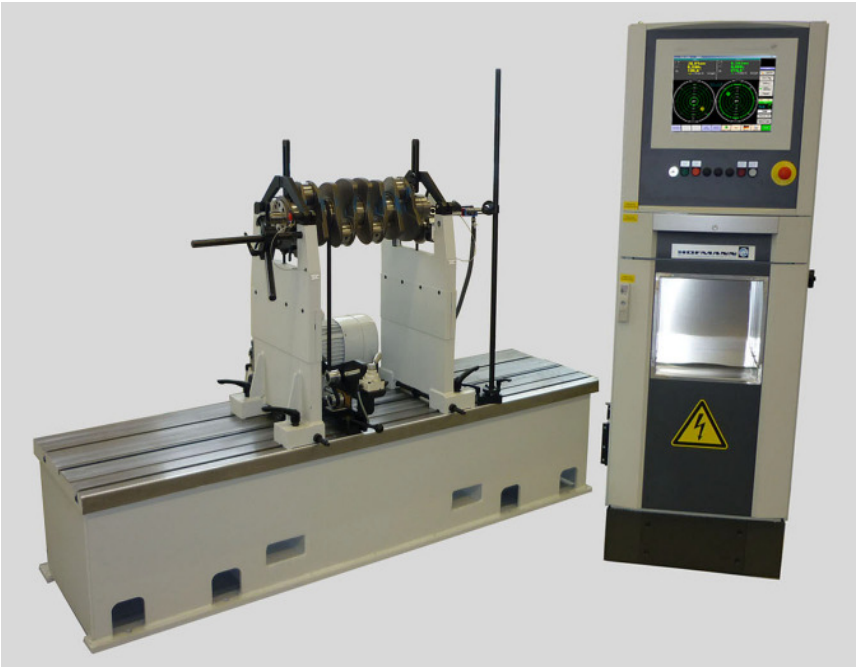
Balancing of general rotors

Horizontal Hard-Bearing Balancing Machine UHK 16 - 26



Balancing a crankshaft on a UHK 19.1

Advantages

- Efficient balancing due to
  - fast changeover
  - permanent machine calibration
  - electronic protractor „Posiquick C“
  - high availability
- Perfectly balanced workpieces through Hofmann force meas-uring principle
- Universal application
- Useful extensions based on a modular design

Application

- Balancing of any kind of medium up to large rotors
  - with own bearing journals
  - on an auxiliary shaft
  - as complete assembly in an adapter frame
- Applicable in
  - manufacturing (single or series)
  - maintenance
- Balancing of rotors like
  - electro armatures
  - generators
  - ventilators
  - turborotors
  - rolls
  - crankshafts

Description

The Hofmann balancing machines UHK 16 to UHK 26 are being used for balancing of any kind of rotors in the weight range up to 150 kg or 12,5000 kg.

The hard-bearing machines are permanently calibrated. For a new rotor type the unbalance measuring system has to simply be set to the specific locations of the unbalance correction planes and the correction radii, only. Then the balancing process may instantly start. Time consuming calibration runs are being omitted.

The pedestals comprising the Hofmann force measuring principle provide a high stiffness. The integrated piezo-electric force sensors are measuring the centrifugal force generated by the rotor unbalance on a direct way and with a very high sensitivity. As a benefit those sensors are not sensitive to temperature fluctuations and external electro-magnetic fields. As a result unbalances may be measured already at low speeds with a very high preciseness.

To speed up the rotors to measuring speed, belt drives are being widely used. Their application is very flexible and their influence on the meas-uring result is small. End drives will be used to fast and safely accelerate rotors having a large moment of inertia.

The unbalance measuring system MC 10 H provides a digital processing of the measuring data with a high selectivity for precision unbalance measurement. The Windows ® operating system guarantees an intuitive, simple and reliable operation. The unbalance correction is being displayed in terms of mass-, unbalance- or correction-units.

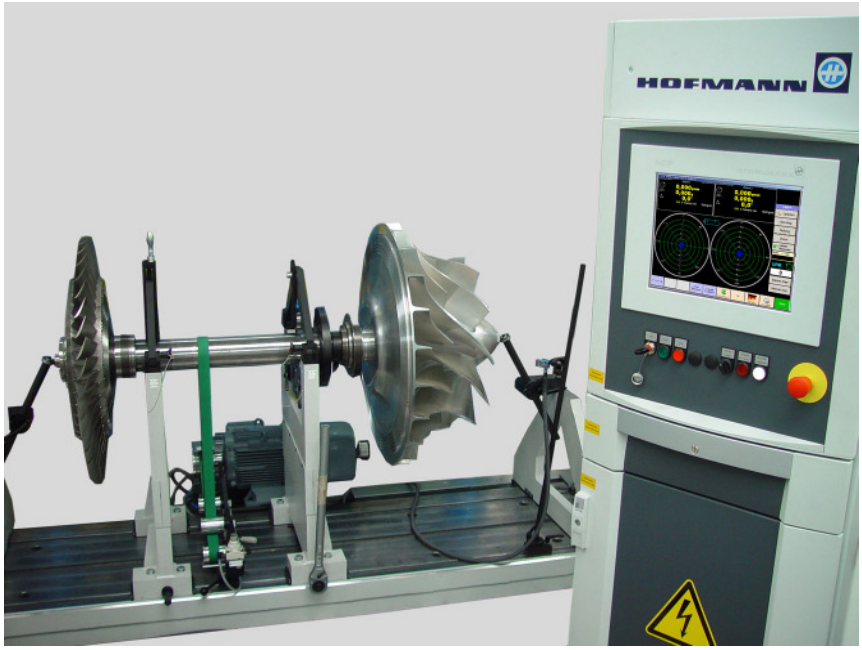
Balancing - made simple.

Adjusting a Hofmann UHK-balancing machine for a given rotor is a matter of very few setups, only - without the need of special tools. The positions of the bearing pedestals, idler rollers of the belt drive and the roller bearings are being adjusted using scales. In case of a belt drive the rotor will be retained by axial counter bearings. In case of an end drive with an universal joint shaft the drive unit overtakes the axial guiding of the rotor.

The end drive with motor (and gear) can be axially repositioned to connect the rotor to the drive shaft. Therefore and also with belt drives Hofmann is applying rugged and at the same time smooth-running linear slides.

With hard-bearing balancing machines only the input of the geometrical positions of the correction planes with regard to the bearings and the correction radii are required, so that the unbalance measuring system MC 10 H calculates the right unbalance. Then the balancing process directly starts with the first measuring run omitting any further time consuming calibration runs.

„Posiquick C“ supports the operator to find the right angular position for the unbalance correction. That function of the MC 10 H displays on its screen, where this position is. Finally, a high angle accuracy with the unbalance correction results in fewer correction steps and therefore more efficiency.



Balancing a turbocharger rotor on a UHK 23.1

UHK 24 with fan rotor in overhung position

Safety comes first.

Because of job safety balancing machines must be equipped with protective devices. That is required by many national and international laws - as is in the countries of the EU. Following the EU rules a balancing machine can be CE labelled only, if it is operated with an appropriate protection.

The design of the protective device is mainly based on the hazardous potential of the rotor to be balanced. According to ISO 7475 a contact protection, safety class B, is to be applied, if any danger occurs when contacting rotating parts (for example cutting tools) or by trapping of the operator‘s clothes. The solution therefore is a fence guard.

In case of hazards by parts flying off the rotor (for example balancing weights) a puncture-proof enclosure, safety class C, will be applied.

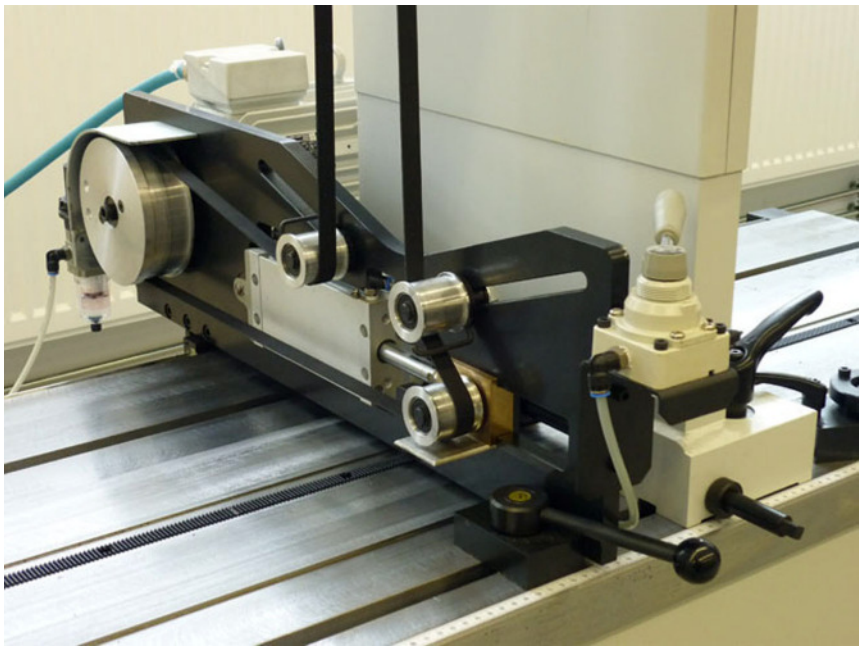
All protetive devices have an electromagnetic safety lock and may be opened at rotor stoppage, only. Vice versa a balancing machine can be started with the protective device closed, only.

In any cases Hofmann offers suitable protetive devices. They provide optimum access to the rotor for unbalance correction. They also have a high ease of use.

Reasonably extended.

For the Hofmann- balancing machines type UHK there are modules available, to adapt an individual machine even better to the given balancing requirements:

- Integrated systems for a precise and efficient unbalance correction, for example by drilling, in case of series or heavy rotors.
- Special drives, for example using compressed air with bladed rotors or the own drive with complete aggregates.
- Strengthened pedestals and drives and special software to balance simple flexible rotors.



Belt drive comprising adjustable idler rollers, pneumatic belt tension and clamping system

UHK 16.1 with rotatable safety cover, safety class C, and integrated drilling units for the unbalance correction

- Interfacing connections to bear rotors with their original bearings.

Options

- Length of machine bed
- Additional roller bearings
- Prism bearings
- V-roller carriages
- Negative load roller for rotors in overhung positions
- Adapting tooling for complete assemblies
- Safety device according to ISO 7475
- Test rotor with test weights
- Unbalance measuring system MC 10 H (see separate data sheet)
- Protocol printer

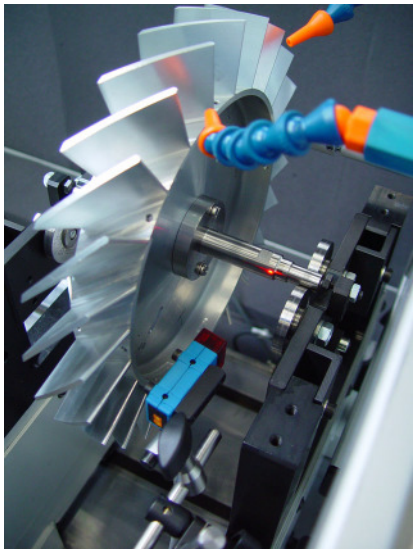
Scope of supply

Machine with belt drive

- 1 Machine bed
- 2 Pedestals with force measuring sensors and roller bearings
- 1 Belt drive
- 2 Axial counter bearings
- 1 Speed sensor with stand
- 1 Unbalance measuring system MC 10 H
- 1 Electric Control

Machine with end drive

- 1 Machine bed
- 2 Pedestals with force measuring sensors and roller bearings
- 1 End drive
- 1 Unbalance measuring system MC 10 H
- 1 Electric control



Compressed air drive of a UHK 11.1 for balancing a fan impeller on an auxiliary shaft

Technical Data

UHK	Type	16	18	19	22	23	24	25	26
Max. rotor weight	kg	150	300	700	1,500	3,000	5,500	8,000	1,2500
Max. rotor diameter above machine bed	mm	800	1,270	1,270	1,600	1,600	1,740	1,740	2,400
Max. bearing distance	mm	depending on the length of the machine bed							
Min. bearing distance	mm	75	90	90	145	145	330	330	500
Journal diameter	mm	10 - 50 / 50 - 120	10 - 60 / 60 - 140	13 - 65 / 65 - 160	15 - 80 / 80 - 190	18 - 100 / 100 - 230	25 - 140 / 140 - 280	30 - 120 / 120 - 350	35 - 180 / 180 - 370
Power supply	V/Ph	400 / 3	400 / 3	400 / 3	400 / 3	400 / 3	400 / 3	400 / 3	400 / 3
End drive									
Driving power	kW		4	7.5	11	15	22	30	37
Range of balancing speed	1/min		300 - 1,500	300 - 1,500	300 - 1,500	300 - 1,500	300 - 1,500	300 - 1,500	300 - 1,500
Min. achievable residual unbalance	gmm/kg		0.45	0.45	0.45	0.45	0.45	0.45	0.45
Max. unbalance reduction ratio	%		95	95	95	95	95	95	95
Belt drive									
Max. rotor diameter above belt drive	mm	500	900	900	1,200	1,200	1,350	1,350	
Min. bearing distance with belt drive	mm	75	90	90	145	145	330	330	400
Driving power	kW	2.2	2.2	4	7.5	11	15	15	22
Balancing speed at driving diameter Ø 150 mm	1/min	300 - 1,300 300 - 640	300 - 1,300 300 - 640	300 - 1,300 300 - 640	300 - 1,400 300 - 1,000	300 - 1,400 300 - 1,000	300 - 2,800 300 - 2,000	300 - 2,800 300 - 2,000	300 - 2,800 300 - 2,000
Min. achievable residual unbalance	gmm/kg	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Max. unbalance reduction ratio	%	95	95	95	95	95	95	95	95

All information without obligation, subject to change without notice!

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