

HM- series Modular Balancing Machines
Precision, Accuracy and Maximum Flexibility for
Universal Applications

About SCHENCK USA CORP.

SCHENCK USA CORP., is a subsidiary of SCHENCK CORP., Deer Park, NY. Its parent company is Carl Schenck AG of Darmstadt, Germany; whose shares are ultimately held by Dürr, AG of Bietigheim, Germany.

SCHENCK USA CORP., is our new name as a result of the merger of Schenck Trebel Corp. and Schenck RoTec Corporation into one entity that together comprises Schenck's Balancing & Diagnostic Systems Group for North America under Schenck RoTec GmbH.

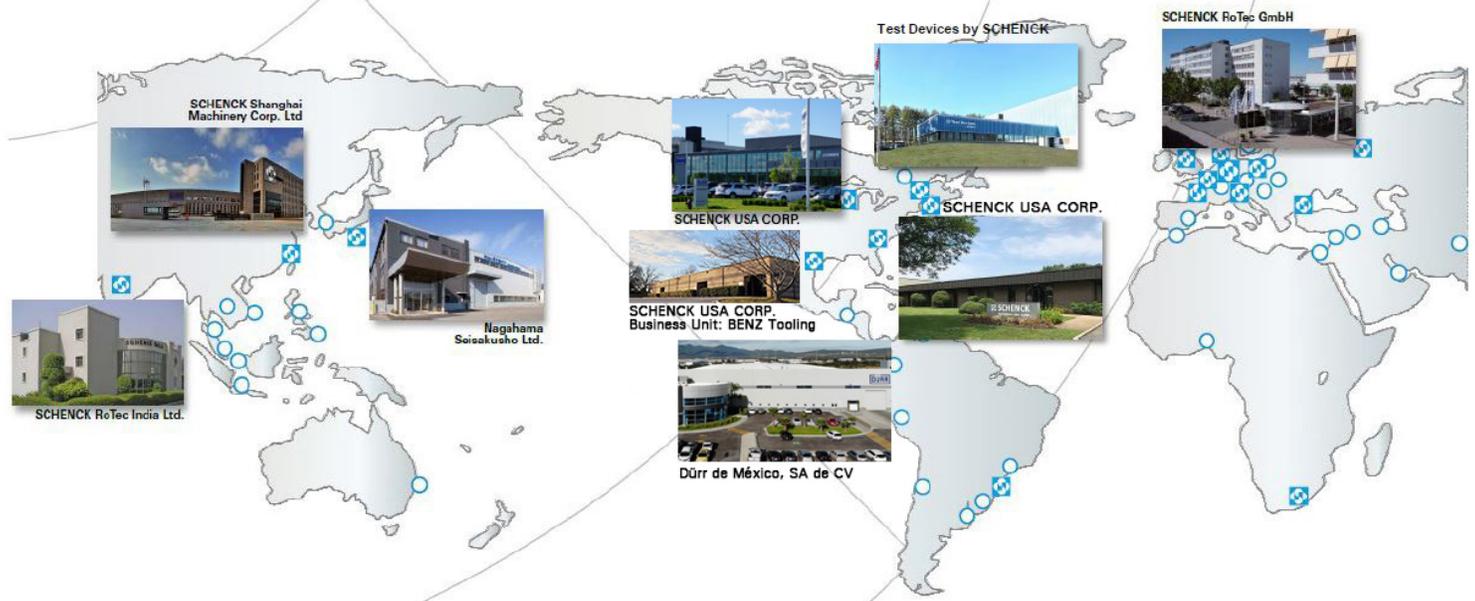
SCHENCK USA CORP. is on four acres of property located at 535 Acorn Street, Deer Park, NY, 11729. The facility has a 22,800 square foot manufacturing and assembly plant, and 17,000 square feet of office space for sales, service, administration and engineering personnel. Our Southfield, MI, location is also a manufacturing and assembly plant serving our Automotive customer base with a local Engineering and Service support staff in Michigan.

SCHENCK USA CORP. provides a complete range of balancing and vibration analysis equipment for the production, maintenance and repair of rotating components, and recent integration of BENZ Tooling, metal division, expands its capacities. Our engineering staff offers a broad range of experience for any balancing application and we maintain a close presence on the balancing committees of ISO and SAE, to ensure the latest practices and procedures are applied. We are ISO 9001:2015 accredited.

Our Service team is available for the commissioning and calibration of balancing equipment from multiple North American service points, in addition to being able to leverage our global service support structure.

With our acquisition of Test Devices Inc., we expanded our capacities in the Spin Testing and Balancing Services areas. We further expanded our footprint with the acquisition of the building and property site of SCHENCK's business unit Test Devices, situated on 6.8 acres, in Hudson, MA, operating a state-of-the-art 57,000 square-foot facility with 5,500 square feet of office space, strengthening our trajectory for growth in support of increased activities with local and global markets in the e-mobility and aerospace industries. The successful business unit is an integral part of SCHENCK's business.

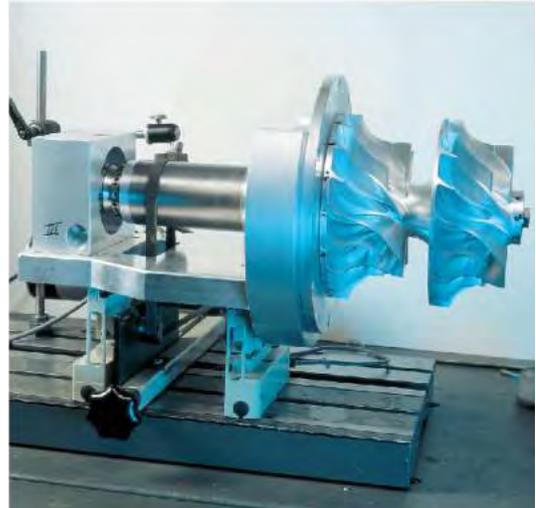
Global Balancing Network - Local Expertise and Support



- + 18 subsidiaries and joint ventures with 9 production plants
- + 37 agencies and offices world wide
- + More than 200 service engineers in 57 service points

Balancing Enhances Quality

The effect of unbalance will often only become noticeable in the finished product. If rotors are not balanced, they can cause undesired or even dangerous vibrations. They can diminish the practical value of a machine, cause damage to the bearing, or fractures to the casing, suspension or foundation. Excessive noise and vibration may also irritate the user and lead them to conclude that the product is of poor quality. A product free from noise and vibration is always a sign of quality, precision and craftsmanship.



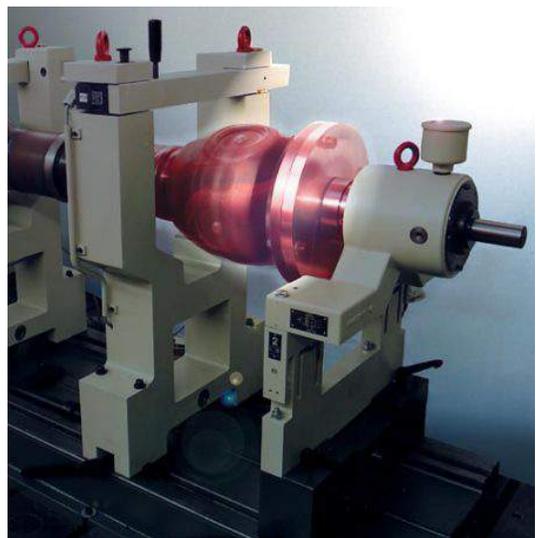
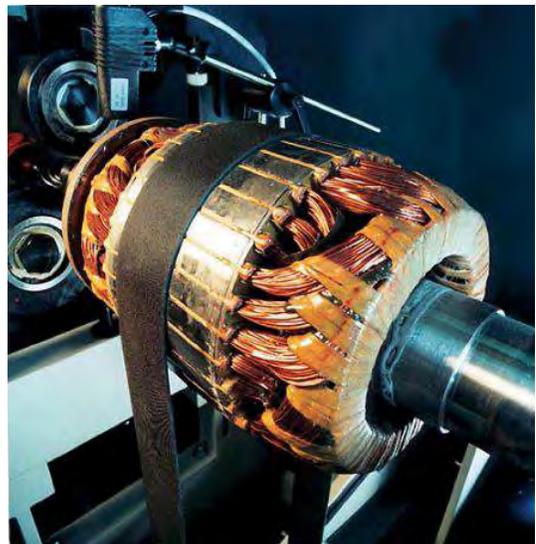
About the HM-series

The HM hard-bearing balancing machines are designed to meet all of your balancing requirements. The concept of the HM-series gives you flexibility with the important machine modules. These five modules consist of the mechanical equipment, drive, measuring unit, safety device and correction unit which can be perfectly adapted to your balancing requirements. The best combination of components depends on many details:

- Are there many different rotor sizes as in a repair shop, or do you balance only one or two rotor types in a production application?
- What are the dimensions and weights of the rotors?
- How are they loaded?
- What accuracy is required?
- Is it a rigid or a flexible rotor?

All of our hard-bearing machines are manufactured with rigid rotor supports and a rugged mechanical design that is particularly suited for workshop applications. These balancers also feature negative load bearings and a safety hold down to ensure operator safety.

Almost anything is possible with HM Series balancing machines – from standard universal machines to completely integrated and customized solutions. The flexibility of these machines is endless. If the requirements of your rotor program change, the existing balancing machine can generally be upgraded at low cost and with little effort.

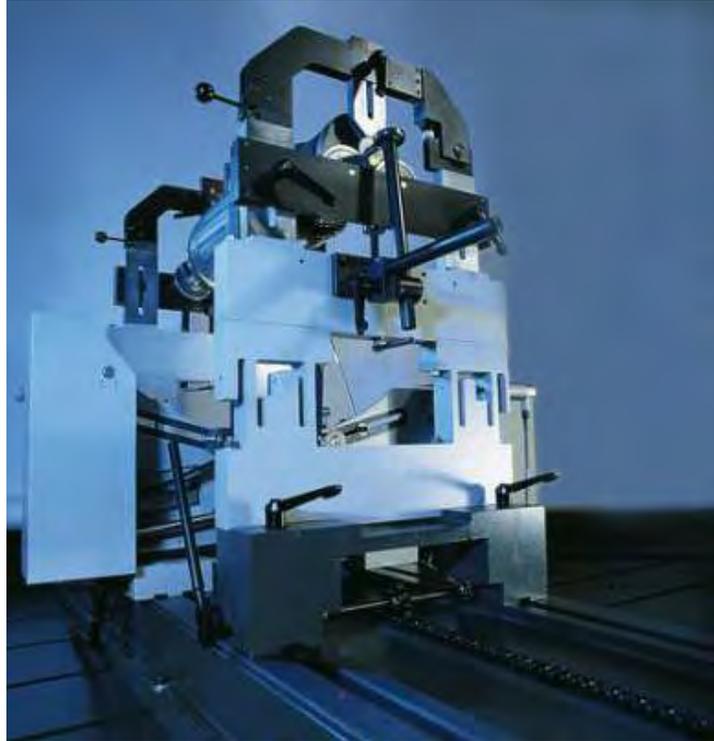


Mechanical Equipment

Versatile mechanical modules allow you to balance a large range of workpieces quickly and precisely. All modules can easily be adjusted to your rotor program at little expense. Based on standard lengths, the machine beds can be specified to meet your individual requirements.

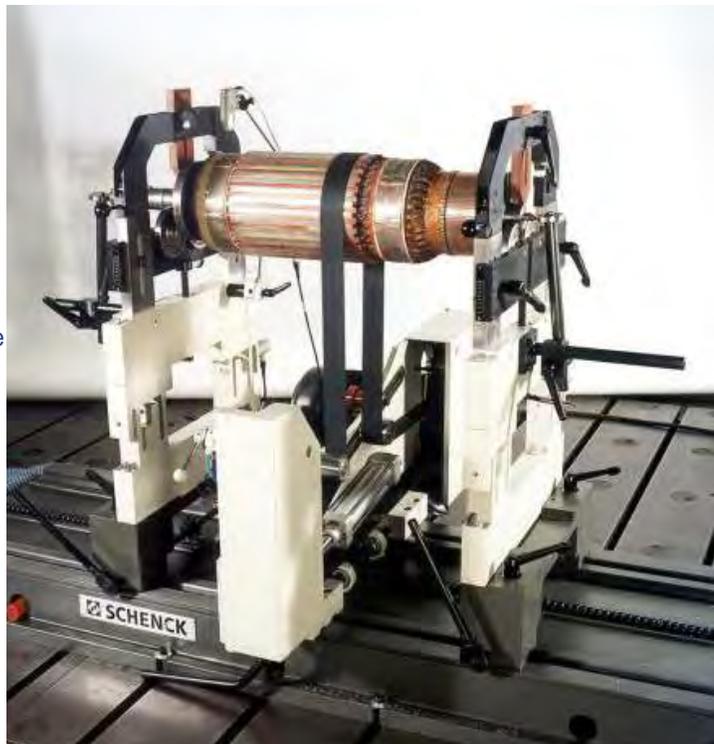
The type of rotor support in the balancing machine is selected according to your rotor design:

- roller carriages for rotors with their own journals
- inclined roller bearings for rotors to be balanced together with mounted bearings
- bearing supports that sleeve bearings for heavy rotors which can not be supported by roller bearings
- custom engineered designs for balancing complete assemblies or universal joint shafts.



The bearing pedestals

Sturdy and precise - are the interface between your rotor and the balancing machine. They are appropriately designed for good balancing quality and for everyday use. Overall stiffness, maximum linearity and minimum damping characterize this mechanical unit. For the HM bearing pedestals we apply the Schenck force-measuring principle. This means that the force measuring part of the bearing pedestal is designed as a robust dynamometer. The measuring system also handles large initial unbalances. The pickups are situated outside the force flow and are not affected by impacts. The entire system is permanently calibrated. In the first measuring run, the amount of unbalance and its angular position are determined for both balancing planes. The steel bearing pedestals absorb heavy impacts that may occur when loading a rotor, without losing their measuring accuracy.



An important detail is the very narrow design of the bearing pedestals in direction of the rotor axis. The bearing pedestals of our HM balancing machines are the basis for precision balancing at low operating and service costs. This provides optimum conditions for easy loading even in case of short rotor journals and excessive cantilever length without requiring expensive special designs. Special customized designs are also available for other applications.

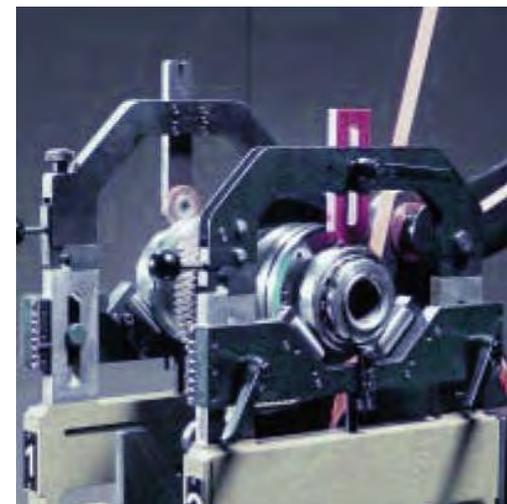
The rotor support – versatile and safe

Roller carriages are the solution for supporting a large range of different rotors. They can be easily adjusted to the journal diameter of your rotor without any tools. The crowned surface avoids edge pressure and excessive stress on rotor journals. A sturdy radial hold-down increases operational safety. For specific applications, we can also supply our patented damped roller carriages.

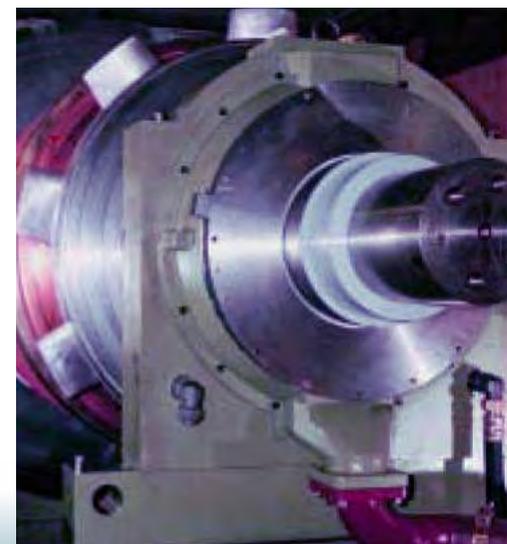


Inclined roller bearings

These bearings safely support rotors equipped with their own anti-friction bearing. This height adjustable bearing holds the rotor to be balanced free from restoring forces about the rotor's transverse axis. Thus, geometric inaccuracies of the anti-friction bearings will not affect the unbalance readout.



Sleeve bearings make it possible to balance large, heavy rotors with journals that are not suitable for roller carriages. To avoid alignment errors, the bearings are spherically adjustable.



Drive

Our modular design offers the proper solution for any rotor or balancing process.

The different drive systems - Belt drives are the right choice for rotors with an even surface. The drive's construction ensures accurate belt guidance. In the specified diameter range, the belt can be adjusted so that the belt runs vertically from the rotor axis. This is the only way to guarantee that the tensile force of the belt does not affect the measuring result. An advantage with this type of belt guidance is only two different belt lengths are required to utilize the entire performance range of the machine. Stepped motor belt pulleys make it possible to adjust the drive power and speed to the body to be balanced.

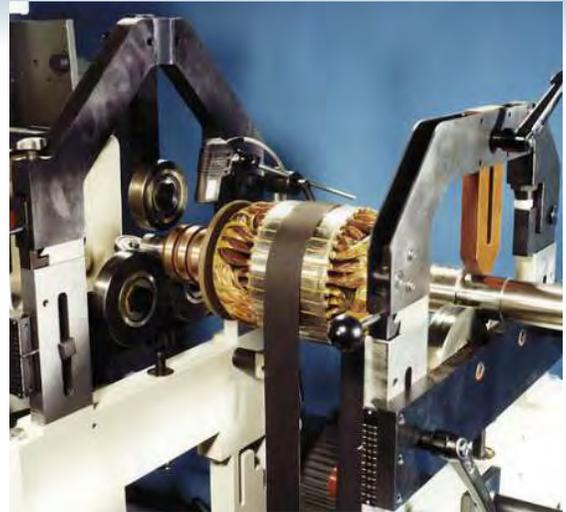
The drives – dynamic and flexible

The construction of the rotor determines the choice of the drive. You are particularly flexible with regard to any balancing tasks if you choose a combined belt-and-end-drive for your machine. With such a solution you will always have the appropriate drive, even with frequently changing rotor programs. With the belt drive, you could balance an electric motor armature, and then change to the end drive to balance a fan which needs strong drive power because of its high air resistance – all on one machine, with only a short set-up time.

Two belt drives available: The underslung belt drive, proven and universal with a large range of adjustment, is an economic solution that is appropriate for rotors with a smooth outer surface and small / medium size lots that require high productivity. With this drive, the rotor loading and unloading procedure is very quick and simple. The overslung belt design is best suited for high production.

End drives - best suited for balancing very heavy rotors with a large moment of inertia. Gearboxes provide optimum adjustment of the electrical drive to speed and torque requirements. An optional holding device fixes the rotor at the circumference in order to ensure safe correction.

The performance – adjusted to the task - AC/DC motors are used for small and medium drive power requirements. DC motors are available for larger controllable power requirements. Variable speed selection, short acceleration and short braking times enable a quick and dependable operation. Smooth acceleration and braking processes treat the universal joint shafts, belts and other drive elements with care. This also leads to high operational safety and reliable availability of the balancing machine.



Measurement Instrumentation: Computer Aided Balancing (CAB)

SCHENCK USA offers 3 measuring unit options - depending on your needs and specifications, we have the product fit for your requirements.



Via Touchscreen

CAB 920 was specifically developed for the most challenging tasks including flexible rotor balancing. Suitable for Hard-bearing, Soft-bearing, Horizontal and Vertical balancing machines, it offers the same Windows-PC compliant graphics user interface and software compatibility that dominates the personal computer market.

With Flash Drive employing embedded Windows as its operating component, the CAB 920 offers the same Windows-compliant graphics user interface and software compatibility that dominates the personal computer market.



CAB 820 is a top class product combined with plenty of operating convenience, excellent precision and exceptionally high accuracy at a competitive price/performance ratio. The CAB 820 is perfect for all horizontal and vertical balancing machines; you'll achieve your company's balancing targets quickly and without a great deal of effort.

Because the CAB 820 is directly derived from our flagship measuring unit (the CAB 920), it contains many features from the more expensive 920. This starts with the extremely simple and much praised operation, excellent precision and exceptionally high accuracy. This product is the right fit for all horizontal and vertical balancing machines.



Via Keyboard

CAB 706 offers state-of-the-art diagnostic functions and powerful correction capability for a wide range of universal balancing applications.

It provides an affordable, complete package for the modernization of the measurement chain of older horizontal and vertical balancing machines. It is quick to install and commission because of its compact design.

Negative Load-Bearing for
balancing overhung rotors

Photocell and stand
for speed signal and
angle reference

Damper to
cushion closing

Journal Diameters
can be pre-set

Axial Thrust Bearing,
to maintain rotor position

Motor

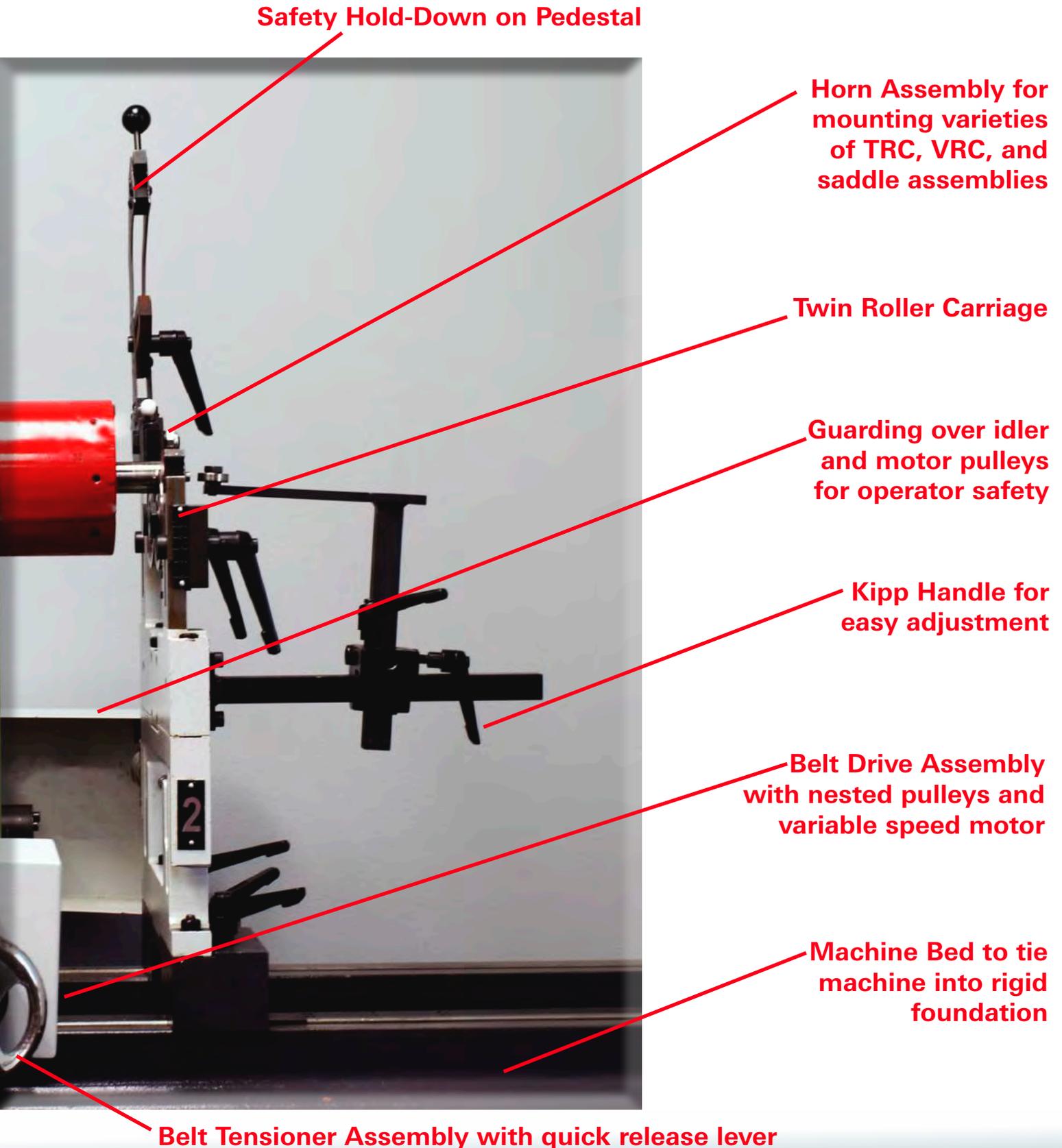
Dynamometer
(spring system)
for measuring
unbalance forces



Pedestal

Machine at a Glance

M20B



Safety Enclosures

SCHENCK USA offers a complete line of safety enclosures that meet or exceed industry regulations for the protection of operator and machine. Safety devices and enclosures for balancing machines help to avoid accidents and are even prescribed by law for many applications.

While United States Public Law 91-596 and the OSHA Standard does not specifically reference balancing machines, paragraphs 1910.212 "Machine Guarding," and 1926.20 "Accident Prevention Responsibilities," do apply. ISO 7475 (and the identical ANSI Standard S2.60) describe possible safety hazards resulting from the operation of a balancing machine, and classifications of safety barriers and enclosures for different protection classes.

Our line of enclosures meet and exceed these regulations and applicable standards for all machine sizes.

First-class safety

One factor for choosing the appropriate safety device is the hazard caused by the rotor being balanced. This hazard potential is determined by the balancing speed, the balancing method, the shape and the quality of the parts that may fly off the rotor. Typically, class B or one of several class C safety enclosures are used with HM-series machines.

Protection class B is applicable if parts coming in contact with a rotor is (such as with fans, bladed rotors or metal-cutting tools) a concern. This class requires protection around the rotor or a barrier around the entire machine. The latter offers optimum accessibility for loading and unloading, during rotor corrections, and provides for easy adjustment to any local conditions. Large sliding doors in the protective enclosure ensure better access to the balancing machine. The enclosure is designed with safety interlocks, so it cannot be opened when the drive is active and there is no risk of injury.



Class B Safety Enclosures

Protection class C is applicable if the possibility of parts flying off the rotor is a concern. The protective device is designed to be puncture-proof so that the operator and surroundings are protected. When the drive is active, the protective device is electro-magnetically locked and cannot be opened accidentally. All protective enclosures are ergonomically designed so the rotors can be accessed quickly, without impeding the operator.

Note: If your balancing application changes, remember to check that the enclosure will meet the new requirements!



HM Balancing Machine with Class C Safety Enclosure

Balancing Machine with Class D Safety Enclosure for high speed applications



High-speed applications usually require burst-proof enclosures, pits, or bunkers, that are designed to contain the complete rotor of major fragments during high-speed balancing or over-speed testing.

Safety as a concept

All safety devices for HM-series machines meet the requirements of DIN 45 690 or ISO 7475. Balancing machines equipped this way comply with the applicable safety regulations. Protection in accordance with the machine enclosure classes B, C, or D is only one part of our safety concept. Comprehensive hazard analyses complete the safety equipment of Schenck Trebel's balancing machines.

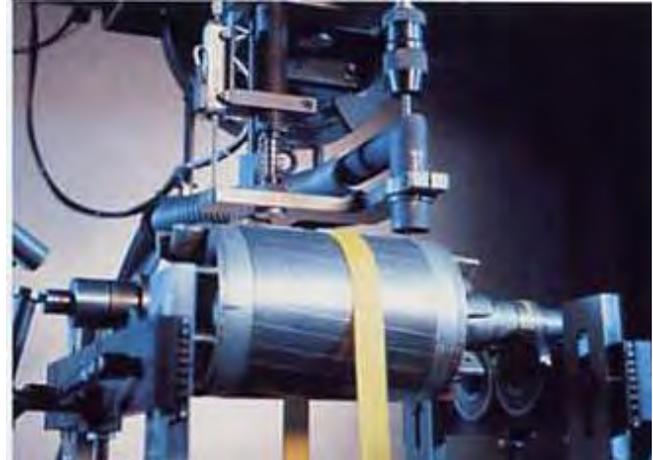
- an ergonomic design avoids improper operation
- pinch points are eliminated
- drives are equipped with safety circuits
- safety hold-down bearings avoid excessive rotor lifting
- axial thrust bearings ensure that the rotors are contained axially

Advice in the field of protective equipment is another element of our safety concept. You can feel safe relying on our many years of experience and knowledge in this field!

Correction Unit

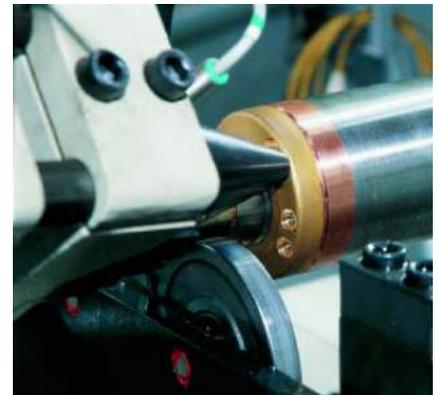
Saving time and cost

The modular components of the mass correction system (MAK) enable unbalance correction on the balancing machine by means of the removal or addition of material. The units can be attached axially for a correction on the face, and radially for a correction at the outer diameter. For angular drilling, the correction unit can be tilted.



Measurement and correction without re-clamping

It is not necessary to move the workpiece from the balancing machine to a separate machine tool for correcting the unbalance. MAK offers many advantages in comparison with the conventional method. Since the rotor remains in the machine during correction, time is saved and balancing quality is improved. Depending on the previously applied balancing method, number, and type of rotor, the required time and cost can be reduced by 30-50%!



Load the rotor and that's it! The rotor is loaded in the machine only once, then the measuring run is started and is immediately followed by the correction. After checking the residual unbalance, the rotor balancing is complete. MAK saves time exactly at the point where you have to invest most of it – during the correction process. Your rotor is transported less, so it is treated more carefully and less material is removed providing additional time and cost savings.



Accurate correction

In addition to the time savings, there are strong technical arguments in favor of the MAK system. A correction in a separate machine often leads to inaccuracies which then require an additional correction run. With MAK, the rotor is indexed in the correct angular position in the correction unit and the drilling is performed exactly at the required depth. As a result, the ratio between initial and residual unbalance improves. So additional correction steps are avoided and the rotor is not ruined by unnecessary drilling.



Modular integration

Suitable modules make it possible to integrate the MAK system into your balancing machine at nearly any point. With this system, correction can be carried out axially, radially, or at an angle. Various methods of metal cutting (removal of material) or of attaching correction weights are possible. MAK can be used for most types of rotors. And, due to its modular design, it can be extended later or built into existing balancing machines.

Ergonomics

SCHENCK USA has thoroughly analyzed the balancing process and eliminated the problematic areas!

Re-setting in the 'blink of an eye'

All frequently used adjusting elements are operated by means of clamping levers with no tiresome search for the appropriate tools. To ensure quick and precise adjustments, the roller carriages and idlers are equipped with scales. For all basic settings that must be changed only occasionally you need only one tool. The bearing pedestals are adjusted at the desired bearing distance by means of a manual travelling mechanism with ratchet. A moving gear with electric motor and spring-loaded clamping devices are available as an option. The HM balancing machine can be set up for another rotor quickly and easily.

Height

Ergonomics also means that the bearing pedestals have the correct operating height. The rotor is easily accessible for correction and all operating elements can be reached without difficulty. The same applies to the safety devices which neither impede accessibility to the working area, nor the loading / unloading of large rotors. To make things complete, operation of the protective devices can be automated in order to achieve faster handling.

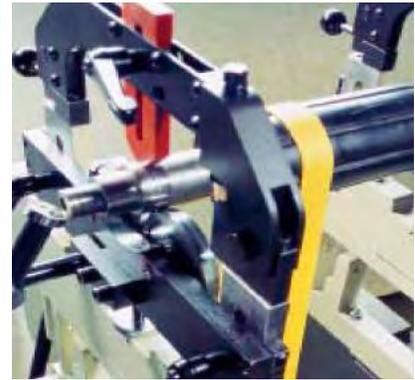
Safety hold-downs

A damping element cushions the closing of the safety hold downs and effectively prevents them from closing accidentally. In case of large hold-downs, gas pressure springs are an additional means to facilitate operation so heavy hold-downs can be opened, closed with little effort, and prevent injury.

Operation

Straight to the objective without complications: this is our philosophy for operating our measuring devices. Providing clear operator instructions, a limited number of function keys, intelligible dialogues and easy-to-read displays will guide you through the balancing process.

The operation of all machine instrumentation is easy to learn and reduces operator faults. The well arranged display indicating only the information actually required can easily be read even from a greater distance. Additional optional accessories such as a second operator's monitor, or motorized bearing pedestals, considerably expand the application range of the balancing machine and make operation even easier.



HM-series machine specifications and information

Different machine bed lengths are available, depending on the type; this makes optimum adaptation to the required maximum distance between bearings possible. Drive system standards are established on each machine to accommodate typical application requirements; however, drives with higher horsepower ratings are also available.

Type	Machine Data			Rotor Data	
	Max. rotor weight on roller carriages [lb] ¹⁾	Max. rotor diameter over the machine bed [in]		Journal diameter range on roller carriages [in]	Max. sensitivity per plane [g·in] ²⁾
		Standard	Optional		
HM 1	22	14	–	0.20 – 2.00	0.002
HM 10	36	14	–	0.24 – 2.75	0.004
HM 2	100	31	49	0.31 – 4.00	0.020
HM 20	250	31	49	0.35 – 5.50	0.030
HM 3	650	49	–	0.35 – 5.50	0.040
HM 30	1500	49	–	0.40 – 6.30	0.060
HM 4	3,300	63	76	0.50 – 8.00	0.100
HM 40	6,500	63	76	0.60 – 9.50	0.150
HM 5	12,000	63	82	0.70 – 11.00	0.300
HM 50	17,500	63	82	1.00 – 15.00	0.400
HM 6	27,500	82	118	1.60 – 12.50	0.600
HM 60	40,000	82	118	2.00 – 15.75	0.800
HM 7	70,000	110	140	2.30 – 20.00	1.250
HM 70	100,000	110	140	2.75 – 24.00	1.500
HM 8	275,000	140	196	–	3.000
HM 80	550,000	140	196	–	5.000

1. For symmetrical loads. Weight capacity is also determined by the available drive power and balancing speed. If machine is to be used mainly in upper speed range, choice of the next larger machine model is recommended to prevent excessive wear. Maximum capacity on rollers is also limited by journal hardness (important above 10,000 pound rotor weight.)
2. This value is approximate and depends on balancing speed and type of measuring unit. The minimum achievable residual unbalance depends on rotor, drive unit and measuring instrument.

HM series machines made easy for service and repair

- Horizontal, Hard-bearing machines with permanent calibration to reduce setup time and eliminate the need for trial runs
- Immediate measurement readout during the first run regardless of the size, weight, or speed of the rotor
- Hard-bearing supports and fewer moving parts to handle larger initial unbalances and provide simple operation
- Easy, fast changeover between rotor sizes
- Rigid supports to more closely simulate actual operating conditions
- Safer operations with safety hold downs and negative load bearings
- Accurate readouts unaffected by windage



HM-series machine advantages at a glance

- are designed to meet most balancing requirements in single-unit or in high volume production
- solve many of all possible horizontal, hard-bearing balancing tasks
- because of its modular design, these machines are able to be fitted to many individual applications
- a universal machine that can be used in a repair shop with frequently changing rotor sizes an individual customized solution, in a production application for one type of rotor only
- are well suited for the industrial work in a repair shop due to their sturdy construction.
- are equipped with ergonomically designed operating elements for easy and safe handling.
- make fast and accurate balancing possible without time consuming calibration runs due to permanent calibration.
- have a measuring sequence with digital measured value processing which makes them extremely accurate and stable in the long run.
- enable perfect balancing of a large spectrum of rotors with variable rotor support and adaptable drive.
- can be configured individually and adjusted to any balancing process by most versatile accessories such as MAK – mass correction without the need to remove the rotor from the machine.
- offer a comprehensive safety package for the protection classes B and C which will protect your operating personnel.
- are a safe solution for the future, upgrading is possible with little effort and at minimum cost.

Schenck in North America

SCHENCK USA CORP.

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Universal and specialized balancing machines for the production, maintenance and repair of virtually any rotating component. Portable vibration analyzers, field balancers and condition monitoring systems.

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High quality production machines for balancing, leak testing, precision assembly, gear chamfering and customized metal cutting.

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