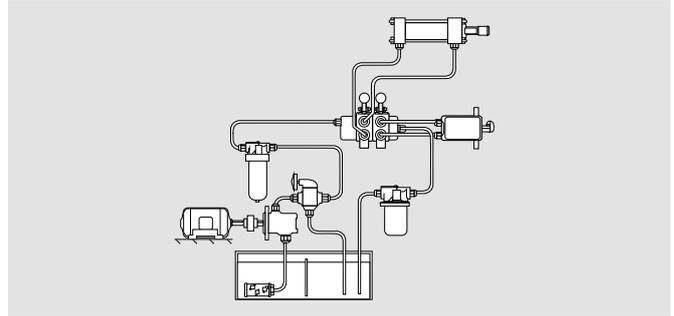
## Safety and environment

Compressed air has high energy losses. In hydraulics, oil at high pressure has a risk of leakages, which are almost impossible to eliminate and require constant service. Additionally, a faulty line can result in dangerous and costly damage.

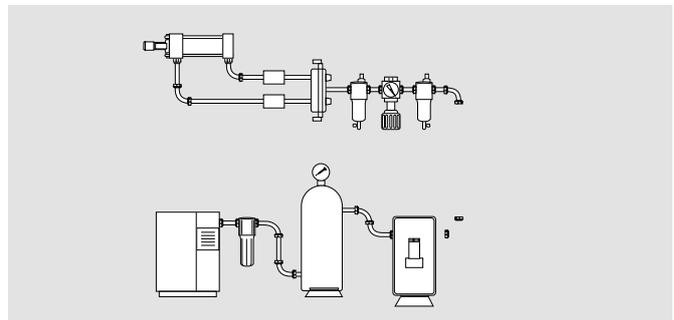
Regarding safety in case of power loss, actuators can maintain their position and stability, and not collapse or change position.

Fig. 1

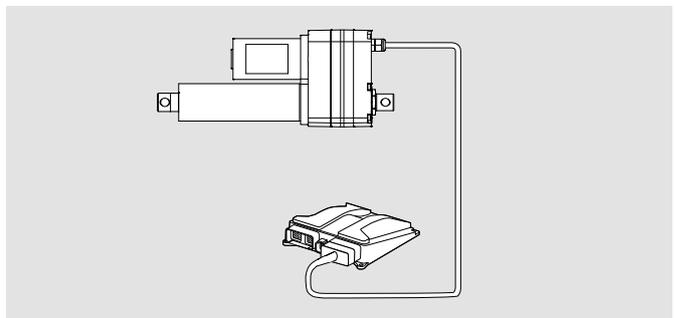
### System complexity



Hydraulic layout



Pneumatic layout



Electromechanical layout

### Benefits

- Fewer components
- Smaller footprint
- Cleaner machine design
- Easier integration in existing equipment
- Quicker installation

### Energy savings

Air preparation and compressibility make pneumatics less efficient than other linear motion technologies.

Depending on the load, hydraulics can operate efficiently; however, they encounter several internal and external losses in the conversion between pressure generation and linear movement.

Electromechanical actuators require only 2-3 steps in converting input energy into output power, providing greater energy efficiency (Fig. 2).

### Overhaul, maintenance and repair

To maintain the performance of the fluid power system, it is essential to follow the overhaul recommendation.

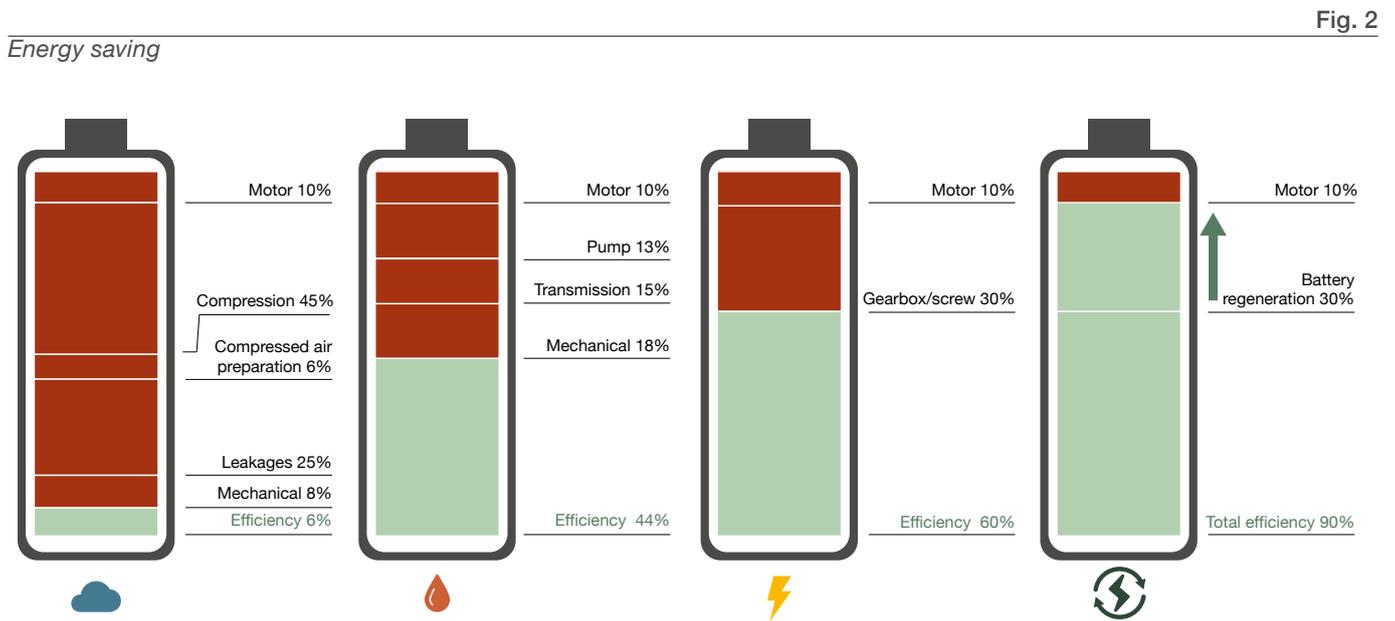
Depending on the type, an electromechanical actuator could be maintenance-free or with very little re-lubrication points. In addition, the built-in electronics of the actuator will provide off-board diagnostic and will help the onboard diagnostic of the machine.

### Energy recuperation

In addition to greater energy efficiency when pushing a load, high efficiency electromechanical actuators can recuperate a significant part of the potential energy used when reversing a movement, depending on its function. This additional benefit can drastically improve the overall efficiency of the system.

#### Benefits

- Power consumption only when operated
- Higher system efficiency
- Easier predictive maintenance and On-board diagnostic
- Easier energy recuperation





# Linear motion solutions designed for Battery Electric Vehicles

On- and Off-highway vehicles must meet both regulatory requirements and user expectations. Some of the regulations the market faces include legislation on CO<sub>2</sub> and greenhouse gas emissions, environmental zones, EU emissions regulations for combustion engines and enclosed workspaces, work environment regulations and urban noise limits. Electrical solutions for hybrid or all-electric systems are increasingly entering the market. Ewellix provides manufacturers with a wide range of electromechanical actuators for demanding environments to support OEMs in their electrification journey.

## Challenges

- No compromise on the work and power density compared to traditional equipment
- Reduced energy consumption and CO<sub>2</sub> emissions
- Quick recharge, more uptime
- Low noise emissions
- Enhanced functionality and safety.

## Value

- No oil, no leaks, virtually maintenance-free, less noise, higher reliability
- Extensive range including high-performance actuators for high speed/force applications
- High efficiency, stability without power, energy recuperation capability
- Safety features to prevent damage to operator or machine
- Telematics ready integrated sensors and feedback to improve process control and reduce downtime



## Refuse truck

### Functions equipped

- Gripper
- Bin lifting
- Compacting
- Tailgate lifting

### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Lower TCO



### Sweeper

#### Function equipped

- Height adjustment
- Arm deployment

#### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Lower TCO



### Dumper

#### Function equipped

- Dumping
- Steering

#### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Lower TCO



### Buses

#### Functions equipped

- Door opener
- Guiding

#### Benefit

- Powered function pneumatic free
- Compatible with pneumatic control
- Smooth operation

#### Linear actuator



CAHB-10

CAHB\_2x serie

#### High performance actuator



CASM-100

#### Ball screw



SX

#### Linear ball bearings



LBBR

# Aerial work platform

Aerial work platforms and access equipment are used in different locations, but they are becoming increasingly regulated by law on construction sites in our cities and buildings. Legislation on CO<sub>2</sub> and greenhouse gas emissions, low emission zones, EU emissions regulations, emission limits for enclosed spaces, environmental rules and urban noise limits are key aspects that manufacturers need to consider. The trend is towards hybrid or all-electric solutions. Ewellix electromechanical actuators are strategic components in electrical solutions.

## Challenges

- Oil-free operation with comparable performance and power density
- Energy-efficient electrical solution
- Critical functions and upgraded functionalities

## Value

- Large assortment including actuators for high speed/force applications
- Higher reliability and mechanical efficiency with brake/lowering device
- Valuable data output for telematics

## Aerial work platform scissor lift

### Functions equipped

- Lifting
- Steering
- Platform extension

### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Lower TCO
- Energy recuperation



### Linear actuator



CAHB-10



CAHB\_2x serie

### High performance actuator



CASM-100

# Material handling

## Challenges

- Oil-free operation with the same performance and power rating
- High responsiveness, speed and positioning
- Key safety features

## Value

- Extensive selection with high-performance drive speeds
- High energy efficiency and recuperation capability
- No risk of leakage
- Greater reliability and mechanical efficiency
- Telematics-ready sensors and feedback options

Material handling equipment requires smooth and fast motion to move material around an operation efficiently. Most forklift trucks and Autonomous Guided Vehicles (AGV) or Autonomous Mobile Robots (AMR) operate with electric drives. Energy efficiency is a crucial feature in material handling to increase runtime and productivity, whilst systems are still prevalent in high power lifting functions but have poor energy efficiency. Ewellix electromechanical actuators provide energy-efficient alternatives for these functions in material handling.



## Forklifts

### Functions equipped

- Lifting
- Mast lifting
- Mast tilting Steering
- Fork adjustment

### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Lower TCO
- Energy recuperation



## AGV/AMR

### Function equipped

- Unit load lift
- Height adjustment forklift
- Side movement
- Tow gripper

### Benefit

- Oil-free
- Energy efficient
- Compactness
- Position feedback
- On-board diagnostic

### Linear actuator



CAHB-10



CAHB\_2x serie

### High performance actuator



CASM-100

### Linear ball bearings



LBBR

# Agricultural machinery

Farmers today face the challenge of reducing costs while increasing crop yields. Agricultural machinery manufacturers have developed a wide range of equipment with the latest technologies that can adapt better to the conditions in which it will be used, thereby improving performance. They need a wide range of products with greater load-bearing capacity and speed, as well as individual solutions from reliable suppliers with a global presence and support. Current industry regulations are already having a significant impact on the engine used, which has consequences for other components such as cooling systems and a heavier bonnet. A new generation of equipment such as battery-electric and autonomous vehicles are being launched. Ewellix offers solutions for increased reliability, performance and safety for OEMs manufacturing such machines.

## Challenges

- Higher crop yield and productivity
- Consistent performance even in demanding environments
- High-cost efficiency

## Value

- Ingress protection in movement IP66M
- Higher controllability and positioning feedback
- No leakage, tested and maintenance-free

## AG robot

### Functions equipped

- 3-point hitch lifting
- Arm deployment
- Lateral positioning tool
- Height adjustment tool

### Benefit

- Oil-free
- Energy efficient
- Smooth movement
- Position feedback
- On-board diagnostic



## Harvester combine

### Functions equipped

- Reel-in out of the header
- Ladder rotation
- Concave adjustment
- Cleaning fan adjustment
- Chopper shift
- Straw deflector orientation
- Sieve table adjustment
- Auger folding

- Spout orientation
- Grain tank cover opening
- Armrest sliding panel

### Benefit

- Precise adjustment
- Position feedback
- Smooth movement
- Lower TCO



### Linear actuator



CAHB-10



CAHB\_2x serie

### Customized linear guides



### Linear ball bearings



LBBR

# Construction equipment

## Challenges

- Greater productivity
- Improved operator safety and ergonomics
- High cost-efficiency

## Value

- Reliable and maintenance-free
- Improved manoeuvrability and position sensing
- No risk of leakage

Construction machinery manufacturers today face the challenges of reducing costs on the one hand and increasing productivity on the other. Products with higher work capacity and performance are needed to achieve these goals and pose higher demands to the components installed. Ewellix offers a wide range of electromechanical actuators for demanding environments to provide more comfort and productivity for construction equipment.



## Road machine

### Functions equipped

- Scraper plate adjustment
- T top height adjustment
- Seat adjustment
- Mirror adjustment
- Beacon adjustment

### Benefit

- Accurate positioning
- Position feedback
- Stability
- Easy operation



## Earthmover machine

### Functions equipped

- Engine bonnet lifter
- Ladder lifter

### Benefit

- Easy operation
- Position feedback
- Smooth movement

## Linear actuator



CAHB-10



CAHB\_2x serie

## Linear ball bearings



LBBR

# Commercial trucks

Long-distance tractor-trailers travel mainly on trunk roads or motorways which are typically faster than in the city. The aerodynamic air resistance, in this case, is three times greater and can be easily reduced by using roof cladding. However most roof wind deflectors, however, are not correctly aligned and therefore cannot produce their full potential. Ewellix's aerodynamic booster actuator ensures continuous adjustment of the deflectors so that they are always in the correct position to reduce aerodynamic drag and thus fuel consumption and CO<sub>2</sub> emissions.

## Challenges

- Cut fuel cost
- Decrease CO<sub>2</sub> emissions
- Ergonomics and safety for the driver

## Value

- -3% fuel consumption and CO<sub>2</sub> emission
- Quick, safe and continuous adjustment without stages
- Reliable and tested solution, maintenance-free

## Tractor trucks roof deflector

### Functions equipped

- Wind deflector adjustment
- Lift
- Compressor

### Benefit

- Manual and electric solution backward compatible
- Easy operation
- Finely tuned adjustment



## Linear actuator



CAHB-10



CAWD series

# Products overview

## Linear actuators



	CAHB-10	CAHB-2x	CAWD
Rated push load	1 500 N	10 000 N	500 N
Speed	18 mm/s	5 to 7,5 mm/s	12 to 16 mm/s
Retracted length	Stroke + 109/143 mm	Stroke + 160/235 mm	Stroke + 1 mm
Static load	2 500 N	20 000 N	2 500 N

## High performance actuator



	CASM-100
Rated push load	82 000 N
Speed	890 mm/s
Retracted length	Stroke + 326
Static load	82 000 N

## Linear guides



	LBB range
Size and range	3 to 80
Dynamic load rating	up to 37,5 kN
Speed	up to 5 m/sec

## Precision ball screws



	Ball screws ranges
Nominal diameter	6 to 80
Lead	2 to 40 mm
Basic dynamic load ratings	up to 91,2 kN

# Your development partner

## Tested for your environment

Ewellix's expertise in mechanics and electronics, and specific application requirements contribute to the development of electromechanical actuators to meet the requirements of mobile machinery manufacturers. We verify our products by a comprehensive test plan that covers all regulatory and environmental requirements.

### Mechanical tests

The actuators are used on mobile equipment, and we put them on different test benches to validate how they withstand vibration and shock on all three-axes.

- Random vibration EN 60068-2-6
- Drop test
- Mechanical shock (operational)

### Climatic tests

The actuators are tested in a climatic test chamber that reproduces extremely low  $-40^{\circ}\text{C}$  and high temperatures  $+85^{\circ}\text{C}$ , and any possible variations, including humidity and corrosive atmospheres. Doing this ensures that all the functions and performance of the actuators are working as expected.

- Cold test EN60068-2-1 (Ab and Ad)
- Dry heat EN60068-2-2 (Bd)
- Change of temperature EN60068-2-14 (Na)
- Salt mist EN60068-2-52 (Kb)
- Degree of protection, dust IEC 60529 IP6xM,
- Degree of protection, water IEC 60529 IPx6M
- Degree of protection, high-pressure water and temperature ISO 20653:2013 IPx9K

### Electrical tests

The actuators are tested with different test equipment that reproduces the electrical environment recommended by international standards, such as power supply, immunity to the electrostatic discharges, and electromagnetic compatibility during extreme cases, even during the transient mode typical on a vehicle.

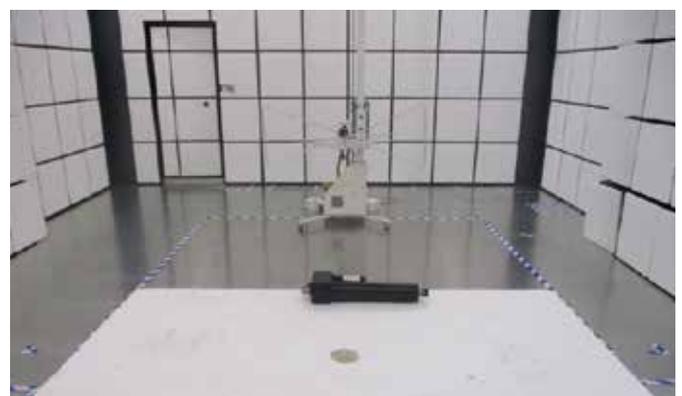
- Power supply 12 VDC ASAE EP455
- Power supply 24 VDC ASAE EP455
- EMC, HF-immunity EN 61000-6-1 and EN 61000-6-2
- EMC, Emission EN 61000-6-3 and EN 61000-6-4
- EMC, Automotive transients ISO 7637-2



*Vibraton test*



*Low temperature test*



*EMC test air immunity or radiation test*



## Digitalisation

Ewellix made a step forward in automating and electrifying the machinery and equipment by adding integrated smart control functions, sensors, and communication. All these new functions are integrated into the SmartX digital platform, where Ewellix delivers actuation solutions that can represent IoT enablers for customers, supporting their journey toward digitalisation.

SmartX digital platform from Ewellix is a set of solutions that address modern equipment needs: intelligent, flexible and connected. With this offering, we enable customers (OEMs and end-users) to unlock a new world of benefits like increased productivity, higher uptime and lower total cost of ownership. We can offer embedded future-proof functionalities that create new possibilities for current and next-generation machinery.



## Innovation

We work pro-actively to better understand and improve our customer's applications, the challenges and benefits they are facing when electrifying their equipment.

On the right a concept vehicle is shown: an electric forklift in which all hydraulic functions have been replaced by electromechanics.



## Scalability of the solution

To enable electromechanical solutions for larger mobile machinery or with higher power work functions, we are continuously expanding our offer to increase the power range. On the right our extension of the CASM-100 actuator series is shown.



CASM-150 (top) and CASM-100

# Supporting tools

## Digital

Ewellix has developed a portfolio of tools to support customers easily selecting and calculating the right Ewellix product for their application.

### Actuators

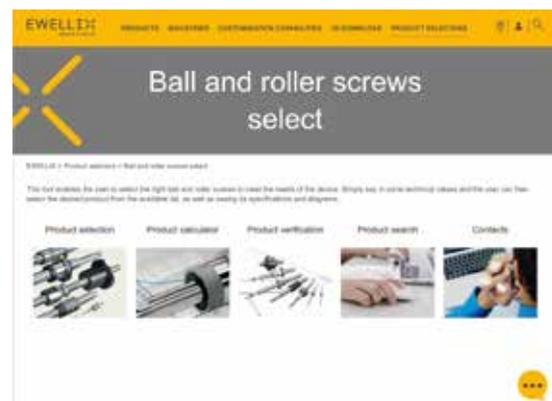
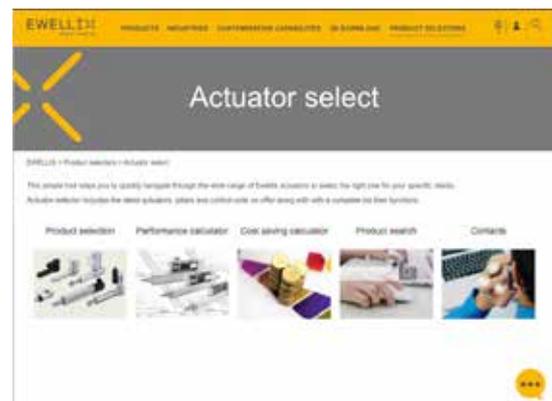
- Product selection
- Performance calculator
- Cost saving calculator

### Ball and roller screws

- Product selection
- Product calculator
- Product verification

### Linear guides

- Product selection
- Product calculator
- Cross reference



## Publications

Supporting documents are available for downloading on ewellix.com in each product page under technical data section:

- operating manual
- mounting instruction

### Linear actuator CAHB series



### Linear ball bearings and shafts

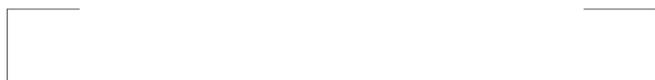


### High performance actuator CASM-100



### Precision rolled ball screws





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