

## CARDANO

Efficient balancing of drive shafts for commercial vehicles





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The right choice for medium  
and heavy-duty drive shafts

Cost-effective for smaller production batches as well



The challenge in manufacturing one- and two-piece drive shafts for commercial vehicles is having to combine a wide range of different types with small production batches. As a solution to this juggling act, we designed our semi-automatic Cardano for efficient balancing of medium and heavy-duty drive shafts.

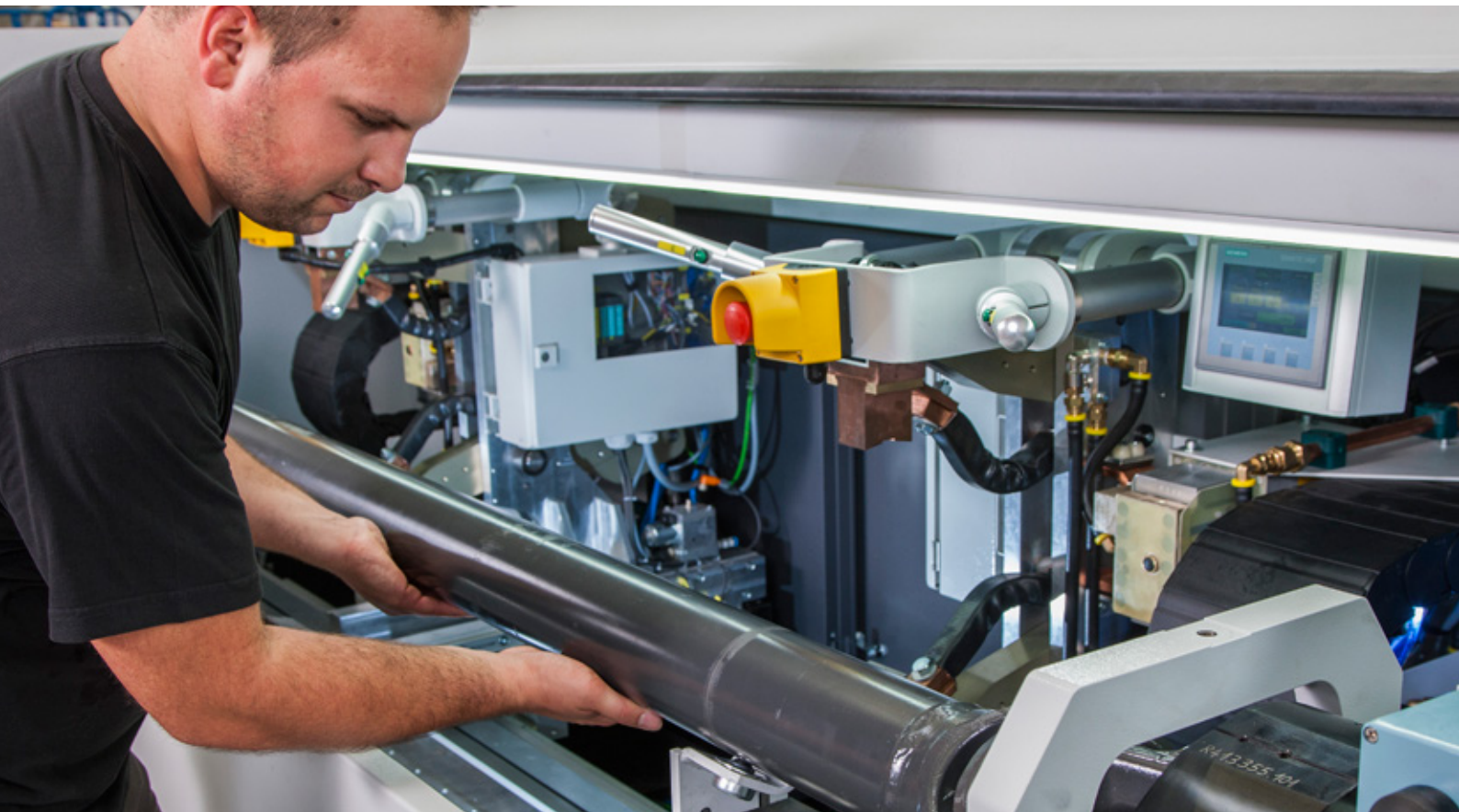
The mix of manual operations and automatic processes is particularly suited for small and mid-size lots and optimizes process reliability during production. This results in shorter cycle times for batch production as well as being ideal for high-capacity maintenance facilities.



Fast – the sectional safety door cycles very rapidly.

# Ergonomic controls ensure better results

Easy to operate - improves cycle times and enhances process reliability



The intuitive operating concept and ready access to all the machine controls allow for quick and safe balancing of medium duty and even heavy-duty drive shafts.

## MINIMISE FAULTS AND INCREASE OUTPUT

- ▶ Convenient manual loading and unloading: simplified loading of shafts thanks to its narrow loading width and integrated part rests.
- ▶ The robustly designed sectional safety door allows lifting assist devices to be used.
- ▶ Automatic measuring runs detect unbalance: the required weights and locations counterweights are shown for each correction.
- ▶ Automated clamp tools: used to precisely clamp drive shafts to the spindles.



Quick and ergonomic placement of even heavy shafts is no issue.

Convenient: the correction display for the weight is located next to the weld gun.

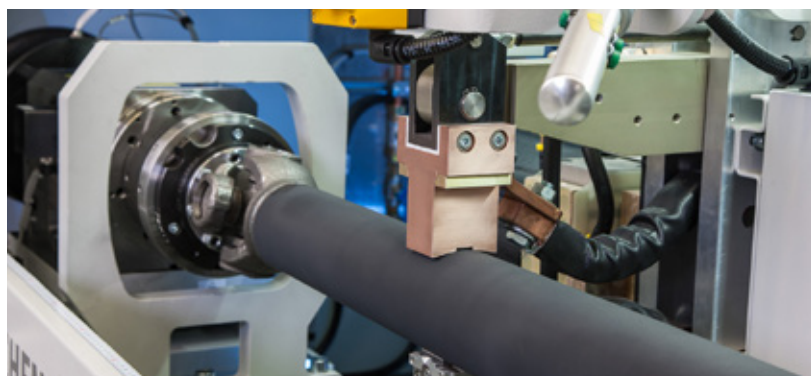
# Mid-frequency welding technology: easy correction of unbalance

## Short welding times and optimized energy usage

Mid-frequency welding technology combines short welding times with optimized energy use. This effective process also allows a high degree of control.

### **DIRECTLY CORRECT UNBALANCE ON THE MACHINE WITH INTEGRATED WELD CORRECTION SYSTEM**

- ▶ Achieves short welding times and optimized heating effects.
- ▶ Easy-to-handle weld gun: installed on guide rails for flexible access to a broad range of weld zones.
- ▶ Pneumatic weld pressure control system.
- ▶ Optionally available: second weld gun to increase the production output.



Mid-frequency welding technology effectively ensures correction weights are welded reliably.

With one handle, the medium-frequency weld gun is readily moved to the zone being corrected.

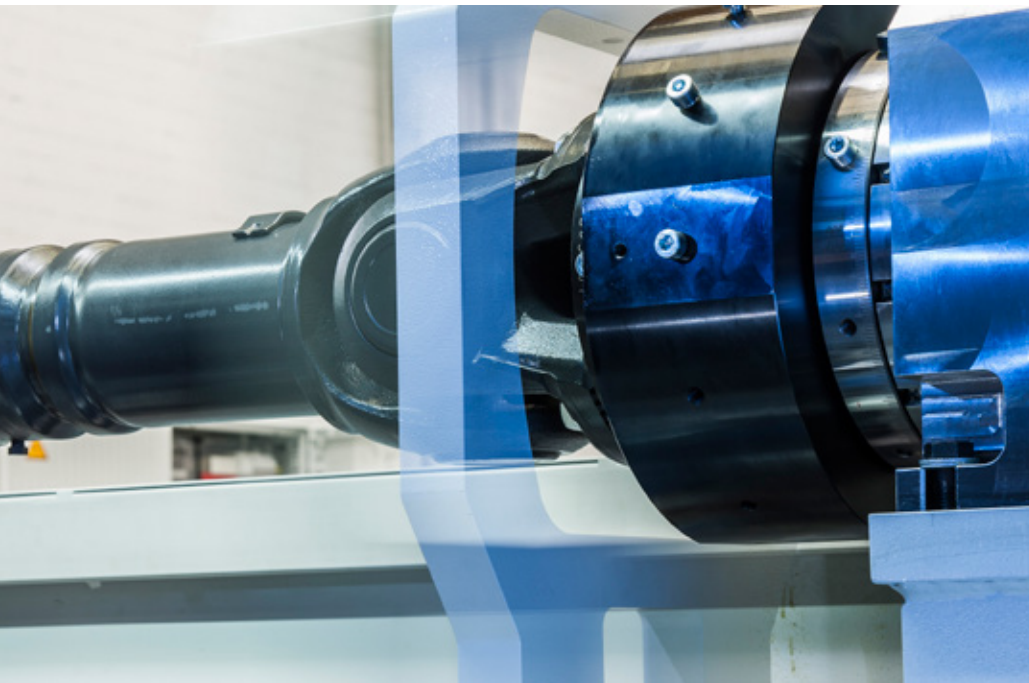
# Uncompromised safety

## Maximum protection for operators and machinery using the strictest standards

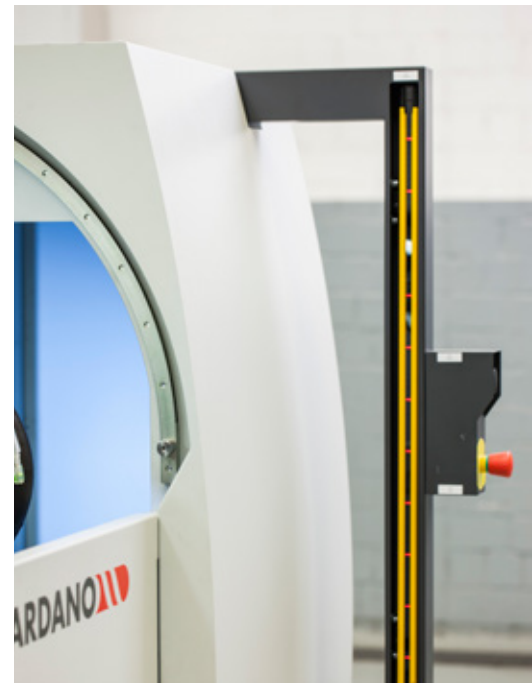
Cardano fully complies with the requirements of the latest Machinery Directive.

### SAFETY FIRST

- ▶ Construction of the sectional safety door according to the strict requirements of ISO 21940-23.
- ▶ Integrated safety catches ensure safety even if a drive shaft is damaged.
- ▶ Integrated vibration monitoring prevents machine damage due to excessive drive shaft unbalance.
- ▶ A light curtain prevents the operator from entering the danger area.



Safety brackets ensure that you are protected even in the event of damage.



Work area protected by a light curtain.

# Energy and the environment: less is more

## Efficient, energy saving design protects the environment

This comprehensive solution provides energy efficiency and high output. It is based on an efficient drive system combined with modern principles of lightweight design and reduction of the moving masses. Another advantage of this design is its modest footprint. As a single-piece machine, Cardano can be easily integrated into existing drive shaft production lines.

Furthermore we have reduced the Cardano emission sound pressure level to roughly 75 dB by intentionally selecting noise-optimized components and insulating and enclosing sources of noise. This allows the Cardano system to operate in any production line or workshop without any additional noise prevention measures.



## Optimized for quick changeovers

Short downtime due to change-over leads to higher productivity

Changeovers create downtime. This is particularly an issue when you have a wide range of types and small production batches. The basis: all the components are readily accessible and can largely be adjusted without the use of tools. Changeovers are fast and convenient thanks to our modular clamp tool design. This means that even a program with frequent drive shaft changes, they can all be balanced cost-effectively.

Effortless drive shaft changeovers with no extra tools.

## Measurements and controls: safely handling complicated procedures

### The state-of-the-art CAB 950

Our measuring and control device – the CAB 950 – is designed to be an intuitive and self-explanatory human-machine interface (HMI). It has an operating concept with logical links that are easy to follow. The result is impressive: after a minimal learning curve, you can start working quickly and safely.

#### ACCURACY FOR OPTIMAL RESULTS

- ▶ Convenient, clear access to all functions of the machine.
- ▶ Modern touch-screen operating concept.
- ▶ Simple, safe handling of even complicated operational procedures.
- ▶ Visualization of unbalance with vector measurements displaying unbalance amount and angle.

CAB 950 – the measuring device for batch production: highly accurate measurements for precise calculation of corrections.



# Cardano Technical Specifications

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## ROTOR DIMENSIONS

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- ▶ Rotor weight: 15 – 150 kg
  - ▶ Tube Diameter: approx. 55 – 170 mm
  - ▶ Max. rotor length: 3,000 mm
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## MACHINE

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- ▶ Width, depth, height: 5,900 mm, 1,750 mm, 1,600 mm
  - ▶ Power supply: 400 V; 3 pH; 50/60 Hz
  - ▶ Balancing speed (continuously variable): 1,200 – 4,000 rpm
  - ▶ Welding technology: medium frequency, 20 kA max. induction current
  - ▶ Drive type: servo drive
  - ▶ Paint: RAL 7035 (light grey), RAL 7024 (graphite grey)
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## MEASURING DEVICES

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- ▶ CAB 950 with touchscreen operation
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## OPTIONS

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- ▶ Comprehensive clamp tool program
  - ▶ Test standard with test weights
  - ▶ Center bearing pedestal
  - ▶ Second medium-frequency weld gun, left
  - ▶ 480 VAC power supply
  - ▶ Automatic prompting of flips
  - ▶ Adaptor for air-actuated clamp tools
  - ▶ Router for remote diagnostics
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