



Second Life. First Choice.

Turbocharger overhaul – The right turn for a sustainable business

With improved balancing quality and profitability in the overhaul of turbochargers



TURBOCHARGER OVERHAUL THE RIGHT TURN FOR A SUSTAINABLE BUSINESS



Turbochargers in the fast lane

Today there are around 230 million vehicles running on Europe's roads, about one-third of which are equipped with turbochargers. Forecasts indicate that this number will double again by the year 2020. The reasons for this rapid development of turbocharged engines are the increasingly strict fuel consumption and emission regulations. This is being counteracted by consistent downsizing of engines. So as not to compromise the performance of engines with much smaller capacity, turbochargers are being increasingly utilized.

Turbochargers: A new life for used parts

Although turbochargers are designed for a very long life cycle, damage still occurs – frequently due to improper maintenance. Defective turbochargers are usually replaced with new ones, which is often not necessary! With the right know-how and suitable equipment, turbochargers can be repaired to as-new condition. In addition to special tools, cleaning equipment and spare parts, two balancing machines are required. Balancing ensures perfectly smooth running, quality and reliability comparable to that of a new part. The result: As good as new!



CARS

Almost all new vehicles with petrol or diesel engines are equipped with turbochargers. A high performance level coupled with very good efficiency is only possible with the use of turbochargers.



COMMERCIAL VEHICLES

For years now, turbocharging has provided the high level of economy and performance needed for the engines of commercial vehicles, construction and agricultural machines.



SHIPPING

Durable, reliable and economical, these are the key requirements for large engines, in which turbocharging has already been standard for many years.



A market with a future.

A decision with foresight.

Anyone now getting into the business of turbocharger overhaul will benefit from a rapidly growing market, in tune with the spirit of the times in terms of economy and sustainability. The investment in the required technology is manageable, so that this business will quickly become profitable. With our solutions you can give a second life to turbochargers for passenger, commercial and construction vehicles, small and medium-sized marine engines or the aviation industry – and generate additional business as well.

TWIN PACK LEADS TO SUCCESS

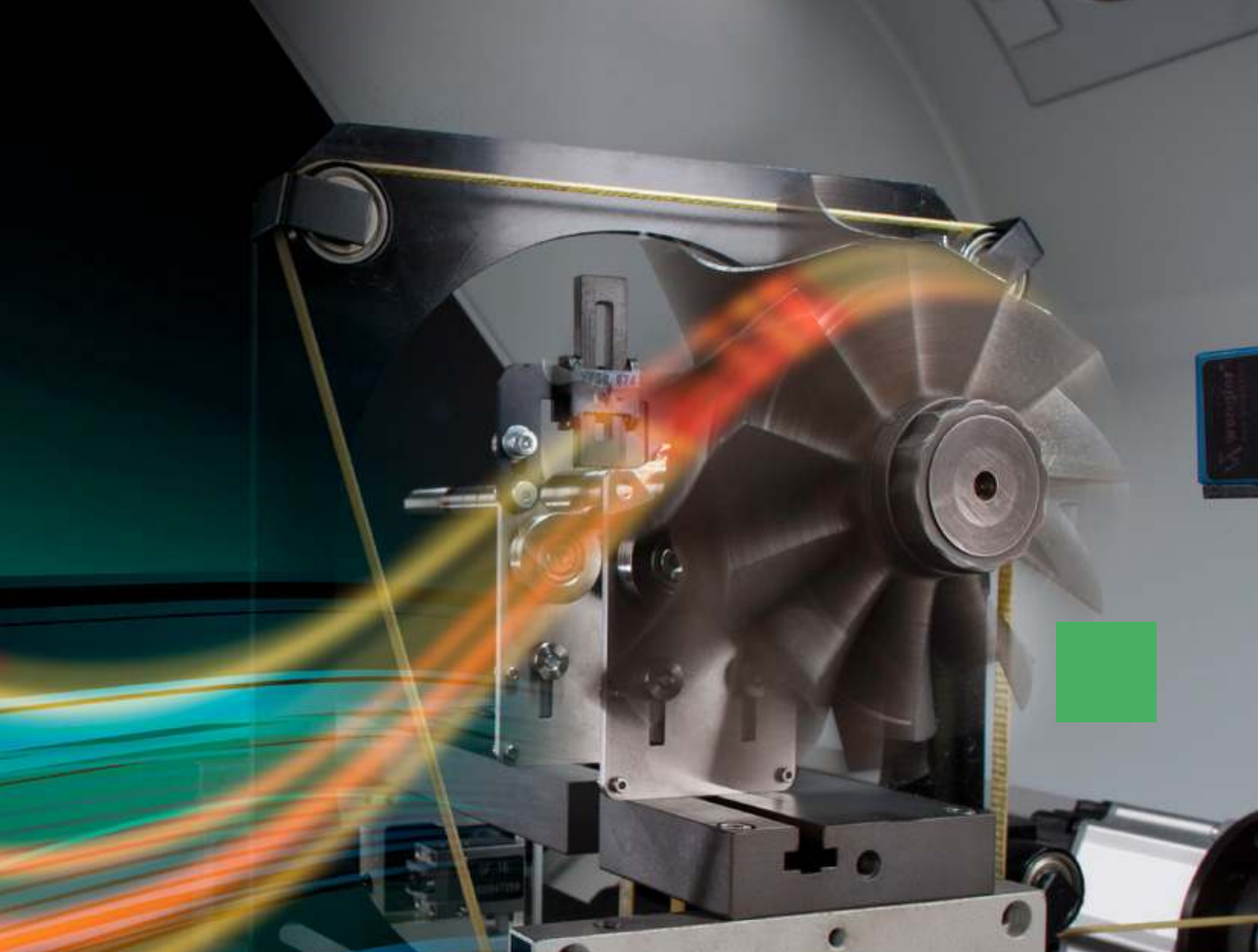
Schenck has for many years offered balancing equipment for overhauling turbochargers, based on high-quality machines for demanding, high volume production. Two machines are used for balancing during overhaul: The **TBcomfort** for preliminary balancing of the turbine rotors and compressor wheels, and the **TBsonio** for high-speed balancing of the complete core assembly.



Why is balancing so important?

We are repeatedly asked why balancing is so important when repairing turbochargers. This becomes clear very quickly when it is taken into account that turbochargers operate at speeds of 180,000 to 250,000 rpm – while very small ones

even achieve speeds of 300,000 rpm. At such speeds, even the smallest unbalances cause pronounced vibrations, which manifest themselves in very loud noises and place a great deal of stress on the bearings. The permissible tolerance is only a few thousandths of a gram – therefore highly



sophisticated measures are required when repairing high-quality turbochargers in order to ensure smooth operation and a long service life.

For this purpose, and in the first step, the individual components and the pre-assembled rotor assembly are carefully balanced at low speed on the **TB-comfort**. This greatly reduces the initial unbalance, and is the basis for the next step – balancing of the complete core assembly on the **TBsonio**. Without thorough preliminary balancing, it would almost be impossible to bring the complete core assembly back into tolerance. And what is worse: the bearings might be damaged or destroyed during balancing.

The pre-balanced core assembly is then finally balanced on the **TBsonio** at almost full operating speed and under realistic operating conditions. After correction and a control run, the core assembly is ready for a further long service life under extreme conditions.





LOW-SPEED BALANCING – THE BASIS FOR A LONG SECOND LIFE



The **TBcomfort** creates the basis for a high-quality overhaul: In the first step the initial unbalance of the components is removed and the mounted rotor assembly is secured. This creates the requirement for subsequent high-speed balancing. This process is made easy by the simple and logical operation of the **TBcomfort**, the ergonomic design of the complete system and its high precision. For example, the easy mounting of the rotor in the machine with

the convenient one-hand overslung belt drive assembly. Or the protective guard, which complies with safety class C. From the logical placement of all pushbuttons to the easy operation of our measuring units – at every operating step, we have user-friendly application in mind.

The wide weight range extends your business

Turbocharger components and rotor assemblies weighing up to 16 kg can be perfectly balanced on the **TBcomfort**. Due to its wide weight range, it is also possible to balance turbochargers of commercial and construction vehicles or marine engines.



Easy setup without calibration runs

No calibration runs are required with the **TBcomfort**. The setup of the machine requires only the input of the rotor's geometric data on the measuring unit – the machine is now ready to start.



TBcomfort

- Monoblock machine – quick set-up and commissioning
- Large weight range for wide turbocharger spectrum up to 16 kg
- Easy operation with just a few tools
- Energy-efficient drive concept
- Touch-screen user interface
- Individual report printout with own company header and logo



Higher measuring accuracy for faster working

The high measuring accuracy of the **TBcomfort** saves time and costs, since a single measuring run and correction step is usually enough to bring the rotor into tolerance.



HIGH-SPEED BALANCING

MAXIMUM SPEED FOR HIGHEST QUALITY



Low-vibration – at the end of the overhaul process the core assembly is accelerated with compressed air on the **TBsonio** and is then balanced under largely realistic conditions. Only after this process does the turbocharger have such a low residual unbalance that it reaches a quality level comparable with a new turbocharger.

Turbochargers are one of the most complex applications encountered in balancing. The reasons are the

elastic behaviour of the rotors, the high balancing speeds and the required accuracy. With its sophisticated measuring concept, the **TBsonio** measures the unbalance over the complete speed range and then calculates the exact weight required for the unbalance correction. In this way, it achieves measuring efficiency and accuracy comparable to our production machines. The benefit for you: fast and accurate balance.



Clean and safe

Residual quantities of oil escaping during mounting and dismantling of the core assembly are collected in the oil basin and fed back to the central oil tank.



Perfectly mounted with the core assembly adapter

The different core assembly types are mounted on the machine with the aid of an adapter ring. These can be ordered easily from our webshop for fast delivery.

An ingenious solution – non-contacting indexing aid

You just have to magnetise the rotor, and you are ready to start the measuring run. Our non-contacting SR70 sensor then scans the magnetically applied zero degree reference mark and displays the exact location of the unbalance – significantly more precisely than previously, and absolutely wear-free.

Correction in the machine

The unbalance correction of the core assembly takes place directly in the machine – without dismantling or dismantling. This avoids possible sources of error and makes the balancing operation much quicker. The metal shavings are picked up by a magnet at the oil connection.



TBsonio

- Ergonomic machine concept for easy and safe operation
- Perfect final balancing of turbocharger core assemblies up to 16 kg
- Crane hook machine – simply connect the power and the compressed air supply – finished
- Noise protection – no separate noise protection measures required
- Safety – complies with the latest Machinery Directive and therefore the highest current safety standards
- CAB950*SmartTouch* offers easy operation and maximum measuring performance
- Unbalance measurement over the complete speed range – no spot measurement, no fixed speed
- Perfect indexing with very high positioning accuracy



CAB MEASURING UNITS – EASY OPERATION, MAXIMUM PRECISION

Both machines are equipped with our proven CAB measuring units. In the case of the **TBcomfort**, this is our new CAB 820. It offers peak performance due to outstanding precision and high reliability – combined with a genuinely easy and much-praised touch-screen operating concept. You will find everything you need for balancing on just two main screens and a third optional screen – clearly displayed and logically structured.

The measuring unit *CAB950SmartTouch* used with the **TBsonio** has been developed for use in our production machines. It offers technical perfection, coupled with simple software design with touch-screen operation. As with the **TBcomfort**, all functions and communication with the balancing machine are controlled via touch-screen. The **TBsonio** offers the same consistent and thorough operating philosophy as with the **TBcomfort**.

SilenceLine – outstanding noise insulation

When a turbocharger is operated at operating speed, it produces a very loud, high-frequency noise, especially if it is not perfectly balanced. With our SilenceLine concept, which includes various measures for the reduction of operating noise, the noise emission of the **TBsonio** is less than 67dB* – allowing both machines to be operated in any workshop without additional noise protection measures.

* (measured at 168,000 rpm with a master core assembly type GT15)



More flexibility for your business

The central machine frame is made of mineral casting. The machines are therefore less susceptible to external interference effects and do not require a foundation. Due to their monoblock design the machines can simply be picked up by forklift and re-positioned where needed for your business operations. All that is required is electrical power, and compressed air for the **TBsonio** – and the machines are ready to start balancing.

Safety is important

The **TBcomfort** and the **TBsonio** comply fully with the requirements of the latest Machinery Directive 2006/42/EC, which has been in effect since the beginning of 2010, and are CE-certified.

The shroud of the **TBcomfort** complies with the demanding requirements of ISO 7475 Class C – Protection against ejected particles. The **TBsonio** complies with the highest possible protection class D of ISO 7475, in order to safely contain parts ejected at high speed in the event of a turbocharger bursting.

Even where no regulations apply, we have taken precautions to ensure that your fingers cannot become trapped, and that all settings can be made almost without the use of tools. The function of all components is safe, easily understandable and often self-explanatory. The operation of both machines requires only minimal training.



The wide weight range extends your business

The **TBsonio** and the **TBcomfort** are matched with each other so that turbocharger components and core assemblies up to 16 kg can be perfectly balanced. Just two machines can now balance turbochargers for commercial vehicles, construction machinery and marine engines.



Rotor dimensions

Maximum rotor weight	16 kg
Maximum rotor diameter	350 mm
Bearing journal diameter	6 – 30 mm
Bearing centre spacing	15 – 230 mm
Smallest achievable residual unbalance	0.1 gmm

Machine data

Width, depth, height	1,483 x 730 x 1,400 mm
Overall weight	approx. 700 kg
Power supply	230 V ± 10 %, 50 / 60 Hz
Rotor drive	folding clamp belt drive
Drive performance	200 W
Noise level	Less than 65 dB (measured with ISO Rotor)
Protective cover	To ISO 7475 Class C (Protection against ejected parts)
Painting	2-colour RAL7035 (light grey), RAL 7024 (graphite grey)

Measuring unit

CAB 820

Options

Measuring unit CAB 920*Smart-Touch*
 Keyboard with shelf
 Printer with shelf for report print-outs
 Support roller attachment for rotors up to 16 kg and 350 mm diameter, with bearing journal
 Support roller inserts for bearing journal diameter 30 – 70 mm
 Adapter for balancing of compressor wheels



Rotor dimensions

Maximum core assembly weight	16 kg
Flange diameter	300 mm
Maximum turbine diameter	130 mm
Maximum compressor wheel diameter	153 mm
Smallest achievable residual unbalance	0.05 gmm

Machine data

Width, depth, height	1,783 x 730 x 1,400 mm
Overall weight	approx. 950 kg
Power supply	230 V ± 10 %, 50 / 60 Hz
Drive	by compressed air (6 – 12 bar / connection M52x2)
Noise level	Less than 67 dB (measured at 168,000 rpm with a master core assembly type GT15)
Protective cover	To ISO 7475 Class D (Protection against bursting rotors)
Painting	2-colour RAL7035 (light grey), RAL 7024 (graphite grey)

Measuring unit

CAB 950*SmartTouch*

Options

Core assembly-specific adapter rings
 Pneumatic manual grinder correction tool
 Master core assembly
 Magnetising and demagnetising tool
 Calibration tool



Balancing and
Diagnostic Systems

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