

ROTOTEST Industrial Dynamometer Systems

ROTOTEST Energy™

4Q - Regenerative
Chassis Dynamometer System



ROTOTEST VPA-RX™

1Q - Absorption
Chassis Dynamometer System



MILESTONES

1988

The company, Rototest, is founded.



1992

The first Rototest chassis dynamometer, ROTOTEST APG™ (Automatic Performance Gauge), is delivered

1999



Rototest's chassis dynamometer generation II, ROTOTEST VPA™ (Vehicle Performance Analyser), is presented.

2004



Rototest introduces chassis dynamometer generation III, ROTOTEST VPA-R™ with more than 30 models.

2005

Active Inertia™ is launched, enabling fully dynamic testing with the ROTOTEST VPA-R dynamometer.



2006

The ROTOTEST Hurricane Cooling Units are introduced, enabling head wind generation up to hurricane speed levels.

2007/08

The ROTOTEST VPA-RX™ range is introduced to selected customers. The applicability is further extended with the patented ROTOTEST Natural Torque Distribution™, NTD

2009

The ROTOTEST Energy regenerative chassis dynamometer is introduced

2011

Rototest receives the prestigious Frost & Sullivan best practice award and is forecasted to become industry standard.

2012

Expanded the regenerative range of dynamometers to include ROTOTEST Energy CP, designed for climatic chamber use.



2014

ROTOTEST Energy NVH product portfolio launched, specially designed for demanding acoustic applications.



Rototest Research & Development Centre, a 10 000-square-foot facility, is located 10 km south of Stockholm, Sweden.

THE COMPANY

Founded in January 1988, Rototest was established by a group of engineers with solid experience in product development in the automotive industry. The company's first years were devoted to intensive development and testing of the revolutionary hub-type chassis dynamometer ROTOTEST APG™ (Automatic Performance Gauge).

Since then, Rototest has evolved into a test system supplier with a reputation and quality recognised by its eminent customers. With an ongoing dedication to improve the technology and a wholehearted belief in the value of long-term R&D investments, Rototest's experienced team, knowledgeable in both product development and testing techniques, constantly works to improve designs.

Rototest is owned and operated by its management. Detailed and active participation by the owners provides the customer with a contact point and a management overview of development and production programmes. Rototest's management is always available and participates in key programme milestones when appropriate.

As it was in the beginning, Rototest's company culture is one in which full employee participation is encouraged. The company pursues a policy of recruiting the best thinkers, building a deep pool of talent in the process. Once part of the team, Rototest's employees are encouraged to innovate, share ideas, and work together to propel the company into the future.

The chassis dynamometers ROTOTEST Energy™ and ROTOTEST VPA-RX™ (the last generation of the much successful ROTOTEST VPA-R™, ROTOTEST VPA™ and ROTOTEST APG™), sold by the company's own sales organisation and authorised sales representatives, have won great approval over the years and are today used by many of the world's renowned industrial companies in more than 20 countries across North America, Europe, Asia and Africa.

Industrial references include

Adam Opel ♦ Daimler ♦ Dgenx

Faurecia ♦ FIAT Auto ♦ GKN ♦ General Motors ♦ KIA Motors
MAHLE ♦ Shell ♦ Toyota ♦ Volkswagen ♦ Volvo Cars ♦ ZYTEK Systems

ROTOTEST Energy™

The ROTOTEST Energy™ regenerative chassis dynamometer is in reality a supreme four-quadrant capable engine dynamometer fitted to each drive wheel hub. With a front-end mounted torque transducer, a high resolution speed sensor and direct-coupling to the vehicle's hubs the ROTOTEST dynamometer is, in contrast to traditional (roller type) chassis dynamometers, also an advanced true measurement™ instrument. By utilizing a state-of-the-art 4Q control system and the ROTOTEST Active Inertia™ technology the vehicle's inertia (mass) is simulated electrically for true road conditions.

Fast Facts

- **Dynamic & Regenerative (4Q Operation)**
- **Full drive cycle capability with inertia simulation**
- **Cutting edge test system for hybrid / electric car development (2WD/4WD)**
- **Installs in less than a day**
- **Low infrastructure requirements**
- **Specially designed models for NVH and Climatic applications available**

Power range:	Up to 640 kW continuous per axle
Torque range:	Up to 8000 Nm momentary per axle
Speed range:	Up to 3500 rpm (approx 420 km/h)



ROTOTEST VPA-RX™

The ROTOTEST VPA-RX™ chassis dynamometer revolutionizes the way complete vehicle testing is performed by allowing more to be done in less time and with less resources. The patented ROTOTEST® dynamometer concept is comparable to a "rolling road", but is far superior in precision and test possibilities as there is no slip between hubs and dynamometer (normally experienced between wheels and rollers), negligible system inertia and thanks to the accurate measuring system that is independent of the absorption system. Its portability allows the complete test system to easily be transported to a new test site and set up in minutes.

Fast Facts

- Flexible & Productive (1Q Operation)
- Complete vehicle testing with engine dynamometer accuracy (2WD/4WD)
- Considerably more cost-effective than traditional test systems
- Installs in less than an hour
- No infrastructure requirements



FEATURES

Today's automotive industry is subject to many regulations and requirements. Growing environmental demands and requirements for high performance, maximum energy efficiency, low noise and outstanding quality make extreme demands on test equipment. The ROTOTEST® chassis dynamometers give you the resources to evaluate these factors accurately and efficiently.

Performance* Exceptional measurement accuracy	<p>Power range up to 1120 kW in 2WD for VPA-RX and 640 kW for Energy.</p> <p>A maximum speed of 400+ km/h or 250+ mph</p> <p>Torque error less than +/- 1% of measured value thanks to patented measuring method and rigid connection to the wheel hubs</p> <p>Synchronous measurement of torque and speed</p> <p>High sampling rate of torque enables "torque noise" studies (NVH)</p> <p>Negligible inertia which ensures detection of minimal load changes</p> <p>Patented Natural Torque Control(tm) for road-like simulation of torque distribution between wheels.</p>	Productive & Flexible (cont.) Ease of Use Safety & Maintenance	<p>The under body is accessible during test</p> <p>No installation costs, turn-key solution that only requires a flat surface</p> <p>Upgradable model range.</p> <p>Connects to rollers for rolling road applications</p> <p>Easy installation and management even for part time users</p> <p>User interface developed for maximum user friendliness and productivity</p> <p>All data is stored in open data format</p> <p>Uncomplicated integration with existing test systems using network communication</p> <p>Approved by The Swedish Machinery Testing Institute</p> <p>Insignificant electromagnetic fields</p> <p>Tyre Safe™ - No risk of tyre blow-out</p> <p>Low maintenance costs thanks to modular design and use of standard industrial parts</p>
Productive & Flexible	<p>Short set-up time, within minutes</p> <p>Two 2WD systems converts into one 4WD system in an instant</p> <p>Moves effortlessly between different test facilities and between front- and rear-wheel drive</p> <p>The unique design allows steering of wheels during test</p>		

* Depending on type and model

AREAS OF USAGE

<u>NVH</u> <ul style="list-style-type: none"> Complete vehicle / Powertrain <ul style="list-style-type: none"> Internal noise External noise Exhaust system noise/vibration Drive joints 	<u>R&D</u> <ul style="list-style-type: none"> Emissions ECU Calibration Fuel mapping / economy Ignition timing TCU Calibration Simulation <ul style="list-style-type: none"> Powertrain Control Design Vehicle-in-the-Loop Hardware-in-the-Loop Engine performance Battery System <ul style="list-style-type: none"> Efficiency Complete vehicle Powertrain Differential tests/split Gearbox Powertrain / Driveline Vertical and horizontal road profiles (up/downhill, curves) 	<u>High Altitude</u> <ul style="list-style-type: none"> In chamber / outdoor <ul style="list-style-type: none"> Powertrain Performance
<u>Climatic</u> <ul style="list-style-type: none"> Cold start Hot conditions Fuel consumption Fuel quality Emissions 		<u>Education</u> <ul style="list-style-type: none"> Vehicle-in-the-Loop/ Hardware-in-the-Loop Powertrain Simulation Driveline
<u>Benchmarking</u> <ul style="list-style-type: none"> Fuel Consumption Powertrain Performance Efficiency Engine specific tests 		<u>Durability/Endurance</u> <ul style="list-style-type: none"> Complete Vehicle Milage Accumulation <ul style="list-style-type: none"> Catalyst aging Fuel deposits Lubricants Particle regeneration
<u>HEV / FEV</u> <ul style="list-style-type: none"> Hybrid testing (IC+EV) Functional testing Control strategy development 	<u>Quality Assurance</u> <ul style="list-style-type: none"> Conformity Of Production 	<u>Drive Cycles</u> <ul style="list-style-type: none"> ECE, EUDC, FTP, US, 11 Mode, 10-15 Mode, WLTP, others User-definable drive cycles Certification <ul style="list-style-type: none"> Emissions Fuel consumption

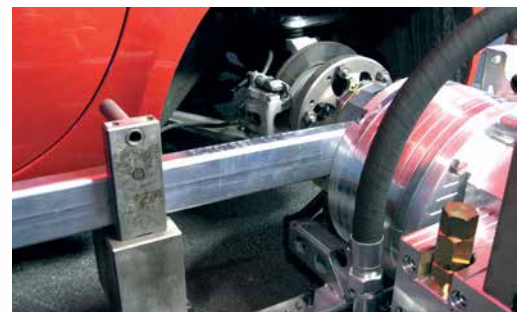
Tried & True solution. Having supplied test systems to the automotive industry for almost two decades, the ROTOTEST dynamometer has evolved to become the world's most versatile chassis dynamometer and is today an important instrument in the development process of modern cars.

Productivity. Just like quality is not a coincidence, there are very good reasons why the ROTOTEST dynamometer is the most productive automotive test system on the market. A key target in every development decision, since the inception of the ROTOTEST dynamometer concept, has been test-productivity. Not to overcomplicate things that can be made easy and still maintain the essentials that make it so exceptional.

True Measurements™ Direct torque measurement with a front-end mounted, patented, torque transducer eliminating measurement chains and providing extreme linearity, repeatability and unmatched accuracy.

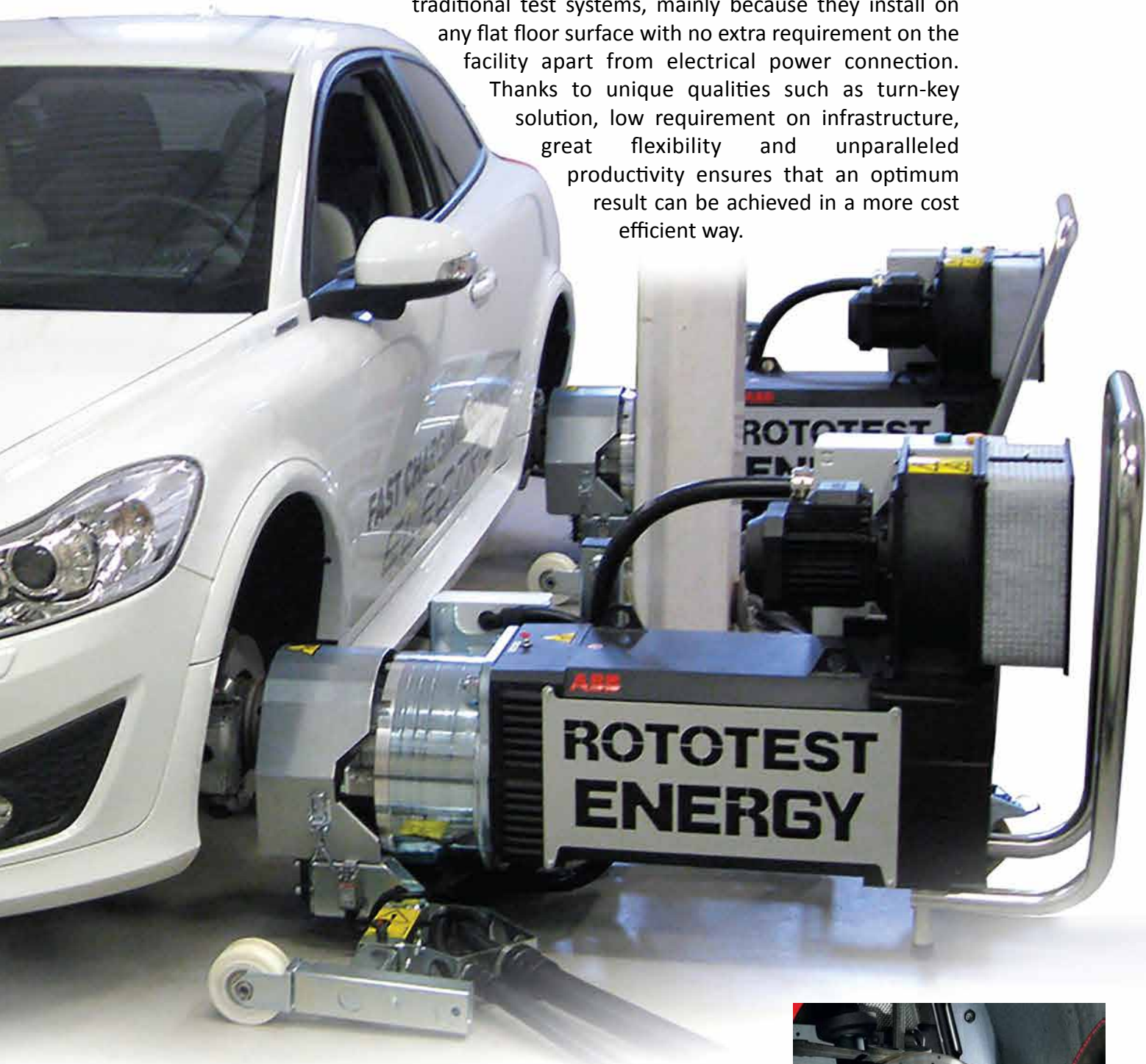


Although the basic principle of operation of the ROTOTEST dynamometer is simple, its control and measurement system is far from simple. The highly advanced control and measurement system is the result of more than 20 years of development of hub-mounted chassis dynamometers. The ROTOTEST dynamometer incorporates distributed intelligence technology with parallel multi-processor architecture and an autonomous operation of each individual dynamometer unit. This combined with the adoption of the latest control algorithms, provides a solution which simply must be experienced.



Tyre Safe™ test system (as the tyre is not in use during testing). Testing on roller-type dynamometers, due to the unnatural stress, has the potential risk of introducing damages to the tyre that may result in hazardous tyre blow-outs during testing or, if the same tyre is used, on public roads.

Cost Effective. The ROTOTEST dynamometers offer much more cost-effective solutions than what are possible with traditional test systems, mainly because they install on any flat floor surface with no extra requirement on the facility apart from electrical power connection. Thanks to unique qualities such as turn-key solution, low requirement on infrastructure, great flexibility and unparalleled productivity ensures that an optimum result can be achieved in a more cost efficient way.



A **Simple & Secure bolt-on design** enables an outstanding productivity. With only a couple of minutes set-up time it is both fast and easy as it eliminates the workload seen on roller-type dynamometer where the car has to be positioned on the roller, strap points needs to be located, the car secured against movement and time consuming wheel base adjustments (4WD). The dynamometer units automatically adjust to camber and steering angles, even under load, making the vehicle installation many times more flexible than the complexity experienced in for instance conventional test rigs.





ROTOTEST Energy™

Members of the ROTOTEST product suite include:

ROTOTEST Energy™

An industrial semi-portable high-dynamic regenerative chassis dynamometer - powered by ABB. The ultimate productivity tool for driving cycle optimisation and powertrain development and research. Available in a wide variety of 2WD and 4WD models including NVH and Climatic versions.

ROTOTEST VPA-RX™

A portable true measurement chassis dynamometer that combines the best of all worlds - the benefit of testing complete vehicles on a chassis dynamometer with the accuracy of an engine dynamometer. Available in a wide variety of 2WD and 4WD models including NVH versions.

Accessories

ROTOTEST® Drive™ - Synchronisation with drive wheels

ROTOTEST® Storm™ - Head wind simulation

ROTOTEST® Datacq™ - Data acquisition system

ROTOTEST® Calibration Weights

ROTOTEST® Wheel Adapters

and more...

Options

High speed torque output (NVH)

High resolution torque

Vehicle inertia simulation

Analog data distribution

CAN bus data logging

Wireless OBD data logger

CAN bus data distribution

External Control

and more...

Rototest representative:



ROTOTEST VPA-RX™



ROTOTEST Storm™



ROTOTEST Drive™



ROTOTEST Datacq™

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