





Dear readers,

What began in a garage in Haldenwang in 1969 is today the world market leader in lifting and testing technology for cars and trucks: back then, the gentlemen Rauch and Schilling developed their first brake tester together, as previously mentioned, in a garage. Since then, the company that was founded shortly afterwards has become a global market leader in several areas: around the globe, in more than 150 countries, more than 60,000 MAHA brake testers and countless other products are in daily use.

MAHA's success is based on high-tech products. This is because, as a pioneer and trendsetter in the industry, products and services of an inimitable quality make our products so unique. Qualified MAHA employees play a crucial role in this – thanks to them, cutting edge technology is “Made in Germany” in the Allgäu region.

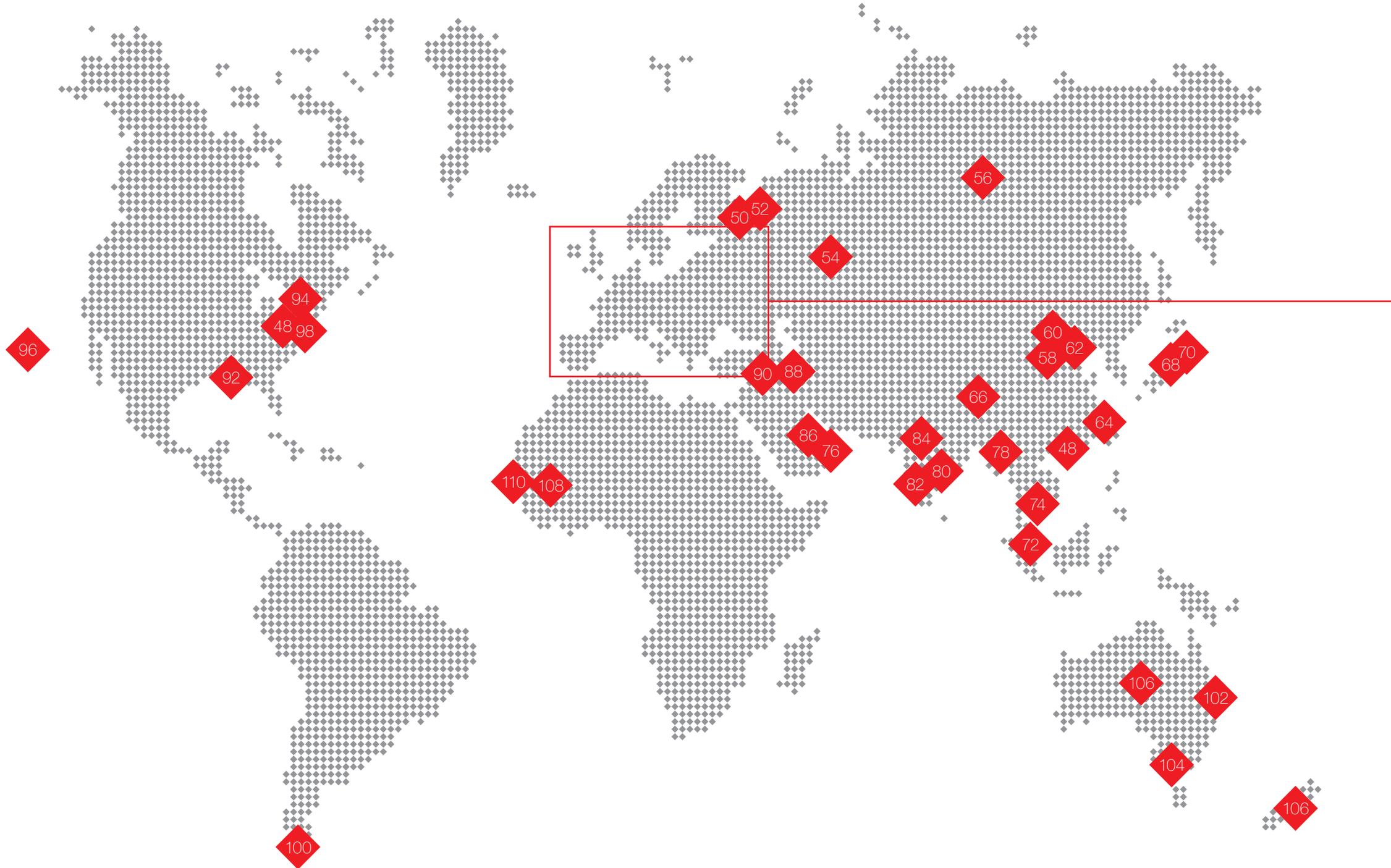
However, the fundamental key to our success is the success of our customers. In close cooperation with you, a wide variety of extraordinary projects have been successfully realised worldwide. This makes us feel grateful and proud at the same time!

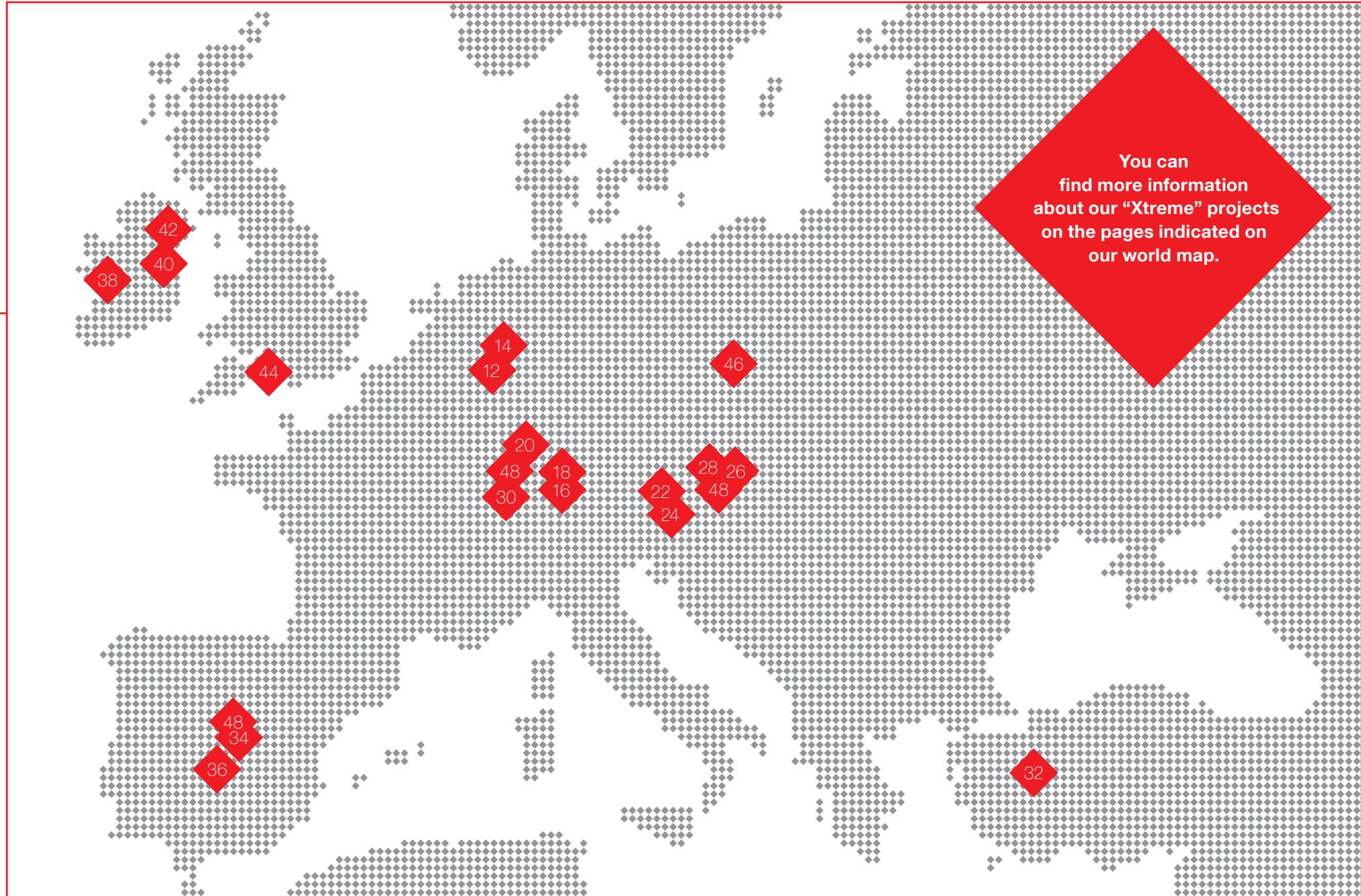
Together with our partners, we have gone out in search of the most unusual MAHA projects to date. From all of the entries submitted, we've compiled the 50 most interesting ones and have created a unique collection of the most diverse MAHA “Xtreme” projects, which is what you are now holding in your hands. Join us on a journey through our special projects – you'll be impressed at what we've achieved together around the world over the years!

Happy reading and prepare to be amazed!

Your MAHA Team







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MAHA Maschinenbau Haldenwang GmbH & Co. KG

High-tech equipment for high-tech vehicles

Drive-on runway lift for above-ground dynamometer at Toyota Motorsport



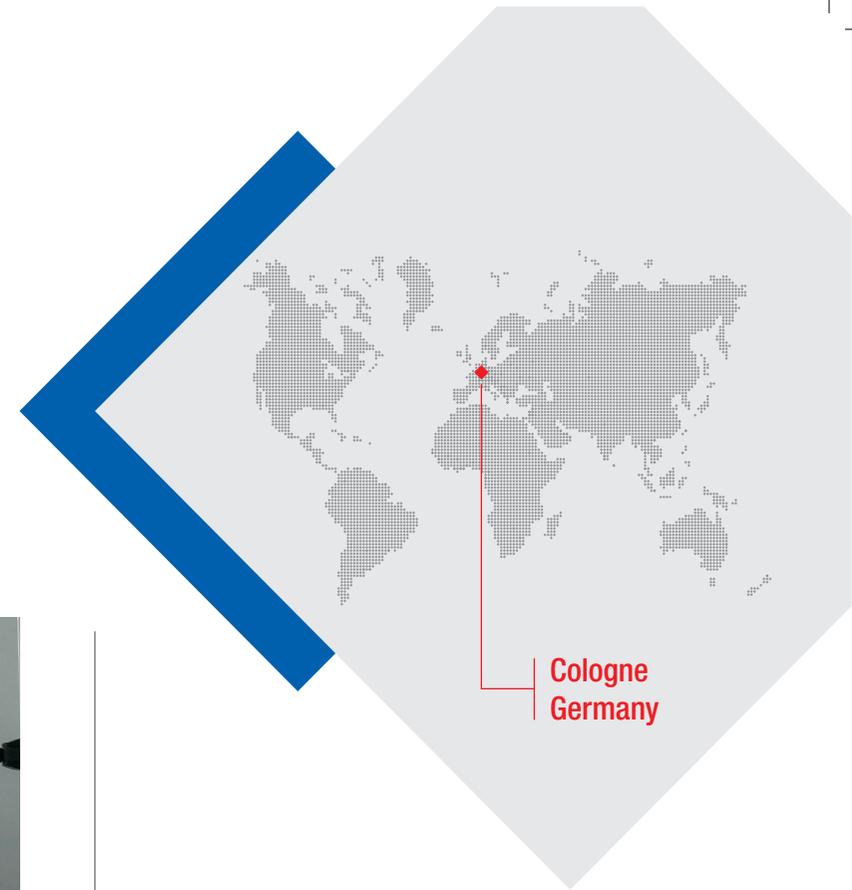
The Cologne-based company Toyota Motorsport GmbH, a test and development company specialised in advanced technology, required a dynamometer for its vehicles. The MSR 1000 from MAHA which was chosen for this purpose is usually installed in-ground to reduce the drive-on height.

But it is not always permissible to perform in-ground installation work on rented property, which is why this client received the dynamometer as an above-ground solution. However, due to the height of the MSR 1000, very long drive-on ramps were required. To get around



this problem, a CARLIFT 4.0 with an electrohydraulic drive was placed in front of the MSR 1000. The columns were also positioned further apart from one another to add a third runway with a handrail for the user.

This four-post lift is limited to a drive-on height of 850 mm, making it exactly flush with the dynamometer. This tailor-made solution means that precision wheel alignment can be performed in the Toyota Motorsport competence centre despite the above-ground installation situation.



Cologne
Germany

Installed MAHA product(s)

MSR 1000
CARLIFT 4.0

Facts and figures

CARLIFT lifting height limited to drive-on height of 850 mm; third runway with handrails; columns in a wider position

Project client

Toyota Motorsport GmbH

Company/dealer

MAHA Maschinenbau Haldenwang GmbH & Co. KG



AKUVIA Engineering and Testing GmbH (Dr. Jörg Hansen)

Tests under any circumstances

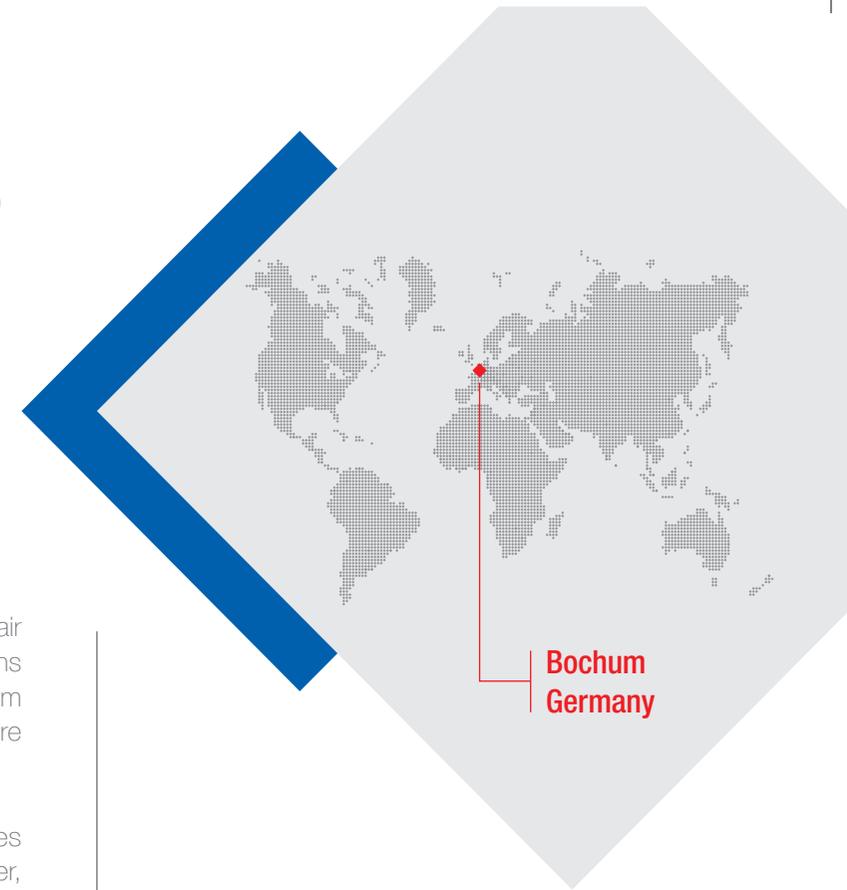
Four-wheel dynamometer for extreme climatic conditions

AKUVIB Engineering and Testing GmbH in Bochum developed and built a special four-wheel dynamometer in the context of the "TIE IN" project, which is subsidised by the German state of North Rhine-Westphalia. The MSR 500 for electric vehicles served as a basis. The tester was supposed to research the in-journey discharge behaviour of electric vehicles under particular climatic conditions. The modified four-wheel single roller dynamometer was integrated into a climatic chamber designed for vehicle access for this purpose. The four-wheel roller was designed for an axle spacing of 1,800 mm to 3,200 mm.

The dynamometer was installed in a climatic chamber with dimensions of 5.3 m x 9.3 m x 4.1 m (W x D x H). It can produce temperatures of -30 °C to 60 °C at an operating humidity of 80 % RH. Complementary insolation can be engaged too. The four-wheel roller dynamometer had to be suitable for these extreme environmental conditions. At the same time, it had to be prevented from affecting the set climatic conditions in the test chamber. For that reason, the exhaust air from the eddy current brakes had to be channelled out of the chamber separately. Furthermore, the motors and brakes of the roller dynamometer had to be insulated towards the climatic chamber. AKUVIB designed a special air conveyance

channel system, which conveys the necessary supply air and exhaust air to the eddy current brakes via two fans and a specially designed regulation system. The system was designed so that no excess or negative pressure can occur in the roller dynamometer pit.

An air mixer, which supplies the eddy current brakes with a conditioned airflow in both winter and summer, also had to be installed to prevent the temperature from falling below the dew point. What made the channel system and air conveyance solution so challenging was the adjustability of the axle spacing. Sufficient air exchange had to be guaranteed at every single one of the moveable rollers' positions. Due to the large temperature fluctuations, the floor of the climatic chamber and the pit for the roller dynamometer had to be specially insulated as well. A special substructure had to be built into the pit to ensure a stable dynamometer position. AKUVIB therefore laid out an appropriate steel base on which the single roller dynamometer including the axle sliding device could be mounted. In this way, the batteries can even be tested at full load. Today, this special tester is an integral part of the AKUVIB Competence Centre for Electromobility in Bochum.



Bochum
Germany

Installed MAHA product(s)
MSR 500/2 4WD

Facts and figures
Climatic chamber

Project client
AKUVIB Engineering and Testing GmbH

Company/dealer
MAHA Maschinenbau Haldenwang
GmbH & Co. KG



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Ready for takeoff with MAHA

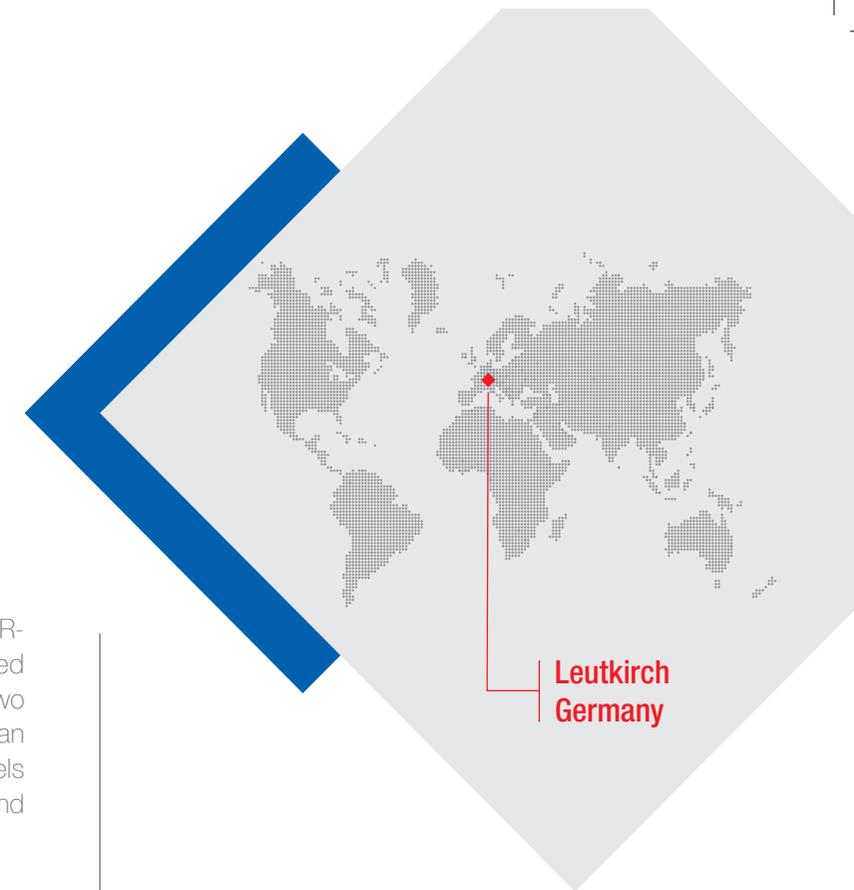
MAPOWER-Hangar aircraft lift

The MAPOWER-Hangar was an ingenious idea of Winfried Rauch, MAHA's company founder, who sadly passed away in 2016. He came up with the idea because he knew someone who owned two sports aeroplanes, which he wanted to house in his hangar using up as little space as possible.

In search of an adequate solution, Mr Rauch realised that the aeroplanes would take up only half the space if they were positioned one above the other.

This observation formed the foundation for the MAPOWER-Hangar aircraft lift. It is made up of two reinforced MAPOWER columns. Both have a load capacity of two tonnes and a lifting height of 2,400 mm. They have an arm which can extend to 1,605 mm for the rear wheels of the aircraft. One of the two columns has a second support arm to accommodate the front wheel.

One of these MAPOWER-Hangars is now in use at Leutkirch Airport in Germany's Allgäu region. As a result, aircraft are ready for takeoff in next to no time – just like vehicles used on land.



Leutkirch
Germany

Installed MAHA product(s)

MAPOWER-Hangar

Facts and figures

Load capacity 2 t; lifting height 2,400 mm; support arm extension range 975 mm – 1,605 mm; max. clear column width 2,800 mm; max. total width 3,800 mm; column height 3,250 mm

Project client

Leutkirch Airport

Company/dealer

MAHA Maschinenbau Haldenwang GmbH & Co. KG



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Customised roller brake tester

For heavy-load transporters with special width and 1,900 mm roller length



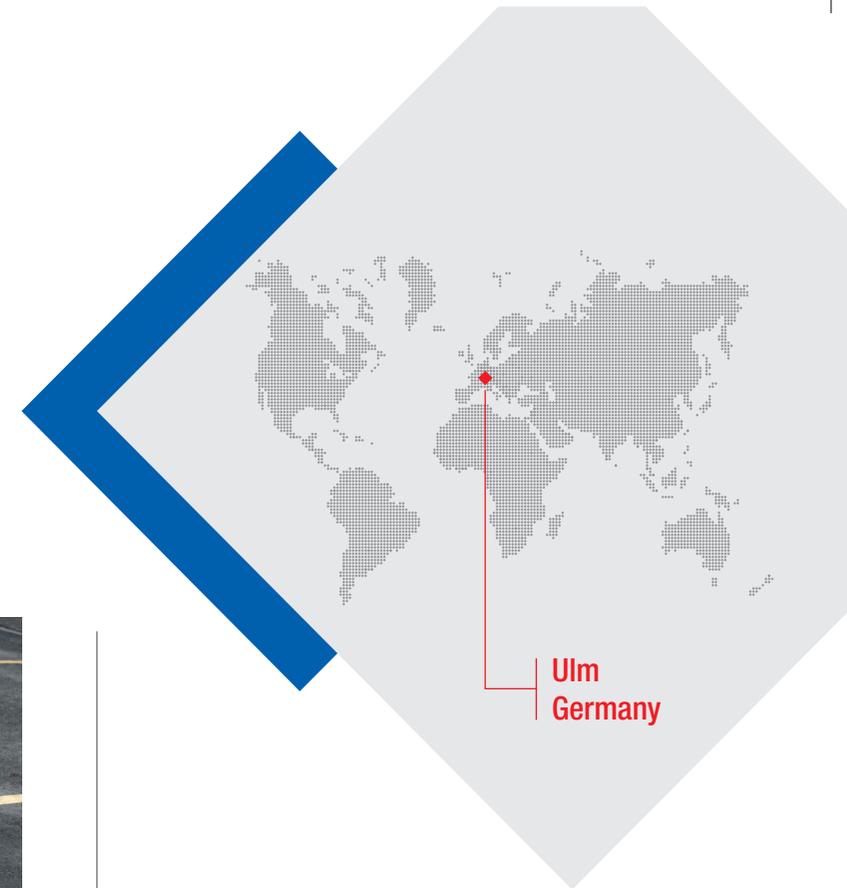
KAMAG Transporttechnik is a subsidiary of one of the world's leading manufacturers of heavy-load vehicles, Transporter Industry International (TII Group), based in Ulm (Baden-Württemberg). The company manufactures special heavy-load transporters with hydraulically supported floating axles, and industrial vehicles. The huge special-purpose vehicles are used, for example, in the steel industry and also in shipyards and in transport logistics. KAMAG has also been an established name in aerospace for decades.

For the inspection of these enormous special-purpose vehicles, KAMAG commissioned MAHA in 2010 with the



challenge of producing a brake tester specially adjusted to suit the vehicles' colossal dimensions while also being suitable for inspecting vehicles with hydrostatic drive motors. In the course of the project, the track width was therefore increased for the client while the roller length of the special test bench was expanded to 1,900 mm (the standard dimension being 1,150 mm).

The widened frame gives the overall test bench an extraordinary total size, specially adjusted to suit the extreme size of the vehicles. Consequently, even extremely large vehicles and heavy-load transporters can be inspected.



Ulm
Germany

Installed MAHA product(s)
IW7 EUROSYSYSTEM (now MBT 7000)

Facts and figures
Special roller length: 1,900 mm

Project client
KAMAG Transporttechnik GmbH & Co. KG

Company/dealer
MAHA Maschinenbau Haldenwang
GmbH & Co. KG



Built on sand with millimetre precision

Construction of the new Autohaus Geisser premises in Karlsruhe

MAHA first had some involvement with this project in 2015. The client, Autohaus Geisser in Karlsruhe, was very keen to have MAHA in-ground lifts in its new dealership location. MAHA's partner, Rolf Schaub GmbH based in Mühlacker, sparked the client's enthusiasm for MAHA lifts. The sales team, the product managers, engineers from R&D, as well as MAHA's specialist Construction Engineering department, conducted a feasibility study on the sandy surface on site.

Once approved by MAHA, the architect was instructed on how the installation boxes should be sunk into the sand base. First of all, the sandy ground had to be removed, and a base plate had to be created onto which the boxes would then be placed and installed in pre-fabricated quivers. A geometer was then used to align them with millimetre precision, before the quivers were concreted one step at a time. In total, 26 installation boxes were precisely positioned and brought to the correct height in this way.

Once the quivers had been pulled out, the foundations could finally be filled with sand and the workshop area was built around the installation boxes. MAHA's partner Rolf Schaub GmbH also supplied and installed the complete



oil supply and disposal system, as well as the compressor and exhaust system for the new car dealership.

All departments involved in this project demonstrated their competence and exceptionally strong performance, producing a really impressive overall result (which the client was more than satisfied with) in great cooperation with MAHA's local partner despite the difficult general conditions on the sandy base. This success was instrumental in MAHA being involved in the implementation of another new build that Autohaus Geisser is planning in Heidelberg.



Karlsruhe
Germany

Installed MAHA product(s)

26x ZS SQUARE,
3x MBT 2100,
4x DUO CM 4.2.1
1x one-post lift

Facts and figures

Large car dealership built on sandy terrain in Karlsruhe

Project client

Autohaus Geisser

Company/dealer

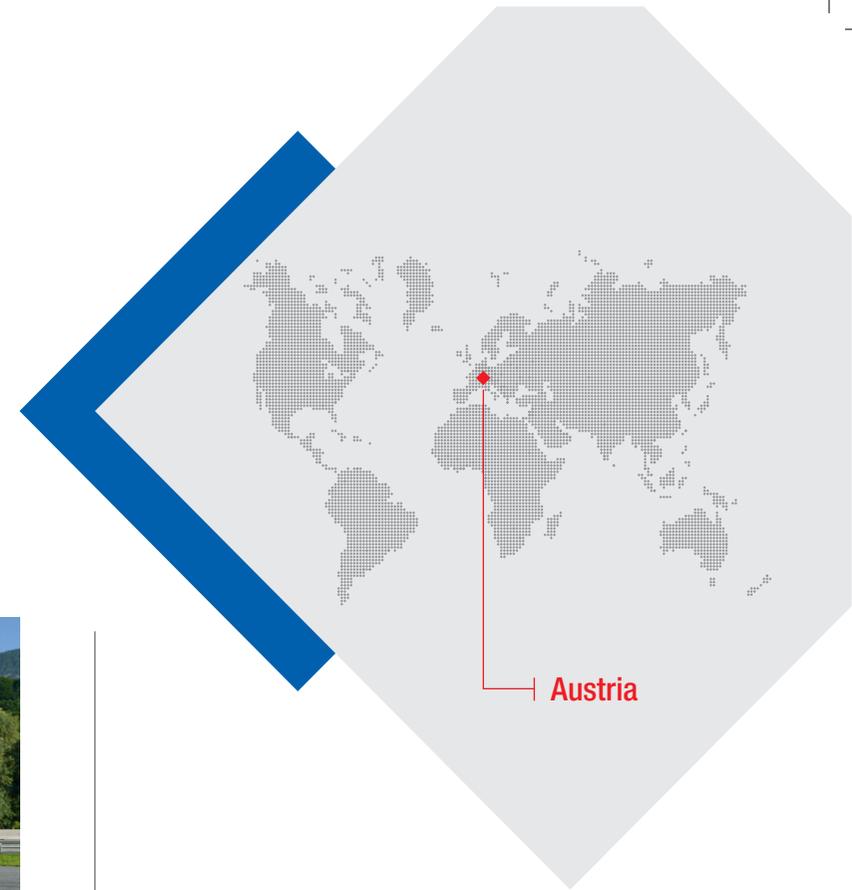
Rolf Schaub GmbH



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Playing a pioneering role in roadside inspection

Mobile inspection trucks on Austrian roads



In Austria, there are currently ten mobile inspection trucks in use by the infrastructure corporation ASFINAG and the state government. They are used on motorways, A and B roads, as well as at border crossings – in all weathers.

Brakes, axles and the general overall condition of vehicles are checked during inspections. The vehicles are usually heavily overloaded, especially on motorways: an axle load of 16 to 17 tonnes is not unusual. This, of course, is a considerable additional load for MAHA testers.

The MBT 7250 EUROSISTEM roller brake tester and the LMS 20/2 axle play tester with crawler chassis are used.

In the event of imminent danger, the numberplate is removed immediately and the driver is detained. Testing takes place on approximately 160 to 170 days per year on average. That means that every inspection truck tests the considerable number of approximately 1,300 vehicles annually. Thanks to this state-of-the-art MAHA equipment, Austria is a pioneer in mobile roadside inspection.

Installed MAHA product(s)
MBT 7250 EUROSISTEM,
LMS 20/2 with crawler chassis

Facts and figures
Approx. 160 to 170 inspection days per year = approx. 1,300 vehicles per year/ per inspection truck

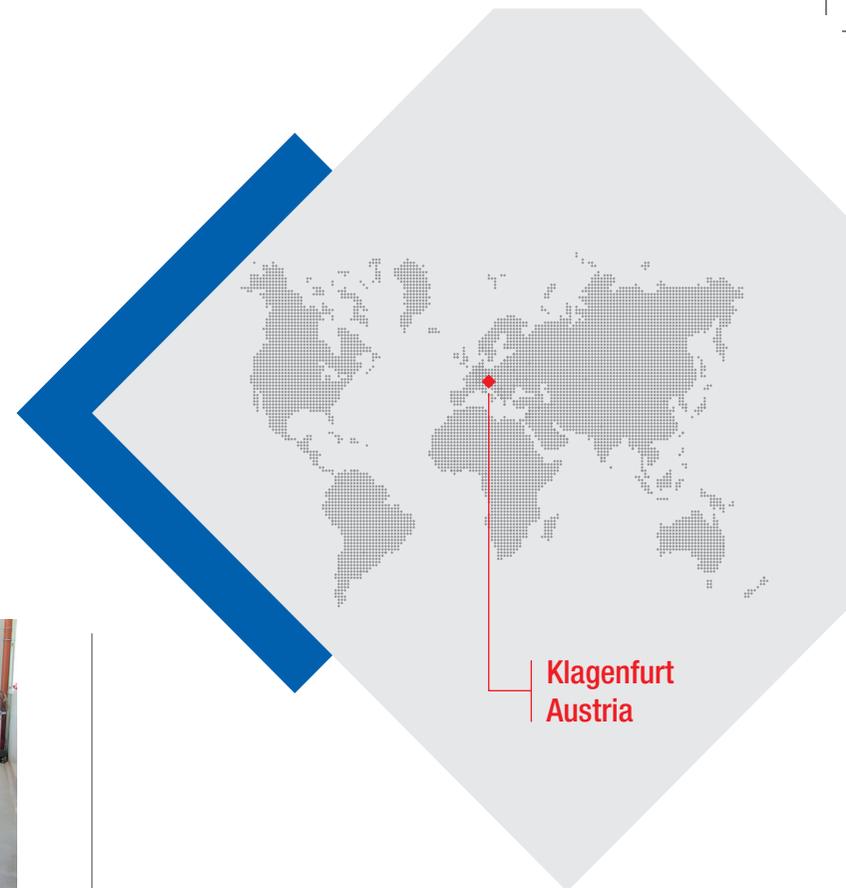
Project client
ASFINAG Austria

Company/dealer
Supanz GmbH



First roller set lift with low-bed trailer design

Cutting-edge state testing facility in Klagenfurt



In 2011, MAHA's partner Supanz, based in Wörgl, implemented the world's first roller set lift with a low-bed trailer design for the State Government of Carinthia. During the conversion period lasting approximately eight months, the most cutting-edge testing facility for motor vehicles in all of Austria was developed in Klagenfurt, the state capital.

The centre was equipped with MAHA's state-of-the-art testers. Everything between 40 kg and 40 t can be tested on the new test lanes. This means that everything from moped scooters, cars and trucks to special-purpose vehicles can be tested.

At the Klagenfurt testing facility the 12 employees can now scrutinise 4,500 vehicles per year in the context of inspections and approvals. The extra-wide truck tester with roller set lift is one of the site's centrepieces. In this commercial vehicle hall, not only can trucks be inspected; agricultural vehicles like tractors can also be put through their paces.

For a long time, the state government had treated the issue of brake testing on these vehicles with neglect. But, since then, there has been a rethink on this matter. The new state testing facility is ideally equipped to meet both current and future requirements.

Installed MAHA product(s)

The world's first low-bed trailer roller set lift design

Facts and figures

Low-bed trailer roller set lift and low-bed trailer axle play tester

Project client

State Government of Carinthia

Company/dealer

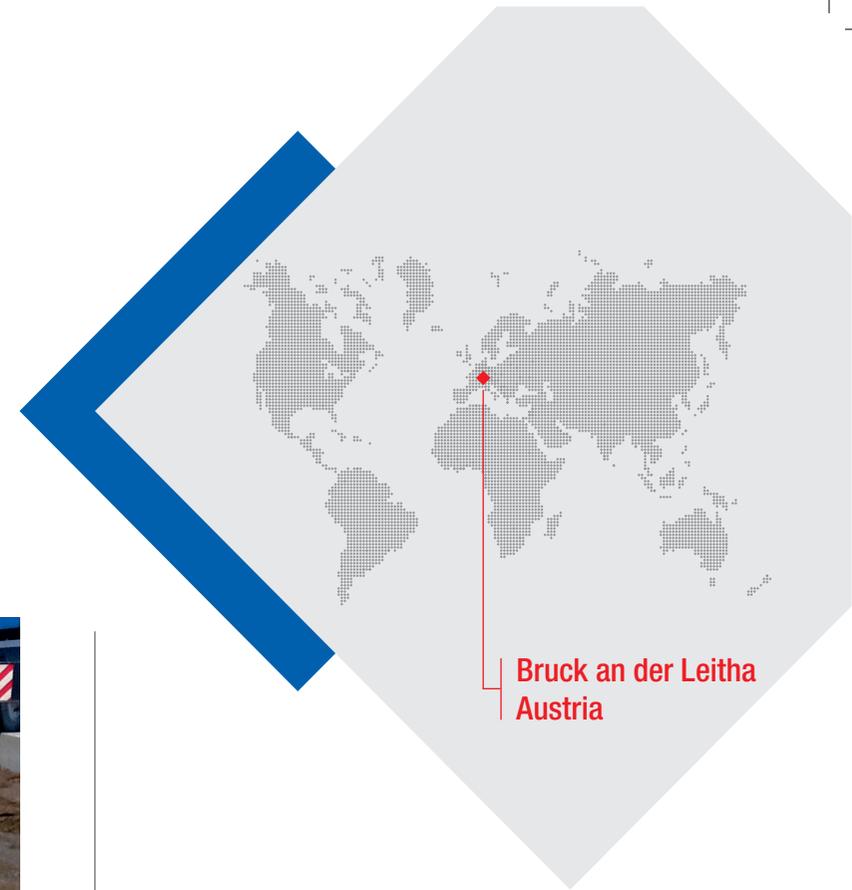
Supanz GmbH



© Supanz GmbH

Showcase project to improve road safety

Checkpoints right next to Austrian motorways



Bruck an der Leitha
Austria



Roadside checks have been carried out right next to motorways in Austria since 1997. The vehicles are guided from the motorway to the test hall in the motorway car park by a traffic management system. In the test hall, the driving times and resting periods as well as the technical loads of heavy vehicles are checked.

There are seven of these checkpoints at present; one more has already been commissioned. By the end of 2020, there are expected to be ten checkpoints in total. They will be operated jointly by the relevant state governments, the police and the customs authorities. A checkpoint was recently put into operation in Bruck an der Leitha on the A4 eastern motorway. The investment costs for



this project amounted to EUR 6 million. The A4 motorway is used by approximately 64,000 vehicles per day, with trucks accounting for a relatively high percentage of the same at 17%. Consequently, the hazard potential is elevated, since accidents are frequently caused by trucks – due to fatigue and/or technical defects.

The Bruck an der Leitha checkpoint covers a total area of 22,000 m², on which around 60 trucks can be checked at the same time. There are 31 parking spaces available for possible waiting times. The checks are performed for approximately 100 hours per month. For the Austrian government, the new checkpoints are a showcase project to improve road safety.

Installed MAHA product(s)
MBT 7250 ESYS with
roller set lift, LMS 20/2

Facts and figures
Technical checks right next to the
motorway without any interruption
to the flow of traffic

Project client
State governments/police/customs
authorities in Austria

Company/dealer
Supanz GmbH



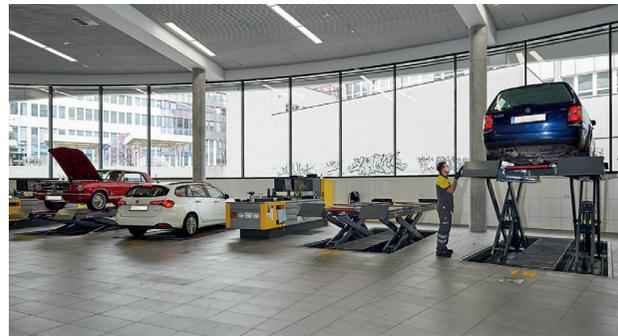
Upmarket architecture and equipment

New headquarters for the largest Austrian motor club



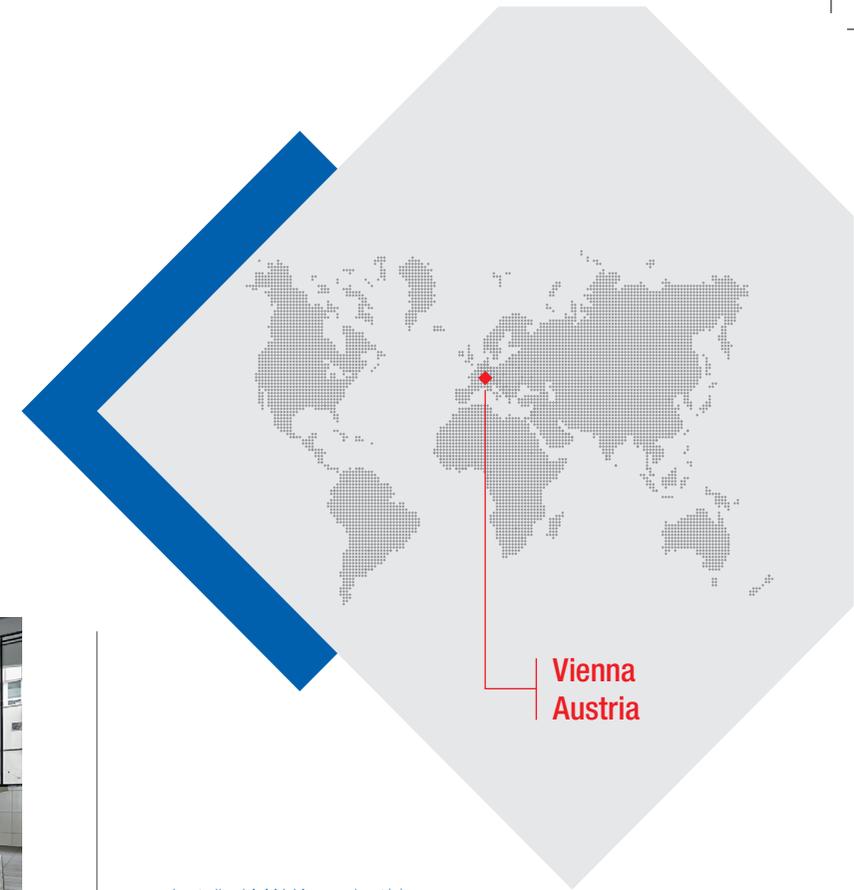
With over 2.1 million members, the Austrian Automobile, Motorcycle and Touring Club (ÖAMTC) is the largest motor club in Austria and the seventh largest in the world. The provincial association for Vienna, Lower Austria and Burgenland has constructed a new main building at the Vienna Erdberg site, which replaces the former five office locations in Vienna.

The headquarters, which were opened in March 2017, offer around 27,000 m² of gross floor area as a meeting and service centre for approximately 870 employees and members. It comprises office space with conference and training rooms, an emergency assistance control panel (call centre) as well as a technical base and a



heliport for the ÖAMTC emergency rescue helicopter. The new building was constructed at “nearly passive house standard”. Component activation is used to air-condition and heat the building. The total investment costs come to around EUR 76 million.

The new technical base in Erdberg uses cutting-edge testers from MAHA based in Haldenwang. The new test centre was equipped with five brake testers, twelve scissor lifts, one axle play tester and one shock absorber tester from MAHA. The lifts' controls were integrated into the central supply stations (working stations). With its new main building, the ÖAMTC is setting new standards when it comes to architecture and equipment.



Vienna
Austria

Installed MAHA product(s)

12x DUO CM 4.2 U scissor lifts,
1x MGH-L 3.5/45 pit jack, 5x car brake
testers, 1x SSA 4000 axle play tester
(Austrian version), 1x MSD 3000 shock
absorber tester

Facts and figures

The ÖAMTC is the biggest motor club
in Austria and the seventh largest in the
world; total investment for the new head-
quarters: EUR 76 million

Project client

ÖAMTC

Company/dealer

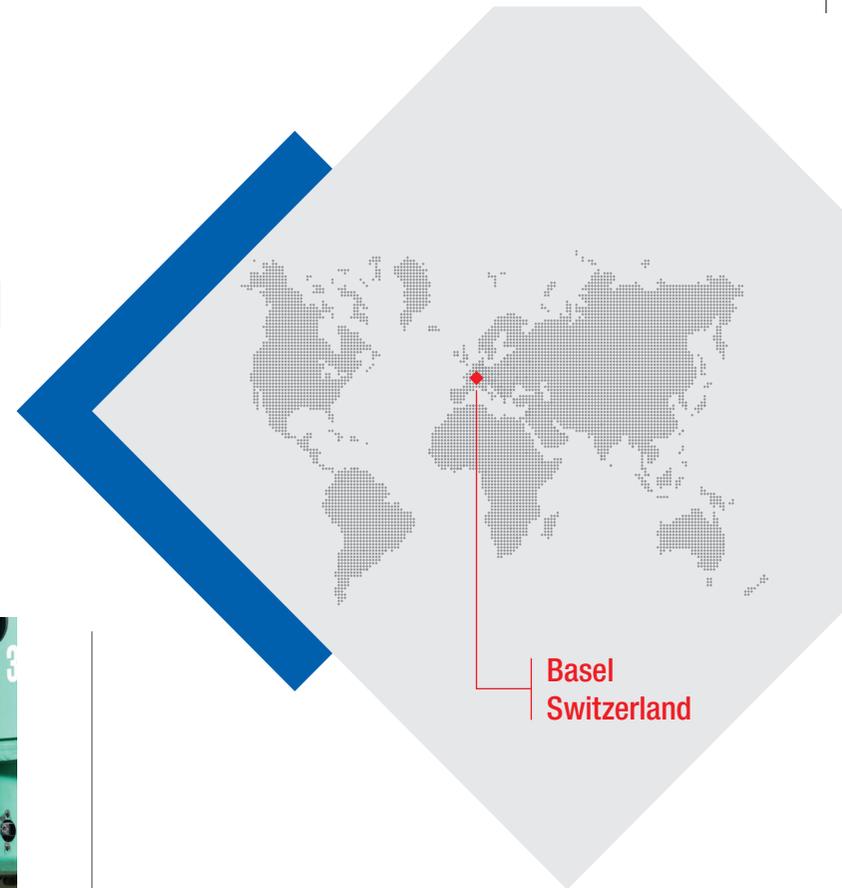
Siems & Klein Autowerkstatt-Technik
Vertriebs GmbH



MAHA Maschinenbau Halberwang GmbH & Co. KG

High-precision synchronous running despite extreme length

Special lifting system for Basel trams



Basel
Switzerland



A special wheel engaging column lift solution for trams was designed for the Basel transport authorities (*Basler Verkehrs-Betriebe*). This challenging project was implemented by MAHA's Swiss-based partner, KSU/A-TECHNIK AG.

The special lifting system is designed for a load capacity of 120 t and a lifting height of 1,750 mm. The carriages of trams in Basel have an enormous length of 43.2 m, which is why Bombardier, the manufacturer, decided to include additional support points for lifting the trams.

This is why 16 mobile wheel engaging column lifts were installed by MAHA, rather than the usual 12. The challenge was to align all the columns with extreme accuracy, since the synchronous running of the wheel engaging systems has to be ensured.

It is safe to assume that there is no other lift system with the same proportions, since trams are usually made up of just two to three carriages. Trams' support points are at the axles. Each carriage has two of them, so four wheel engaging systems per carriage are usually enough.

Installed MAHA product(s)
RGE

Facts and figures
Load capacity 120 t
Lifting height 1,750 mm

Project client
Basler Verkehrs-Betriebe

Company/dealer
KSU/A-TECHNIK AG



MAHA Maschinenbau Haldenwang GmbH & Co. KG, TÜVTURK

An individual project of gigantic proportions

Over 500 complete test lanes for TÜVTURK

The Republic of Turkey had been planning to introduce a nationwide mandatory vehicle inspection for years. The TÜVTURK project was given the go-ahead in 2005 and the first station was opened in Elaziğ in 2008.

188 more test stations were opened within a year and, in early 2009, there was already at least one test station in every bigger city, guaranteeing nationwide coverage. A total of 459 test lanes were installed and put into operation for the inspection of cars, trucks and motorcycles on the basis of the German model.

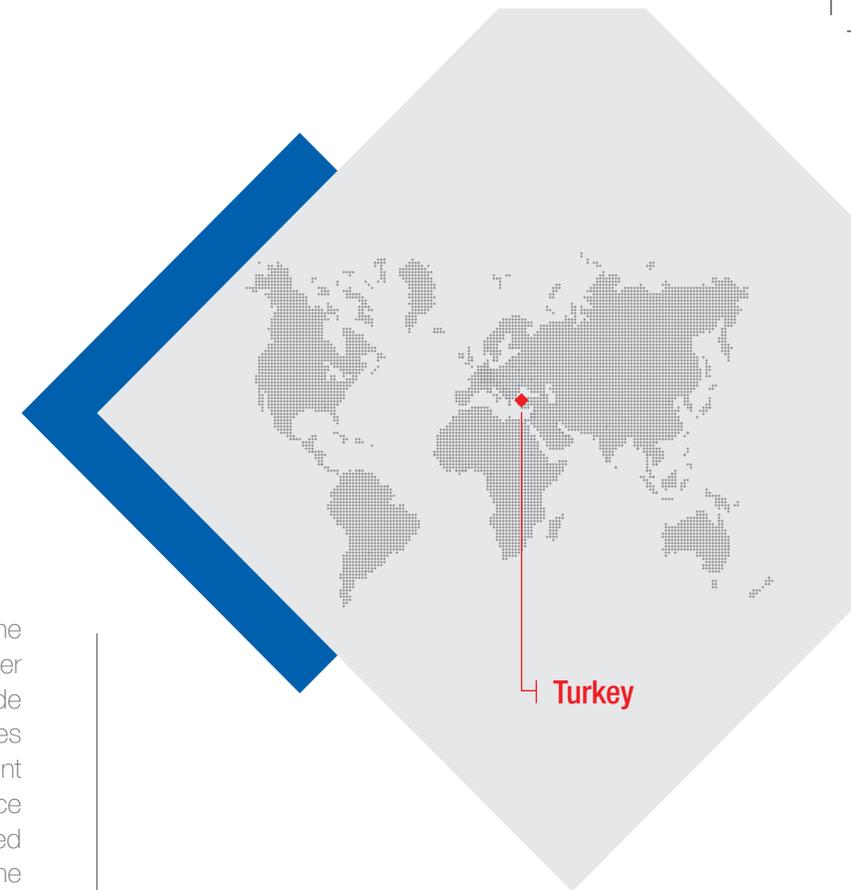
This was a huge challenge for the MAHA project management team, because production planning took place in Germany, construction management was carried out locally, test lanes were transported from Germany to their installation site in Turkey and on-site technicians had to be coordinated on a nationwide scale for the installation process.

High-precision resource planning and cost control were indispensable for a project of this size. At the same time, the local geographical, cultural and political circumstances required an extremely flexible approach.

The regular servicing requirements combined with the extreme distance between the stations were another challenge. In winter or summer, in a country with a wide range of climate conditions – MAHA's response times and the short-term spare parts supply are consistent throughout Turkey. MAHA oversees over 2,000 service visits centrally from Istanbul every year, implemented from five service support points distributed across the country.

All operations such as repairs, spare parts supply, re-installations and servicing are managed and documented with central software. The number of stations has steadily increased since 2008, so there are now over 200 stations with over 500 test lanes to be supplied.

The productivity and professionalism of the MAHA project management team guarantees a successful collaborative relationship with the client, even for the years to come after the project has been concluded. This also applies to the hitherto biggest individual project implemented in MAHA's corporate history.



Installed MAHA product(s)

Over 500 complete test lanes for cars and trucks all across Turkey

Facts and figures

The biggest individual project implemented in MAHA's corporate history to date

Project client

TÜVTURK

Company/dealer

MAHA Maschinenbau Haldenwang GmbH & Co. KG



MAFA-Maschinenbau Halberwang Lesperle, S.

Reliable operation in conflict zones

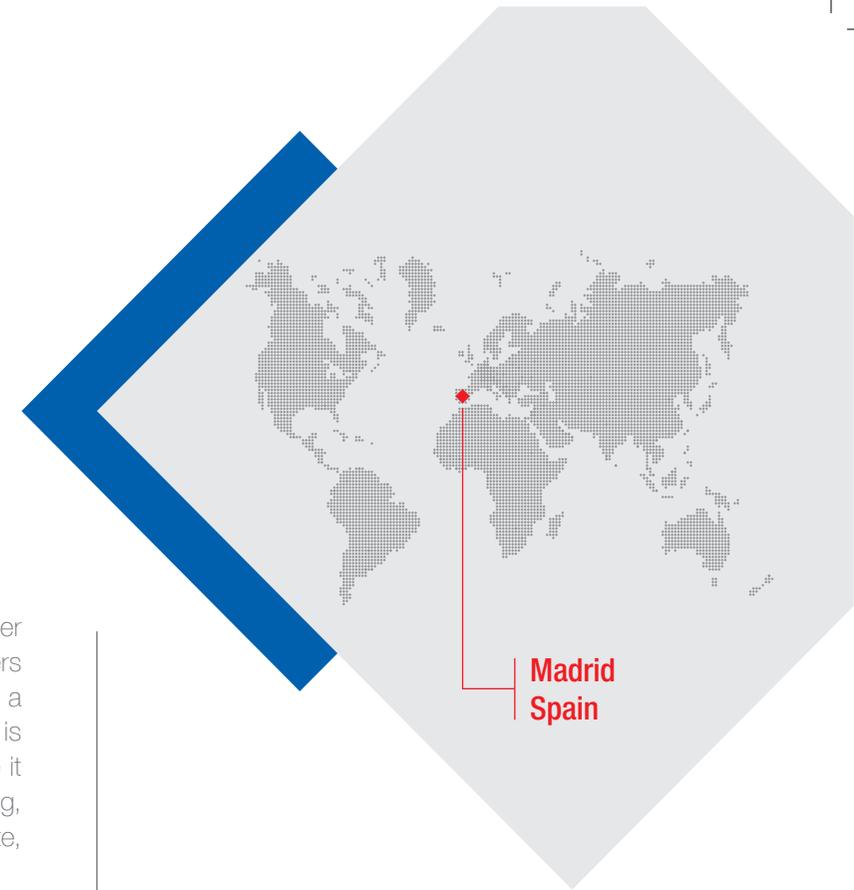
Mobile test lane for the Spanish Army

As a member of the United Nations, the Spanish Army provides humanitarian aid in conflict zones. High-quality technical support must be guaranteed for the vehicles used there, since the heavily armoured vehicles are used for passenger transport and are thus subject to extreme strain. Consequently, their parts are replaced much earlier than usual.

Nevertheless, the brake systems, suspension, joints and alignment have to be in ideal condition during their short lifetime, which is why MAHA was commissioned to deliver a mobile test lane. It had to be possible to transport the test lane to any conflict zone by aircraft in record time to examine the different types of transport vehicle. Based on prior experience, a mobile unit in a 20-foot container was developed.

It was equipped with a side slip tester, a shock absorber tester, a brake tester, an axle play tester, exhaust testers and a headlight tester. The unit was varnished with a special paint so that it could avoid radar detection. It is also equipped with its own power generator, to make it independent of external power sources. Once planning, construction and operational testing were all complete, the unit was delivered to the army in 2006.

The first goal was to support the forces deployed in Iraq, and subsequently in Afghanistan and the Gaza Strip. The unit is currently being used to aid all of the Spanish Army's bases.



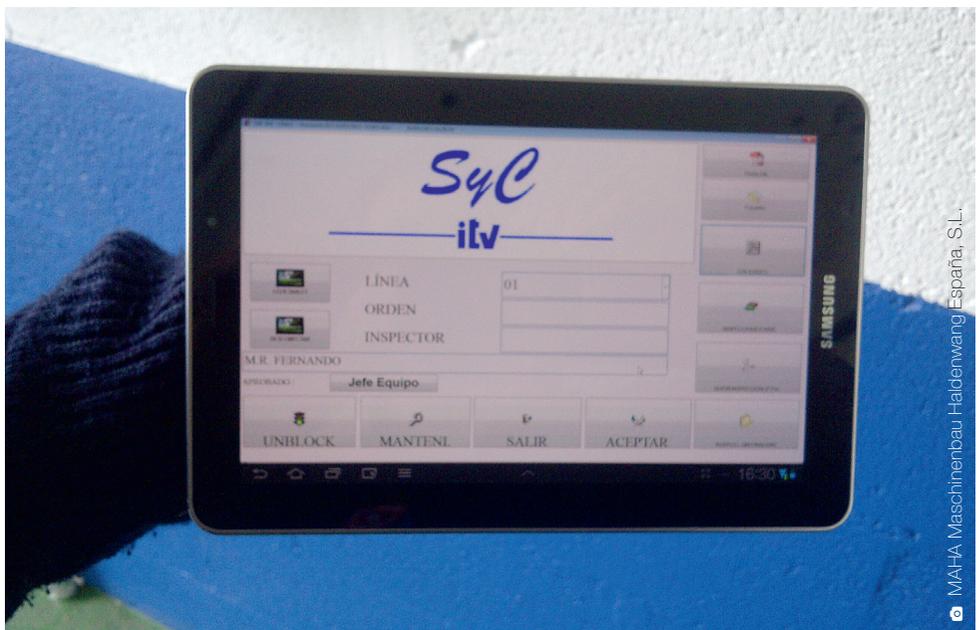
Madrid
Spain

Installed MAHA product(s)
MINC II, SA 2, IW 7, LMS 20/2,
MDO 2, MGT5, LITE

Facts and figures
Armoured vehicles for the Spanish Army

Project client
Spanish Army

Company/dealer
MAHA Maschinenbau Haldenwang
España, S.L.

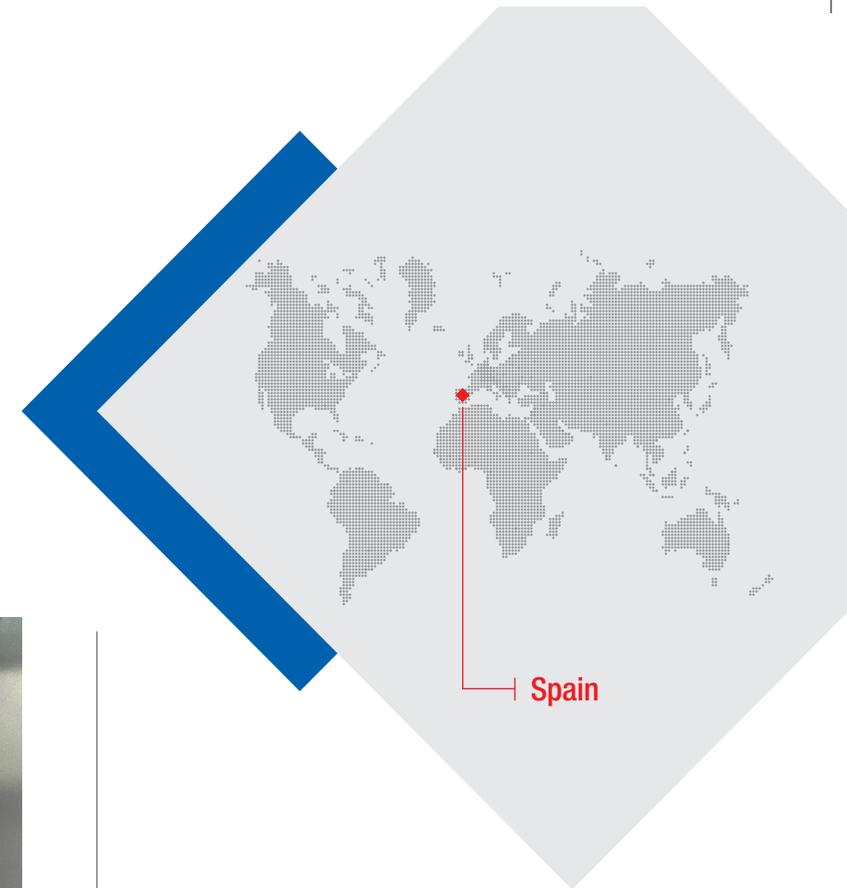


Clearing the ground for the high-tech inspection

Diafan station with a deskless test lane

MAHA España was commissioned to develop a deskless test lane. The station for periodic vehicle inspection is equipped with a server room, in which the power board and the computer with remote access as well as all the other electronic devices are located. This means that all of the station's corridors are clear, and no elements can block the testers' way. This, in turn, leads to a quicker service.

In a Diafan station for periodic vehicle inspections, only one server PC is needed to control all the machines. So not every desk and every test lane is required to have a computer, meaning that costs can be cut and the risk of damage can be reduced. The tester controls the inspection using a tablet, which reduces the required inspection time. At the same time, this means that processes can be controlled continuously. Visual defects are recorded immediately using the tablet. In this way, even more time can be saved, as the tester doesn't need to move to the desk first. Furthermore, no fixed cameras are required to take photos of numberplates, as the tester can do this directly using the tablet. The open station concept meant that fixed costs could be cut, and that the productivity and the profitability of the station could be increased at the same time.



Installed MAHA product(s)

MBT 7250, MINC II, LMS 20/2,
MBT 2250, MINC I, PMS 3/2, etc.

Facts and figures

Diafan station with a deskless test lane

Project client

PTI Station Spain

Company/dealer

MAHA Maschinenbau Haldenwang
España, S.L.



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Raising glasses to celebrate lifting with MAHA Ireland

ZS SQUARE lifts used as a basis for celebrations



In 2014, Colm Quinn BMW, a local authorised BMW dealer based in Galway City, commissioned MAHA Ireland with a large-scale project. It involved the complete construction of a new workshop comprising eleven halls.

For this project, MAHA Ireland delivered eleven new MAHA lifts, a headlight tester, ten new Dura workbenches and an in-ground extraction system from s.tec Fahrzeug-technik, as well as reels for providing oil, water and air.



The opening ceremony organised by the authorised dealer had an unexpected surprise in store, as over the course of the evening, the ZS SQUARE lifts had spontaneously been transformed into tables for drinks.

Without knowing it, MAHA Ireland had therefore not only delivered test lanes, but also beer tables ready for the opening ceremony. This impressively demonstrates that MAHA Ireland is the right choice for lifting and raising – of more than just BMWs.

Installed MAHA product(s)

- 9x ZS SQUARE
- 1x ECON III 4.0 t
- 1x DUO CM 4.2 U
- 1x MLT 3000

Facts and figures

- 11x MAHA lifts
- Dura workbenches
- s.tec exhaust extraction, oil supply, water supply and air supply

Project client

Colm Quinn BMW, Galway

Company/dealer

MAHA Ireland Ltd.

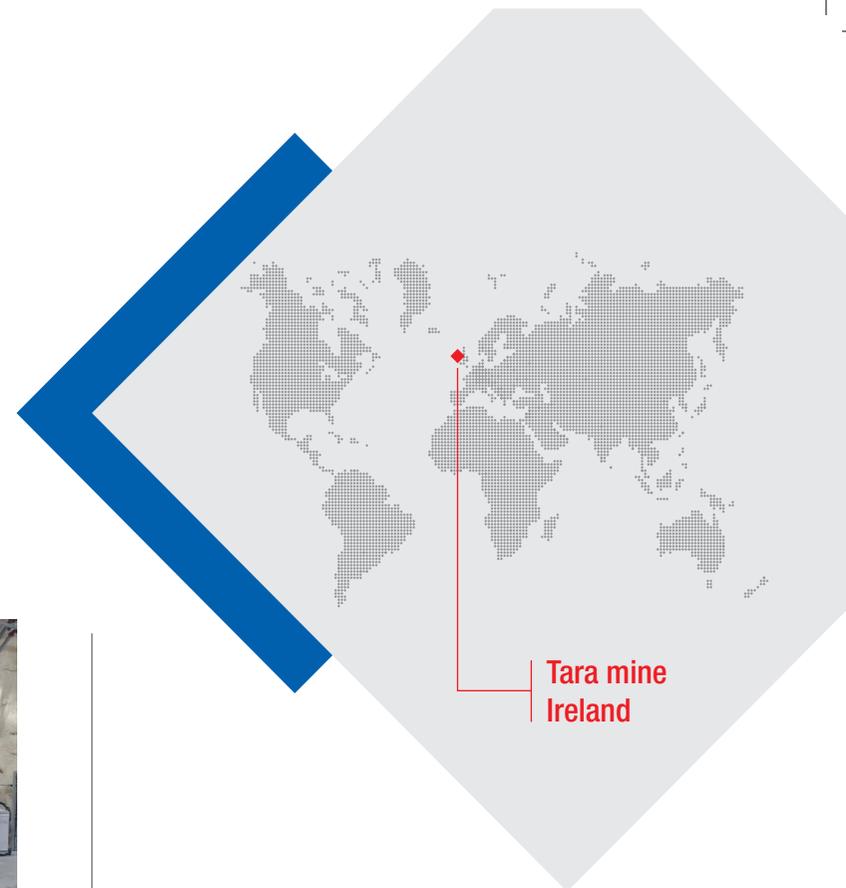
Galway City
Ireland



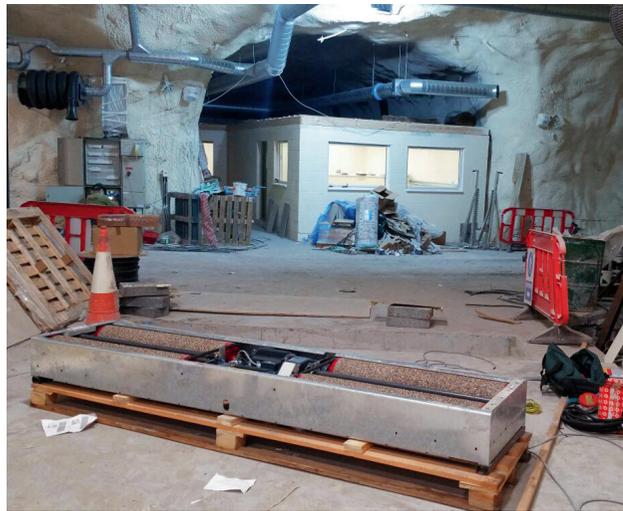
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Mining 1,000 metres underground

Roller brake tester for four-wheel vehicles



Tara mine
Ireland



The Tara mine is an underground zinc and lead mine near the town of Navan in Ireland. The ore body in this mine can be found at a depth of between 150 and 1,000 m underground.

The Tara mine is the largest zinc mine in Europe and the ninth largest in the world. It was first discovered in 1970, and production started in 1977. Since then, more than 85 million tonnes of ore have been mined. In 2004, the



mine was purchased by the Swedish mining company Boliden. Today, 580 people work in the Tara mine and extract approximately 2.6 million tonnes of ore every year for the production of zinc and lead concentrates.

In 2016, Boliden agreed to purchase a new roller brake tester (MBT 2250 with RS 5) from MAHA Ireland to test its fleet of four-wheel vehicles used in the mine. A roller brake tester is probably a rather rare sight at this depth.

Installed MAHA product(s)
MBT 2250 with roller set no. 5

Facts and figures
1,000 meters underground

Project client
Boliden's Tara mine

Company/dealer
MAHA Ireland Ltd.



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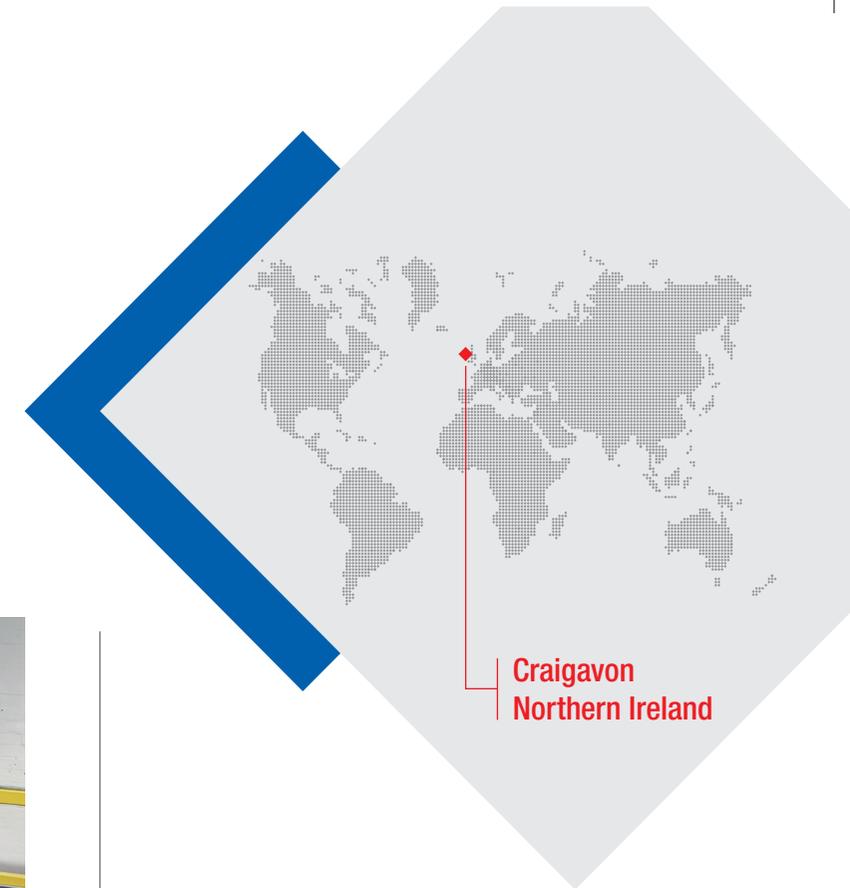
No ground clearance in sight

Special roller brake tester design for forklifts

Hyster-Yale, based in Craigavon in Northern Ireland, is the largest plant manufacturing counterbalance forklifts in the United Kingdom. Most of the products made in the Craigavon plant are exported to Europe, Russia, Africa and the Middle East. The company is therefore making a significant contribution to the United Kingdom's export market.

The plant, which has an expansive surface area of 41,300 m², was opened in April 1981 and today provides employment for several hundred people. Each year, approximately 11,000 forklifts are made in the plant, located southwest of Belfast.

In 2011, MAHA Ireland delivered custom-made forklift brake testers (MBT 3250) to Hyster-Yale's Northern Irish production plant. They are used to test all the new forklifts at the end of the production line. The vehicles' extremely low ground clearance meant that a custom-made design was necessary.



Installed MAHA product(s)
MBT 3250 roller brake tester

Facts and figures
Approximately 11,000 forklifts are tested each year

Project client
Hyster-Yale Forklifts

Company/dealer
MAHA Ireland Ltd.



Première out of love for vintage vehicles

The first MSR tester in the United Kingdom



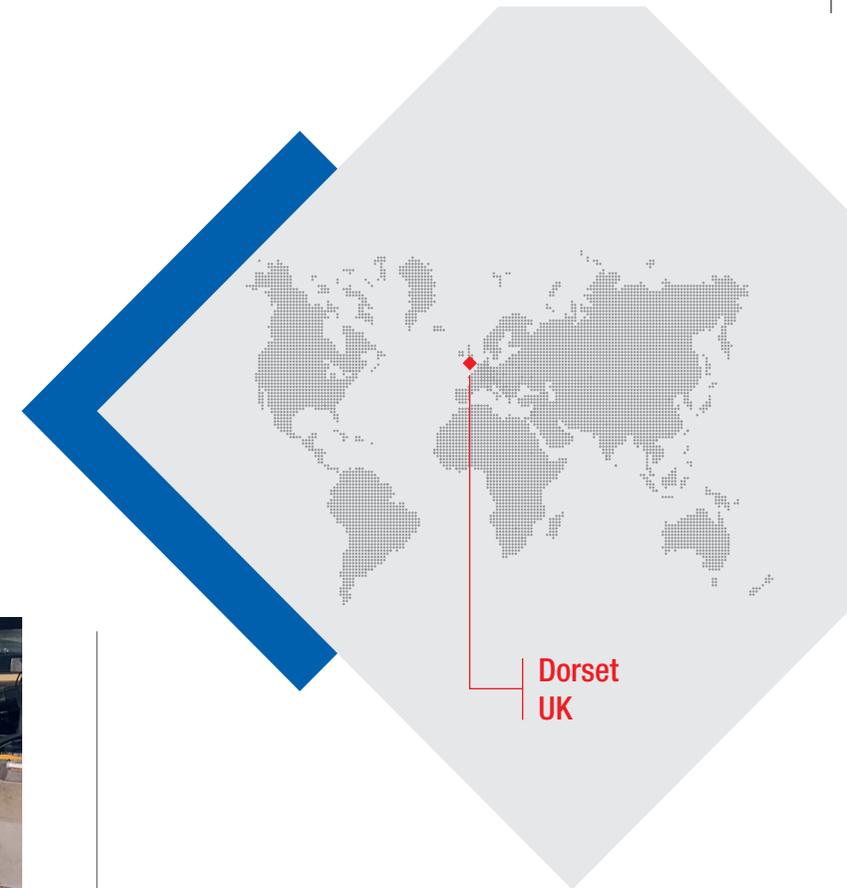
Sigma Engineering is based in the south of England and can neither be found on social media platforms nor on other websites. Nevertheless, thanks to numerous client recommendations, the company is very successful. The owner and his small team are experts who specialise in six-cylinder Jaguars.

They mainly work on models of the Jaguar E type. The team assembles engines, performs machine processing and mechanical equipment tasks, and even installs components in these beautiful cars. Their work could almost be referred to as art. The results are reliable, reproducible and powerful. One day, it was high time to replace the outdated, water brake dynamometer.



The client was not interested in finding an inexpensive substitute, but rather wanted the best possible equipment. At that time, his requirements could only be met by MAHA's brand-new MSR 830 dynamometer.

He had long since realised that single roller dynamometers are perfectly suited to the restoration and repair of sensitive vintage vehicles. At that time, Sigma Engineering was the first company in the United Kingdom to purchase an MSR tester. The new MSR has since been in operation without any problems since 2009. This small but significant project paved the way for the successful establishment of MAHA dynamometers as popular branded products in the UK.



Dorset
UK

Installed MAHA product(s)
MSR 830

Facts and figures
Numerous Jaguars

Project client
Sigma Engineering

Company/dealer
MAHA UK Limited



Pampering for high-quality cars

Lifts for the “car spa” in the Porsche Centrum Wrocław



The Porsche Centrum Wrocław was opened by the Lellek Group in 2015. The building is an architectural highlight and impresses even at night by its spectacular lighting. And it was this building in Poland that had the first “car spa” area integrated to offer special care for high-quality cars.

The car spa is located in a glass cube above the main workshop, and a lift transports the vehicles to this area. The “spa”, which puts the cars on clear display, offers a special care programme. In laborious processes, the cars are prepared, cleaned and “pampered” by hand – both inside and outside. Depending on their requirements,



car owners can choose between a basic programme and an extended “spa” version.

The entire workshop area is kitted out with MAHA equipment. The client decided to integrate two TWIN IV double scissor lifts to facilitate vehicle preparation. Due to the lifts’ low installation depth, integration did not pose any problems.

This special project was honoured by the importer themselves and is an advertisement for Porsche’s entire dealer network. MAHA Polska is proud to have made a significant contribution to this success story.



Wrocław
Poland

Installed MAHA product(s)
TWIN IV

Facts and figures
Up to 3.5 t

Project client
Lellek Group

Company/dealer
MAHA Polska sp.zo.o.



© Mack Rides GmbH & Co. KG, M&A-Maschinenbau Halgenwang GmbH & Co. KG

For a safe recreational experience

Lifting system for rollercoaster maintenance



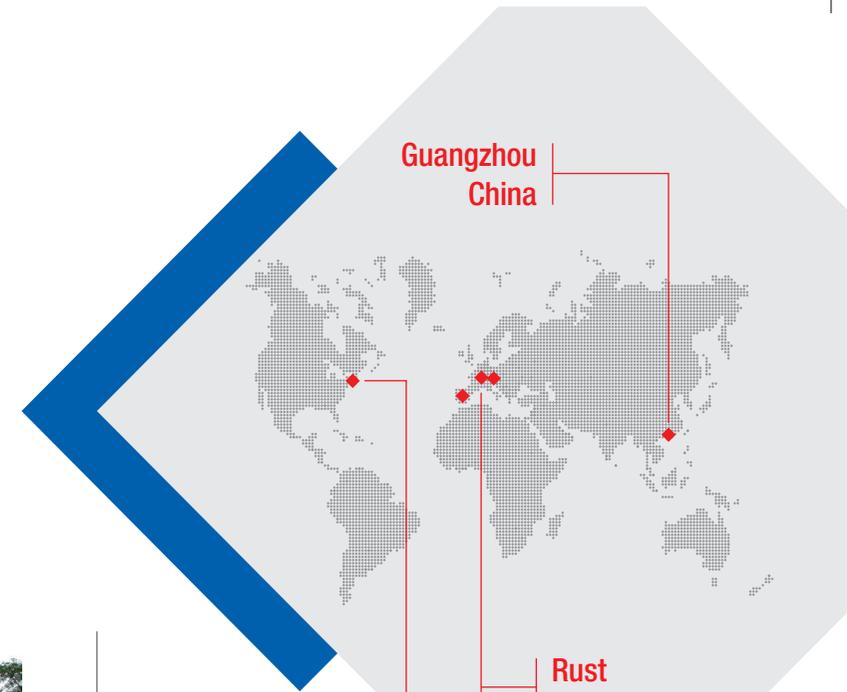
Mack Rides, a company based in Waldkirch near Freiburg, is counted among the leaders in the field of amusement park attractions.

Maintenance of its rollercoasters required a special, lowered lifting system underneath the tracks, so that a track segment located under the track can be lifted. To do so, two track segments were arranged one on top of the other to ensure that the track was closed, no matter whether the maintenance track segment or the normal track segment ended flush with the track. The maintenance track travels upwards to inspect the cars. The cars are pushed onto the track and lowered.



If the track travels with two "trains" at the same time, the rollercoaster ride can continue with only one train and therefore the rollercoaster can remain in continuous operation.

The special challenge for MAHA was to ensure that the transitions between the moving track segments had to end exactly flush with the remaining parts of the track. After all, the cars have to be prevented from derailing. An appropriate lifting system is now required every time this type of rollercoaster is sold. So MAHA is even providing off-road safety within this extraordinary project.



Guangzhou
China

New York
USA

Rust
Germany

St. Margarethen
Austria

Madrid
Spain

Installed MAHA product(s)
RGE

Facts and figures
Load capacity 16 t

Project client
Mack Rides GmbH & Co. KG

Company/dealer
MAHA Maschinenbau Haldenwang
GmbH & Co. KG



© MAHA Russia OOO

End-of-line testing for vehicle manufacturers

Special solution for Nissan plant in Russia

Nissan Manufacturing Rus (NMGR) had chosen an SKD assembly for its QX luxury models. This led to a problem with testing at the end of the production line. NMGR had two options: either install new industrial equipment, or find a completely different solution.

One of the mandatory specifications given by NMGR was an above-ground installation. MAHA Russia subsequently suggested a solution for industrial use based on workshop equipment. A diagnosis test lane with above-ground installation for the end of the production line was designed. It is made up of the column for wheel alignment as well as DUO UC 5.0 W A, LPS 3000 4WD, IW2 EUROSISTEM 4WD, LITE 3 and DUO 4.7. All the equipment (with the exception of the lift for wheel alignment) was combined in a test lane and connected using ramps.

In this test lane, the vehicle is located at three different levels – ground level, 600 mm (LPS 3000 on the ground) and 280 mm (height of the IW2 on the ground). Additionally, MAHA Russia's leading engineer, Igor Laetin, developed an individual piece of software for the LPS 3000 4WD, so that he could evaluate the test results according to the requirements set by NMGR. Furthermore, another special solution was developed together



with s.tec – an automatic exhaust extraction system for cars with a dynamometer.

The project was started in the late spring of 2001 and completed in January 2012 with successful installation. Compared to industrial standard projects, the client (NMGR) therefore benefited from significant economic advantages – in terms of costs and implementation time.



Saint Petersburg
Russia

Installed MAHA product(s)

LPS 3000 4WD, IW2 EUROSISTEM 4WD, LITE 3, DUO 4.7, DUO UC 5.0 WA

Facts and figures

Above-ground installation, test lane capacity: four vehicles per hour

Project client

NMGR – Nissan Manufacturing Rus

Company/dealer

MAHA Russia OOO



© МАПА Russia OOO (Oleg Spiridonov)

A size larger, twice over

Vehicle inspection in Saint Petersburg

In 2001 and 2002, MAHA Russia kitted out the two largest police stations for periodic technical vehicle inspection (PTI) in Saint Petersburg. The client was the Russian traffic police. The image on the right shows the Vice-Governor of Saint Petersburg and the Major General of Police and Vice-Chairman of the Federal Road Safety Service (GIBDD) of the Ministry of the Interior of the Russian Federation at the opening ceremony.

Both stations have the same equipment, but differ to some degree in terms of structure. Three EUROSYSYSTEM test lanes were installed in each station: one for trucks, one for light trucks and buses, and one for cars and vans – each with three test areas for exhaust testing, headlight testing, and visual inspection from above.

All the PCs in both stations were connected in a single network. That way, all the data can be transmitted from the offices to the PCs in the test lanes and vice-versa. There was no documentation in the workplaces – all the paperwork was completed in the offices. Furthermore, both stations were provided with exhaust extraction systems by the German company AFA.

One of the stations received a semi-automatic exhaust



extraction system. Each station should perform approximately 100,000 tests per year. This means that both stations have a combined annual throughput of 200,000 vehicles. However, the actual number of tests performed is higher than what was planned initially.



Installed MAHA product(s)

EUROSYSYSTEM test lane for cars and trucks

Facts and figures

The two largest police stations in Saint Petersburg have a total annual throughput of more than 200,000 vehicles.

Project client

Russian police

Company/dealer

MAHA Russia OOO



© ATLAS International GmbH / Arthur Kerzob

One of the first stations with a testing arrangement in several sections

Formerly the largest vehicle testing facility in the Ural region



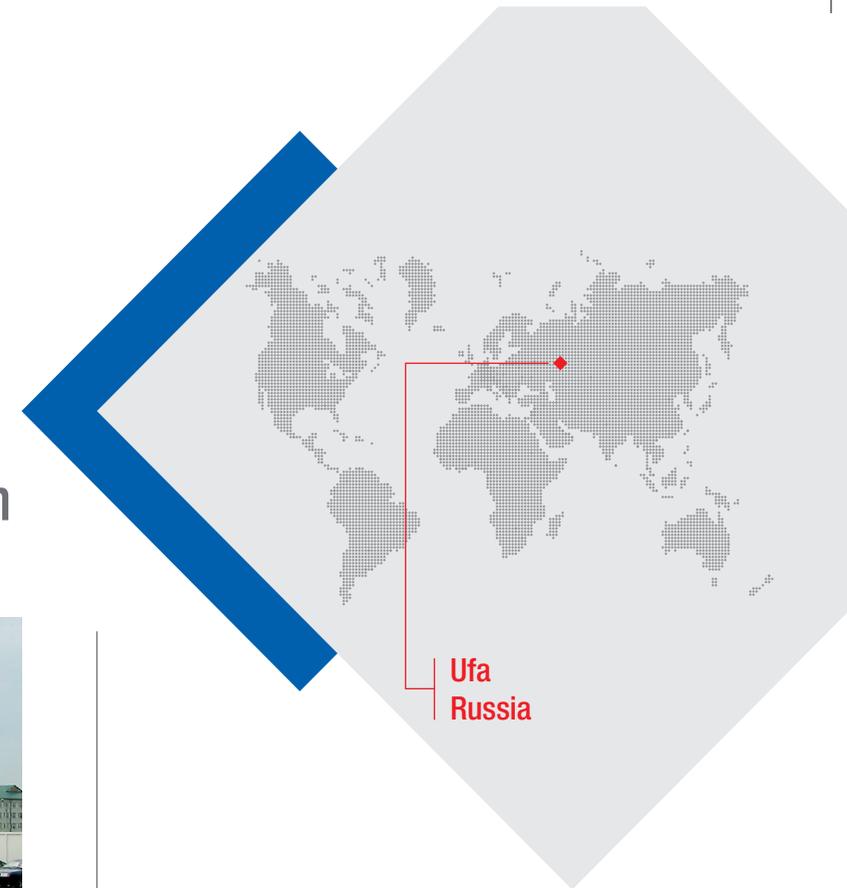
The first decade of the 21st century was a “golden decade” in Russia. Vehicle registration figures were seeing an annual increase of double-digit percentages. Garages and vehicle testing facilities experienced a boom too. Ufa is the capital of the autonomous Republic of Bashkortostan, which is located at the border of Europe and Asia.

In 2005, a vehicle testing facility for the client BashTech-Kontrol was built in this area – the largest in the region by far. The project was implemented by ATLAS International GmbH.

The testing facility had eight car lines and two truck lines of the MAHA EUROSISTEM type. These ten

three-post test lanes were used to test up to 1,000 vehicles every day. This new test station was therefore completely sufficient for Ufa, a city with over a million inhabitants, and even took on a pioneering role. At that time, the test station was one of the first installations with a testing arrangement in several sections and, at the same time, it was the largest testing facility in the world to be equipped with this technology and had the highest vehicle volume too.

What was brand-new technology then now enables testers to perform individual tests on vehicles. Back then, there were no testing facilities of a comparable size or with a comparable vehicle volume using this technology.



Installed MAHA product(s)
EUROSISTEM test lanes

Facts and figures
Testing facility with eight car lines and two truck lines; built in 2005, largest testing facility in the Ural region

Project client
BashTechKontrol

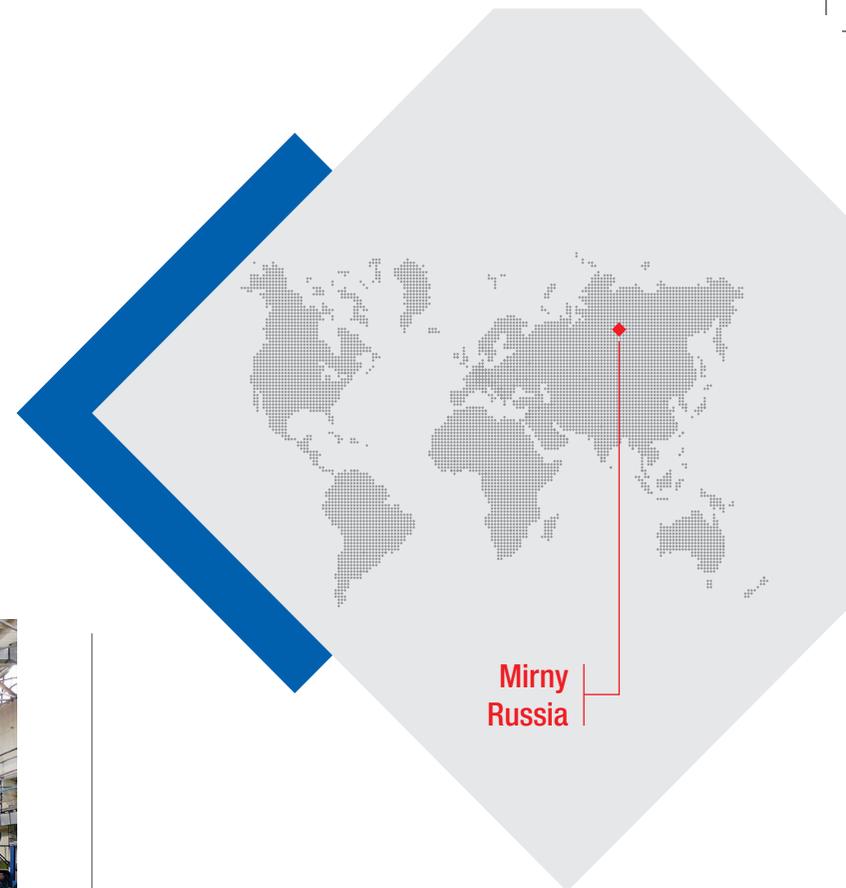
Company/dealer
ATLAS International GmbH



ALFROSA/Anastie

MAHA is supporting diamond mining in Siberia

Mobile wheel engaging column lifts for ALROSA



Mirny
Russia



The Russian corporate group ALROSA is the world's leading diamond producer. ALROSA mines 97 % of all diamonds in Russia and has a 27 % share of the diamond production market worldwide. The group focuses on prospecting, mining, reprocessing and selling rough diamonds.

ALROSA is based in the town of Mirny, which is located in the Sakha (Yakutia) Republic in the north-eastern part of Asian Russia. Due to the region's extreme continental climate, winters there are very cold and long, while

summers are short. The working conditions in this region are therefore extreme too. In winter, temperatures drop below -45 to -50 °C.

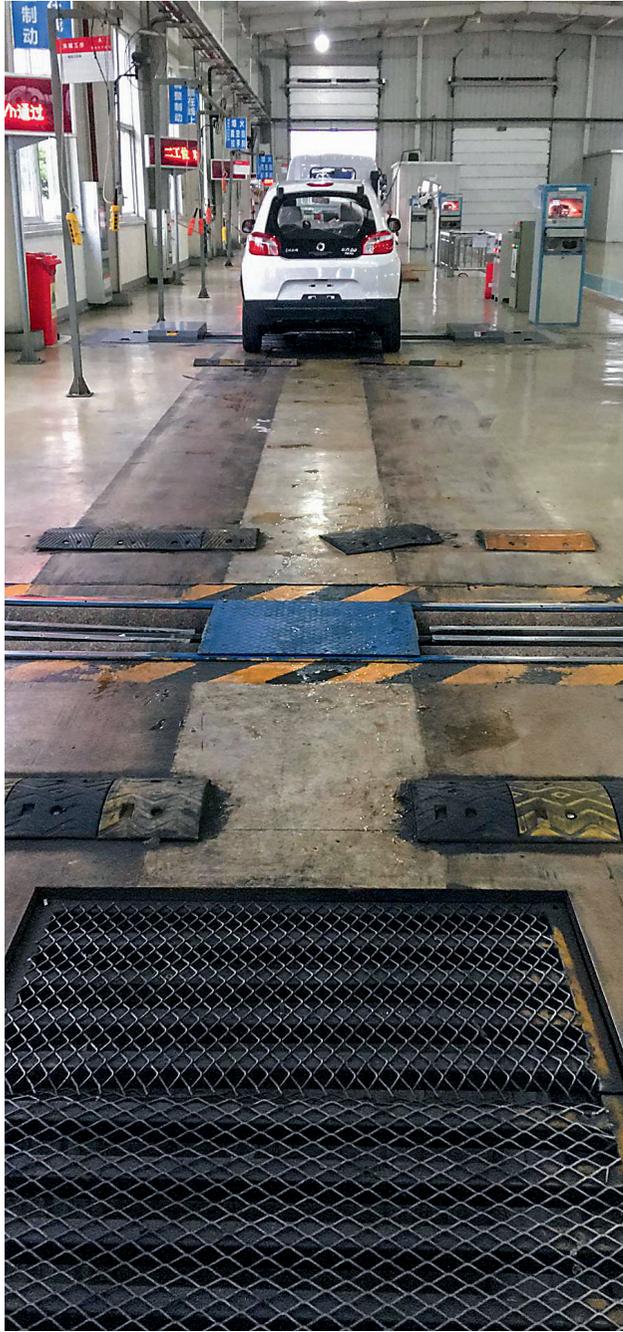
Between 2013 and 2014, MAHA Russia delivered nine mobile wheel engaging column lifts of the RGE type to ALROSA. The high-quality equipment proved to be exceptionally reliable – even under these extreme climatic conditions. According to the client, the lifts have definitely proven their worth – particularly when comparing them to lifts from other suppliers.

Installed MAHA product(s)
RGE

Facts and figures
Between 2013 and 2014, MAHA Russia delivered nine mobile wheel engaging column lifts of the RGE type to ALROSA

Project client
PJSC ALROSA, diamond mine

Company/dealer
MAHA Russia OOO



MAI-A Maschinenbau (Beijing) Trading Co., Ltd (Taishan Tang)

High loading and lack of maintenance, but no downtimes

Testing light trucks in China

The Dongfeng Motor Corporation is a state-owned car manufacturer headquartered in Wuhan, China. Besides trucks and vans, the company also manufactures parts and cooperates with foreign companies. In 2014, the Dongfeng Motor Corporation was the second-largest Chinese vehicle manufacturer (making more than 3.5 million vehicles per year) and the largest truck producer (making approximately 450,000 per year). Every day, more than 130 light trucks leave the assembly line and are tested using MAHA's IW4 truck roller brake tester. The equipment is therefore exposed to very high loads. Usually, the equipment should be maintained according to MAHA's specifications. Every three months, fill levels should be checked and topped up if necessary. The hydraulics system should be checked for leaks, and the sealing collars should be checked for damage and be replaced if necessary. The unit should be checked for unusual noises during operation, and fixing screws should be checked to ensure that they are tight. Every six months, the liquids should be tested for contamination or ageing and replaced if necessary. All of the components should be checked for damage every twelve months.

However, MAHA's recommendations for maintenance of the equipment at Dongfeng Motor had not been followed for



years. The client attributed this to issues with software communication. During the examination, large amounts of oils were detected on the surface. The surrounding area was also humid and dusty. Once the brake tester had been cleaned, it continued to work faultlessly. After all, MAHA products always function reliably – despite extreme environmental conditions, high throughput and even lax maintenance over an extended period of time. No downtimes occur even when there is oil and dust on the equipment surface, and this is particularly vital for end-of-line clients.



Xiangfan
China

Installed MAHA product(s)
IW4

Facts and figures
Permitted axle load (drive-over) 3.5 t

Project client
Dongfeng Motor Corporation

Company/dealer
MAHA Maschinenbau (Beijing)
Trading Co., Ltd



MAHA Maschinenbau (Beijing) Trading Co., Ltd (Yan Jia Feng)

Suitable for vehicles and cargo

Mobile lifting device with a load capacity of 30 t

Some production facilities, loading and unloading zones, and even warehouses or open storage facilities, do not have docking bays or loading platforms. In this case, the loading and unloading of containers or freight boxes can often be very expensive. High personnel costs are incurred, and the use of forklifts or pallet lifters is inefficient.

However, if the transport container is lowered to street level, the cargo can be unloaded with extreme ease. This increases efficiency during loading and unloading and decreases operational hazards. For containers with a load capacity of 30 t, four lifting devices with a load capacity of 7.5 t each are used. They can be operated by just one person from each of the columns and the mechanical dolly allows for flexible positioning.

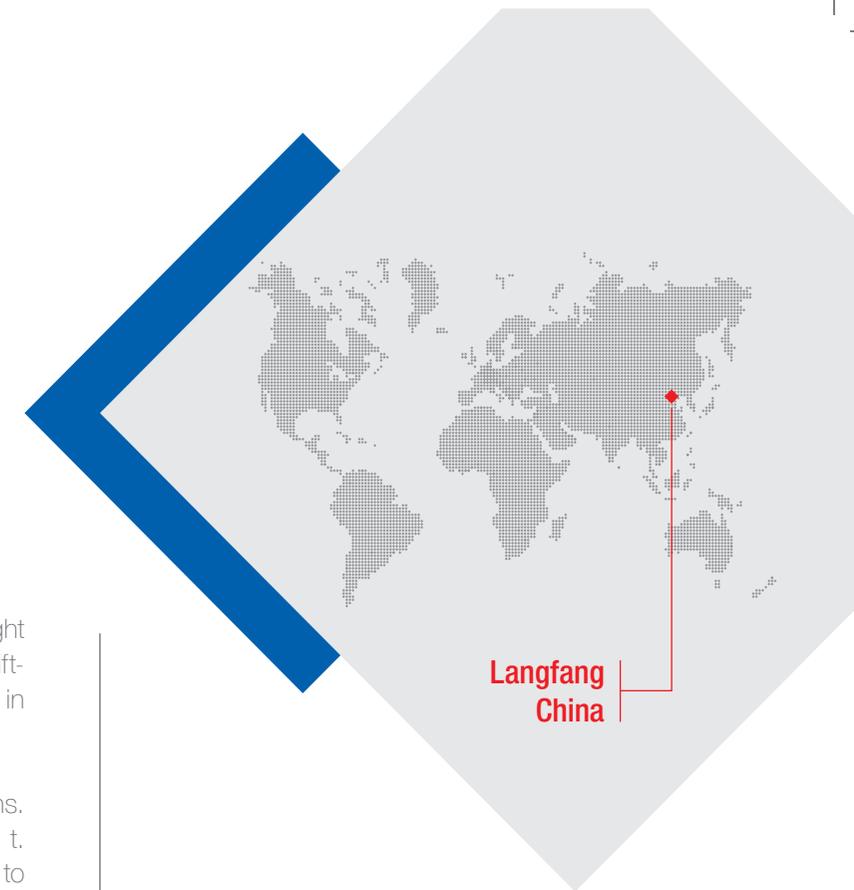
The area underneath the lifted container is easily accessible. A standard system has a maximum lifting height of 1,200 mm; the lifting and lowering time is approximately 150 s. In the event of a power failure, the container can be lowered mechanically using an emergency release.

The weight per lifting column is 500 kg. The lifting height can be adjusted to the clients' requirements, and the lifting columns can be operated both individually and in groups.

It is even possible to group more than four lifting columns. Six columns, for example, can lift loads of up to 45 t. If the columns are at different initial heights, they have to be adjusted to the container's position individually.

When all of the lifting joints are attached and secured, group mode is engaged and the container or freight box is lifted off of the truck chassis. This lifting system can be used for lifting containers, freight boxes, moving boxes and residential containers, as well as exhibition containers and event containers.

The length of the containers is not an issue. But before the containers are lifted, it must be ensured that all of the attachment devices are installed correctly.



Langfang
China

Installed MAHA product(s)
Lifting system for containers

Facts and figures
30 t load capacity

Project client
MAHA China warehouse

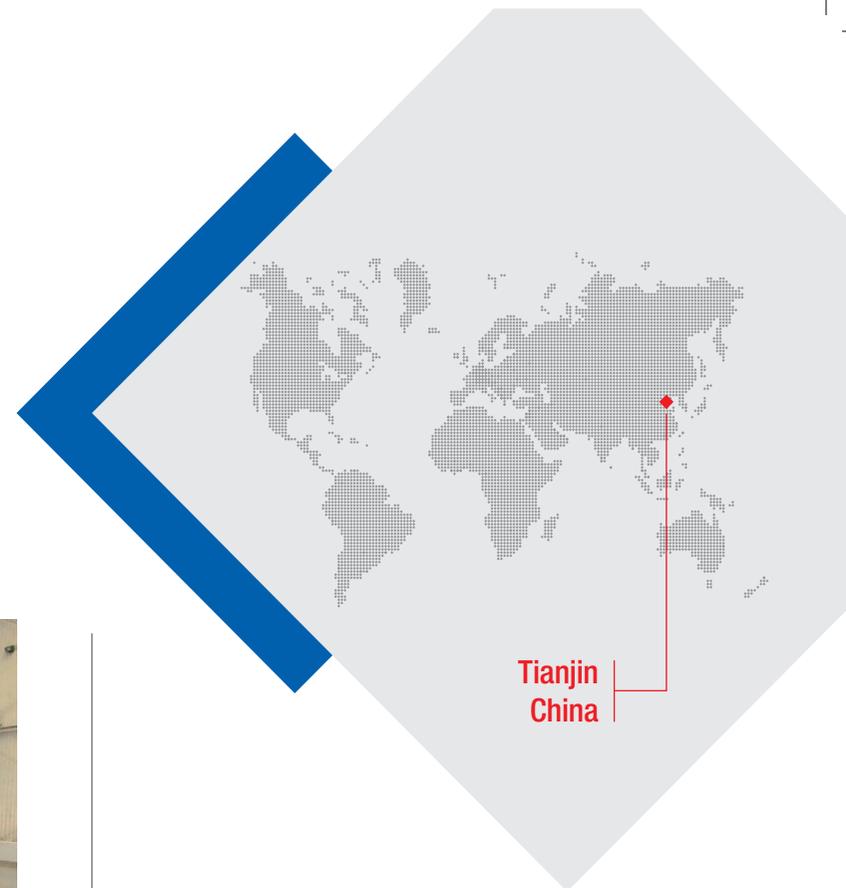
Company/dealer
MAHA Maschinenbau (Beijing)
Trading Co., Ltd



MAI-A Maschinenbau (Beijing) Trading Co., Ltd (Yang Liu)

Durable despite an extremely high throughput

Motor vehicle test lane at the Port of Tianjin



Tianjin
China



Tianjin Tianxin Motor Vehicle Testing Service Co. Ltd. performs over 200,000 safety technology inspections in import and export vehicles. In China, it is counted among the companies with the highest-quality equipment.

The import vehicles are inspected right at the Port of Tianjin. The lighting, emissions and brakes are checked, to name but a few examples. This is to ensure that the vehicles adhere to the national standard in China. The vehicles can only be sold on the Chinese market after they have passed the inspection. In 2015, a MAHA test



lane was installed for that very purpose. It contains the following six pieces of test equipment: the MGT 5 and MDO 2 emission testers, the MINC I side slip tester, the IW 2 EUROSYSYSTEM 4WD brake tester, the LITE 3 headlight tester and the FPS 2700 roller function tester.

Unlike Chinese vehicles, the emission tests on imported ones are conducted at partial load. The equipment is operated at high intensity and is in use for 13 to 14 hours per day with 300 to 400 vehicles. Not even an extremely heavy strain like this can wear the MAHA equipment down.

Installed MAHA product(s)
EUROSYSYSTEM 4WD, MGT5, MDO2,
MINC, IW2, LITE3, FPS2700

Facts and figures
Six testers in one test lane

Project client
Tianjin Tianxin Motor Vehicle Testing
Service Co., Ltd

Company/dealer
MAHA Maschinenbau (Beijing)
Trading Co., Ltd



© MAYA Maschinenbau (Beijing) Trading Co., Ltd (Kevin Fei)

Shanghai meets the Zuffenhausen district of Stuttgart

Headquarters' standards implemented in the Porsche Asia Training Centre



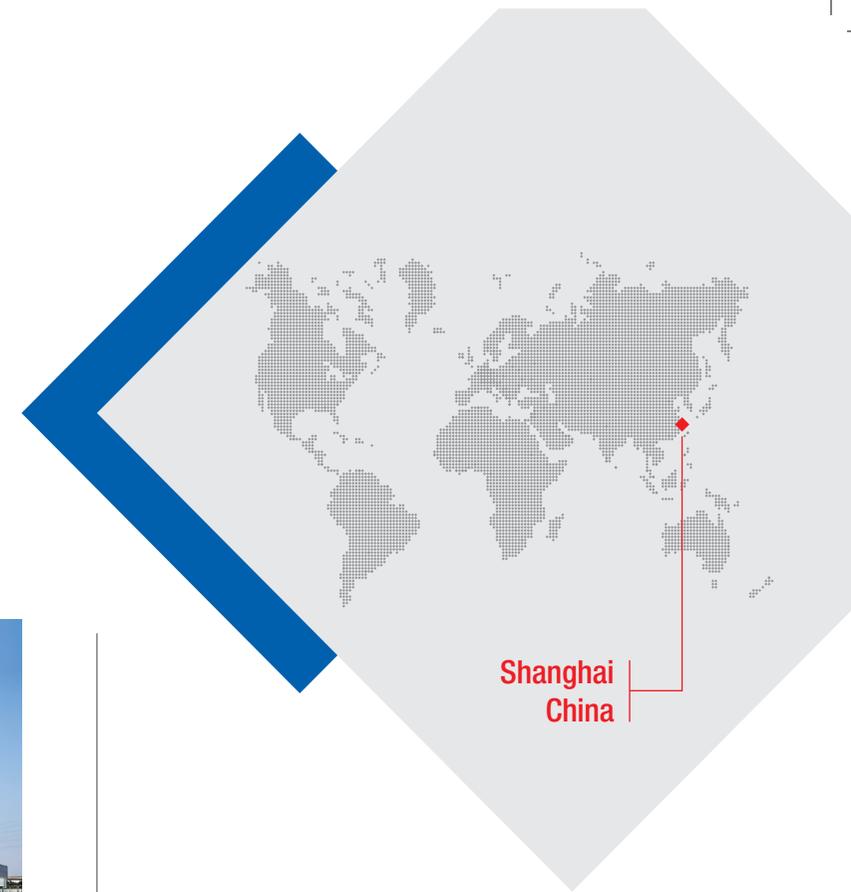
In the Pudong district of Shanghai, a new Porsche training centre has been built on an area measuring 15,490 m². The atrium is almost the size of a football pitch. The front of the two-storey building is jet black and an example of impeccable craftsmanship. Its one-of-a-kind pitched roof is similar to the one on Plant 1 in the Zuffenhausen district of Stuttgart, where the first car model named after Porsche (the Porsche 356) was built.

The new training centre offers a multitude of different special training programmes for national dealers. This is to sustainably foster Porsche's talent development in China for the long term. To build a dealer network as



quickly as possible, the Porsche Asia Training Centre offers a tailor-made service to its Chinese clients. The training centre boasts 22 training rooms for technical training and six training rooms for non-technical seminars. Once it is complete, approximately 220 people can be trained per day.

MAHA provided the training centre with equipment – including a ZS SQUARE II 3.5 SPG two-post inground lift with swing arm support and a load capacity of 3.5 t. With this unique new equipment, Porsche was able to transfer the standards of its headquarters to Shanghai.



Shanghai
China

Installed MAHA product(s)
ZS SQUARE II 3.5 SPG & E Box

Facts and figures
3.5 t load capacity

Project client
Porsche Asia Training Centre

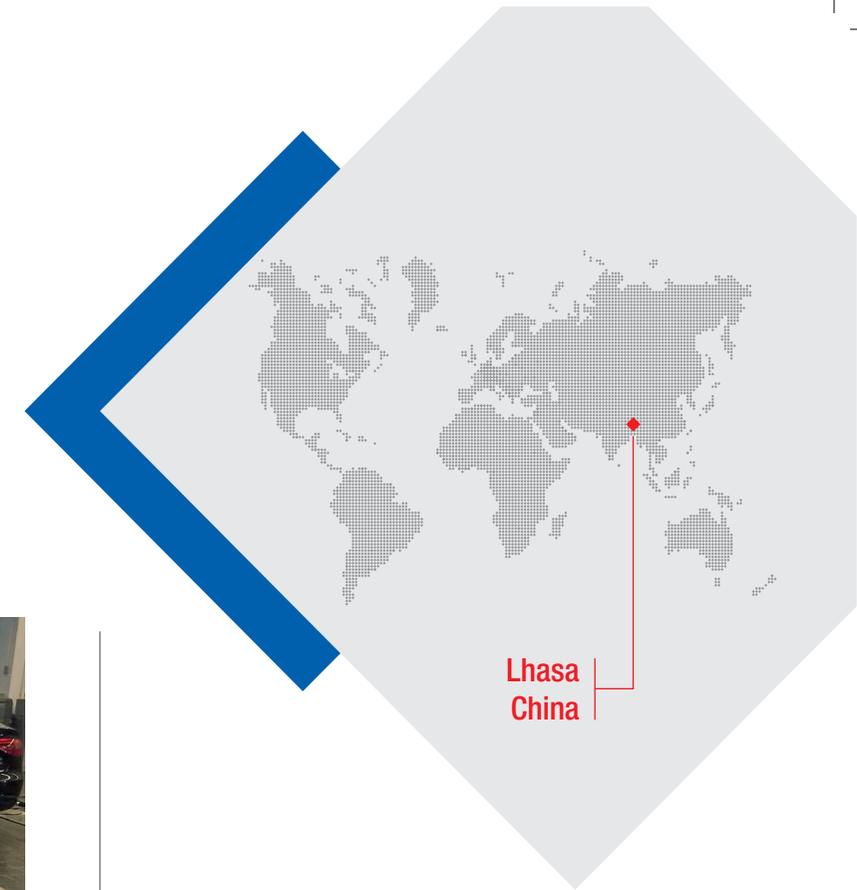
Company/dealer
MAHA Maschinenbau (Beijing)
Trading Co., Ltd



MAFA Maschinenbau (Beijing) Trading Co., Ltd (Taishan Tang)

Maximum performance you can rely on

Lasa Kangao Automobile Sales & Service Co., Ltd



Lhasa
China

Installed MAHA product(s)
MAPOWER II/ECON III, ZS SQUARE/
ZS MATOP/ZS SQUARE II, ZS SQUARE/
ZS SQUARE II, MBT2250 + MSD3000 +
MINC I, LITE 3/MLT3000, 4IN1 test lane

Facts and figures
MDT 3000, axle load 2.2 t

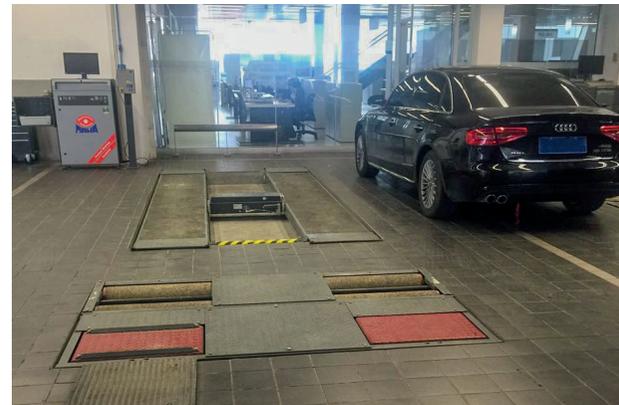
Project client
Lasa Kangao Automobile
Sales & Service Co., Ltd

Company/dealer
MAHA Maschinenbau (Beijing)
Trading Co., Ltd



Lhasa is the capital of the Tibet Autonomous Region of the People's Republic of China. It is located at the centre of the Qinghai-Tibet Plateau. The city is 3,650 m above sea level and is therefore one of the highest cities in the world.

For the client Lasa Kangao Automobile Sales & Service Co., Ltd, the workshop was fitted with MAHA equipment on site. Among other devices, a two-post lift, a two-post inground lift, a roller brake tester, a shock absorber tester, a side slip tester and a headlight tester were installed. The installation succeeded even despite the challenging



working conditions, so the system could be commissioned immediately afterwards.

The 4S shop (in China, authorised dealers are called 4S car dealers, which is short for Sale, Spare Parts, Service and Survey) was opened in August 2015. The equipment has worked without any problems ever since. It is not affected by the low pressure or other general unfavourable conditions. This once again illustrates the durability and reliability of MAHA equipment. This is the maximum performance achievable.



MAHA Maschinenbau Haidenwang GmbH & Co. KG Japan
Representative Office (Takashi Shiramizu)

No downtimes thanks to extremely quick installation

Lift installation for BMW Japan

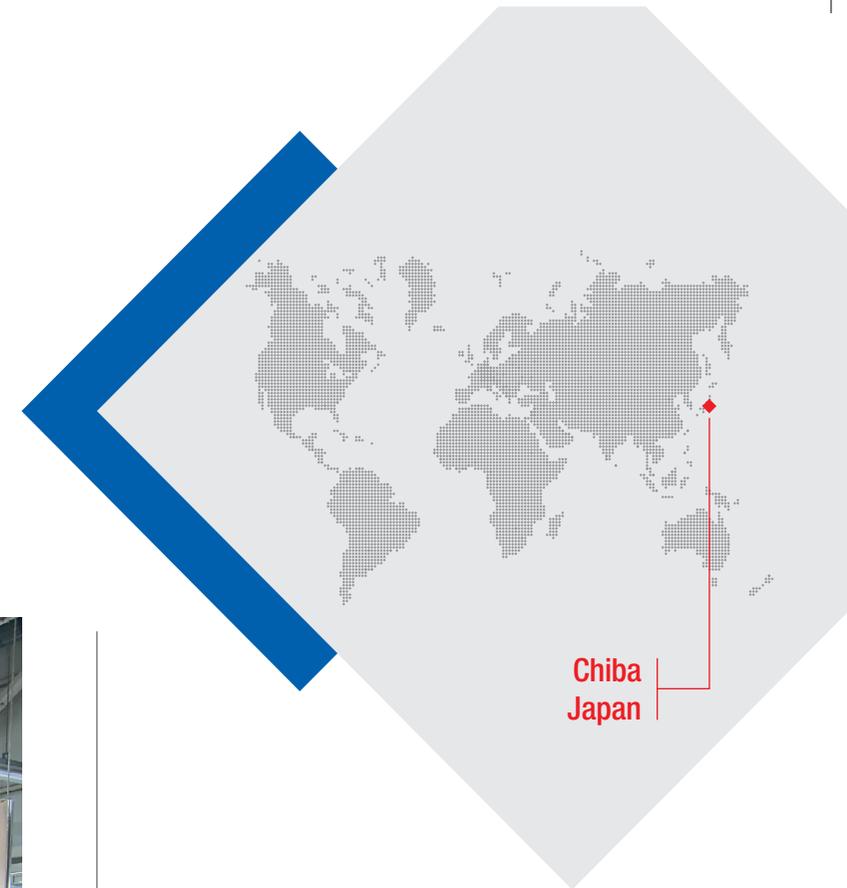
BMW Japan commissioned MAHA Japan to install two lifts of the ZS SQUARE II 3.5 BMW type in the city of Chiba. The client's assignment only allowed for three days' time – from the initial preparation of the foundations to complete installation. The reason for this was that the work was scheduled to take place during the client's holiday.

On the first day, the work began with the preparation of the concrete floor. Due to the limited space, the ground had to be dug up with a small excavator. Then the installation boxes were cast in the ground with concrete.

On the second day, the installation of the lifts and the electrical installations began.

On the third and last day, a special curtain was mounted at the workbench that is used for the maintenance of electric vehicles. This was ultimately followed by the conclusion of the installation process, start-up and acceptance by and handover to the client.

Thanks to this highly flexible and last-minute implementation work, the client did not suffer any downtimes.



Installed MAHA product(s)
2x ZS SQUARE II 3.5 BMW

Facts and figures
Installation within just three days

Project client
BMW Japan

Company/dealer
MAHA Maschinenbau Haldenwang
GmbH & Co. KG
Japan Representative Office



© MATA Maschinenbau Halberwang GmbH & Co. KG Japan Representative Office (Takashi Shitamizagi)

Quick and efficient yet quiet

A specially adapted lift for the testing facility in Japan with an extremely high throughput

A special lift was installed for the client Light Motor Vehicle Inspection Organization by MAHA Japan. The ZS SQUARE II, including wheel-free jack, axle jack, axle and tolerance detector, pneumatic floor compensator and automatic rollover protection, served as a basis.

The main lift has a load capacity of 1.5 t and a lifting height of 1,800 mm. At full on-load lifting force, the lifting time is only 18 seconds. Normally, twice that duration would have to be expected. The roll-off safety fixture works automatically on both runways at the front and the back. A sensor switch detects whether the safety fixtures are raised completely. If they are not, the lift shuts down automatically.

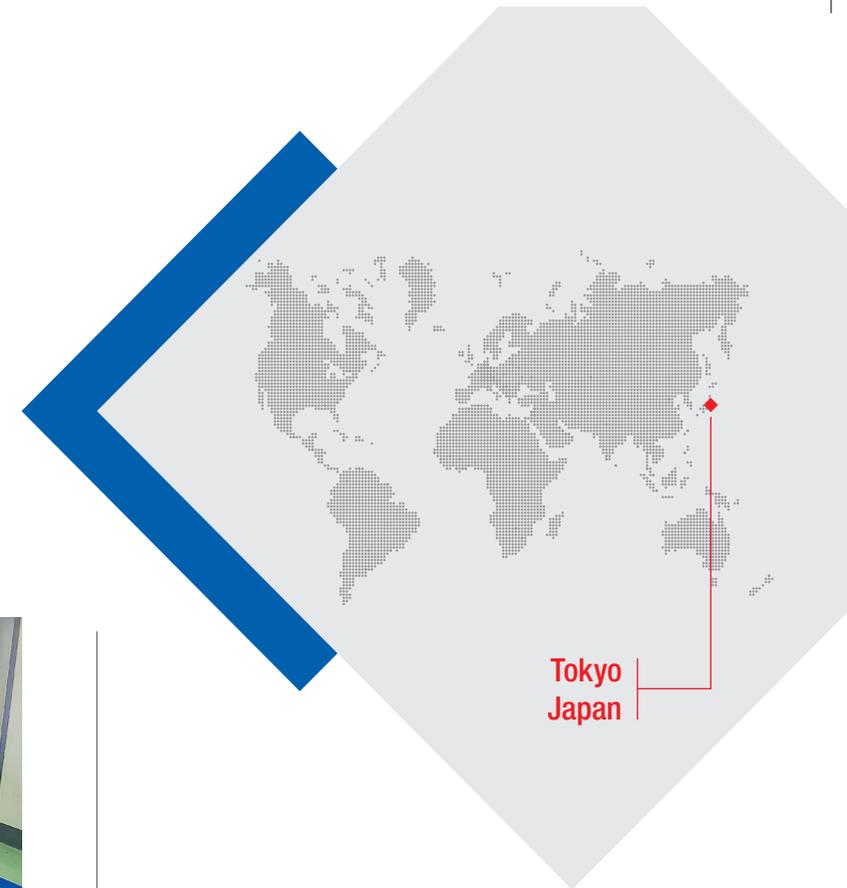
The hydraulic unit is installed separately in a location where it can easily be maintained. This requires durable, pressure-resistant hydraulic hoses between the unit and the lifting device. A safety device reacts to faults at the level of the hydraulic hoses, the unit or the electrics.

Furthermore, there is an emergency valve to lower the system during a power failure. The noise emission one meter above the hydraulic unit with the lifting device activated remains below 70 dB(A). A test vehicle was



used to determine the capacity.

The throughput was up to 30 vehicles per hour or 120 to 150 vehicles per day, with a maximum of 200 to 240 vehicles per day possible.



Installed MAHA product(s)
ZS SQUARE II 3.5 PF

Facts and figures

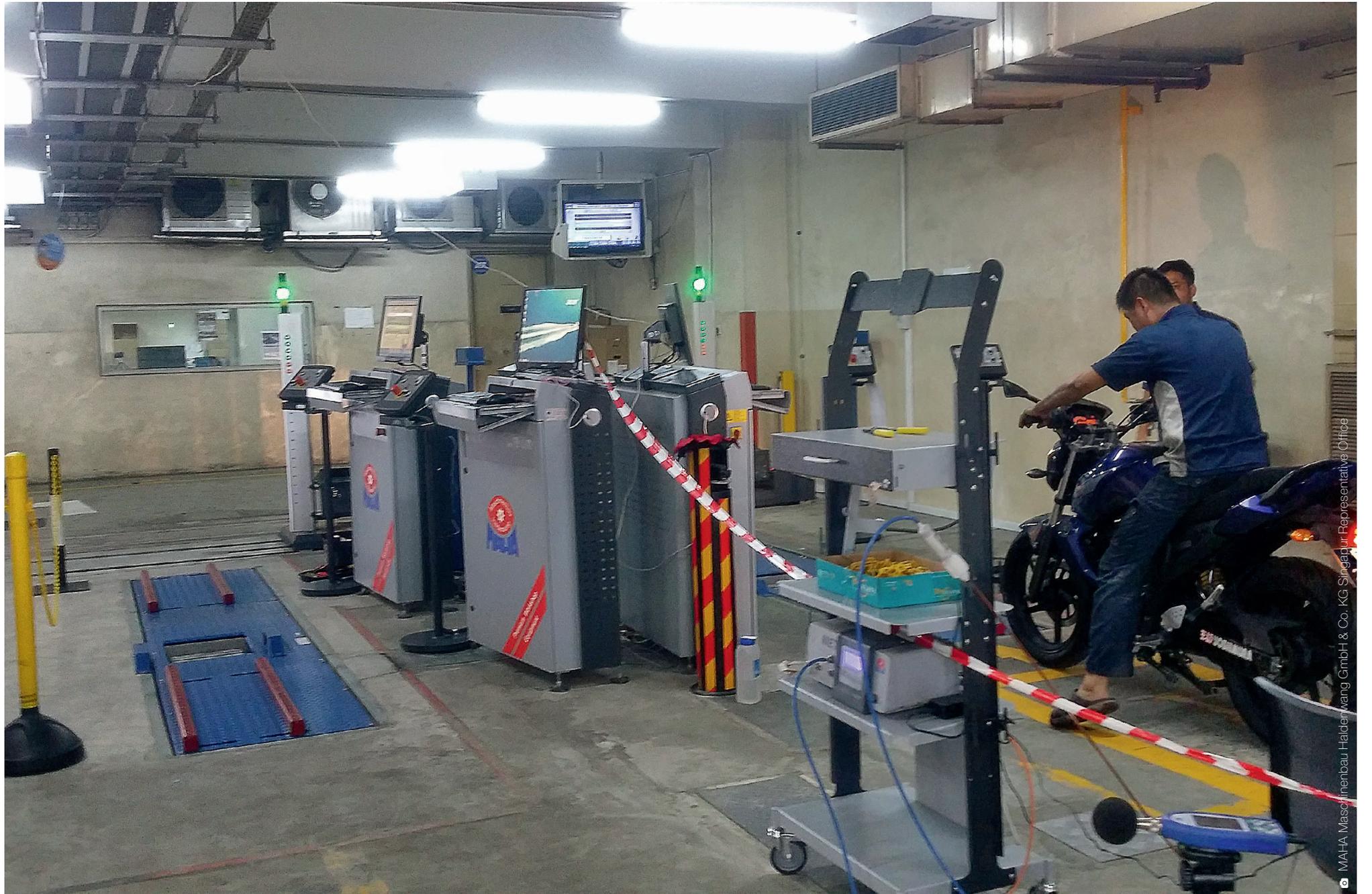
Vehicle throughput during inspections:
up to 30 cars per hour,
a total of approx. 120 to 150 cars per day

Project client

Light Motor Vehicle Inspection
Organization

Company/dealer

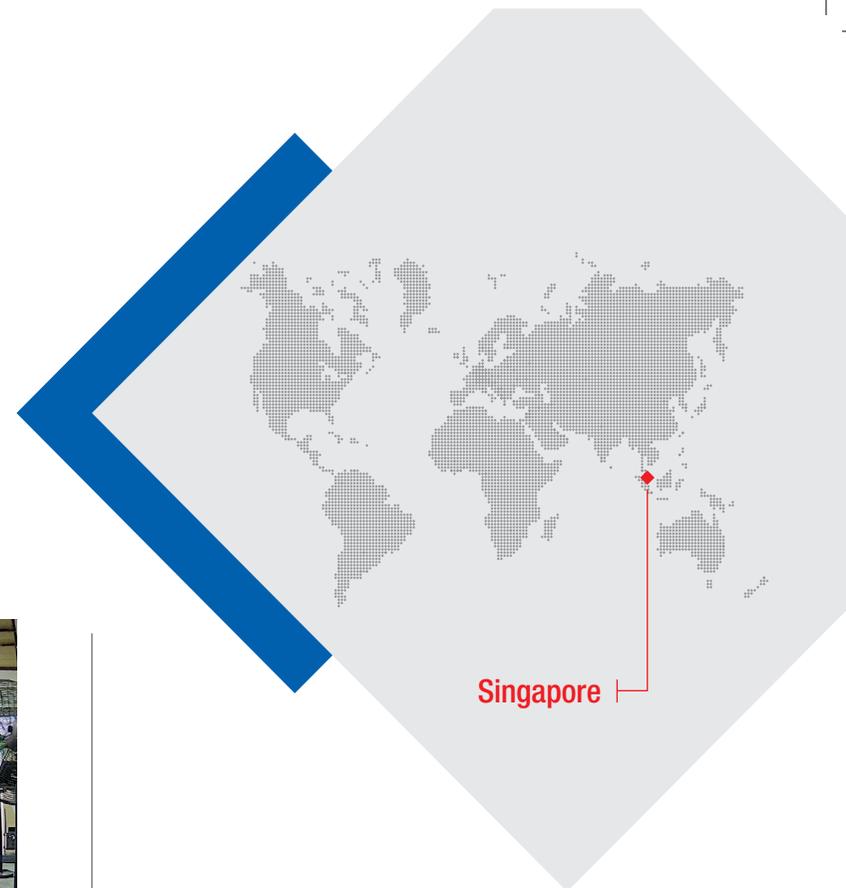
MAHA Maschinenbau Haldenwang
GmbH & Co. KG
Japan Representative Office



MAHA Maschinenbau Halderwang GmbH & Co. KG Singapore Representative Office

Twice as good a solution in the most limited of spaces

Two-way test lane for motorcycles in Singapore



VICOM LTD commissioned MAHA Singapore to install two adjacent test lanes for motorcycles. As the test centre serves on average over 150 customers per day, a single test lane was not sufficient.

The space conditions in the centre are rather confined, and it employs only few inspectors. The communication desks were to be located right next to one another to spare the inspectors the longer walking distance. Both installation and construction were performed one step at a



time, as checks were to take place in parallel. A complete function test includes a visual inspection as well as an inspection of the noise level, the emissions, the headlights, the brakes and the side slip.

The MBT 1000 roller brake tester, the MINC III side slip tester, the MET 6.1 emission tester, a noise level meter and the MLT 3000 R headlight tester with a light set-up robot were installed based on the EUROSYSTEM solution.

Installed MAHA product(s)

EUROSYSTEM, MBT 1000, MINC III, MET 6.1, 3M SE-402, MLT 3000 R

Facts and figures

Very confined space for two adjacent motorcycle test lanes

Project client

VICOM LTD

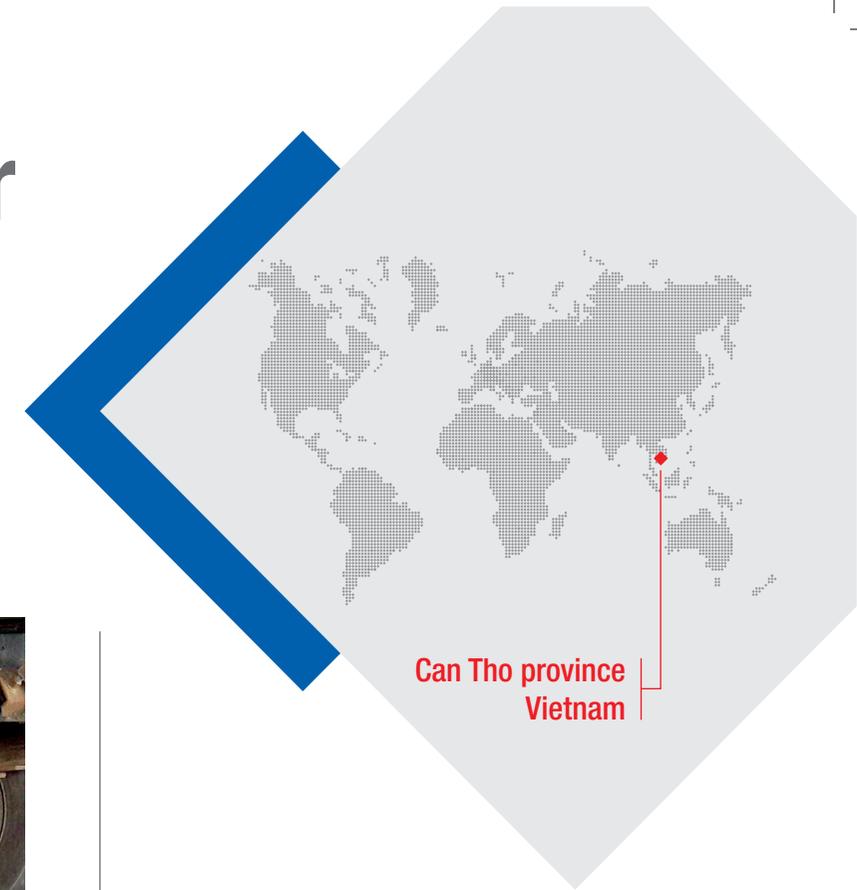
Company/dealer

MAHA Maschinenbau Haldenwang GmbH & Co. KG
Singapore Representative Office

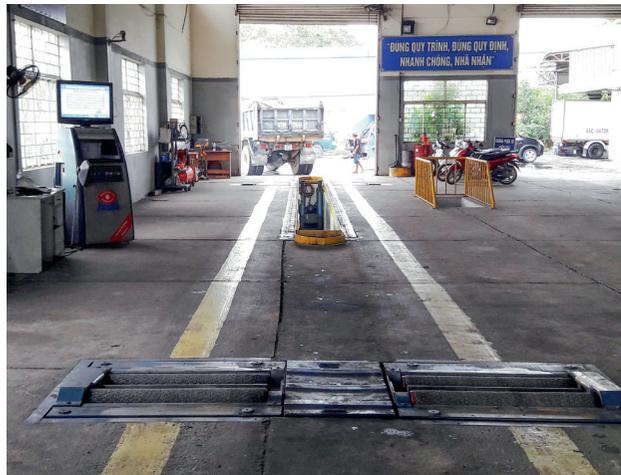


Blowing our client out the water

Brake tester in the marshland of the Mekong Delta



Can Tho province
Vietnam



In Vietnam, the Mekong Delta is called “the river delta of nine dragons”. In this region in the south-west of Vietnam, the Mekong river runs across a network of tributaries towards the South China Sea, eventually flowing into it.

With a total area of 39,000 square kilometres, the Mekong Delta region spans a vast part of south-west Vietnam. The largest city in this region is Can Tho, which is a provincial administrative unit and known as an economic, scientific and cultural hub.



In 2009, MAHA Vietnam installed the MBT 4250 brake tester in the Can Tho Inspection Centre. This test centre is located near a canal in a swampy area. 60 to 70 trucks are tested at the centre daily, which greatly contributes to road safety within the region. Despite high humidity levels due to its specific location, the brake tester is still working flawlessly many years later.

Installed MAHA product(s)
MBT 4250

Facts and figures
Marshland surrounding the Mekong Delta

Project client
Can Tho Inspection Centre

Company/dealer
MAHA Vietnam Co., LTD



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For a sultanate with safe roads

The national testing facility network in Oman has been one of the largest projects in MAHA's corporate history to date

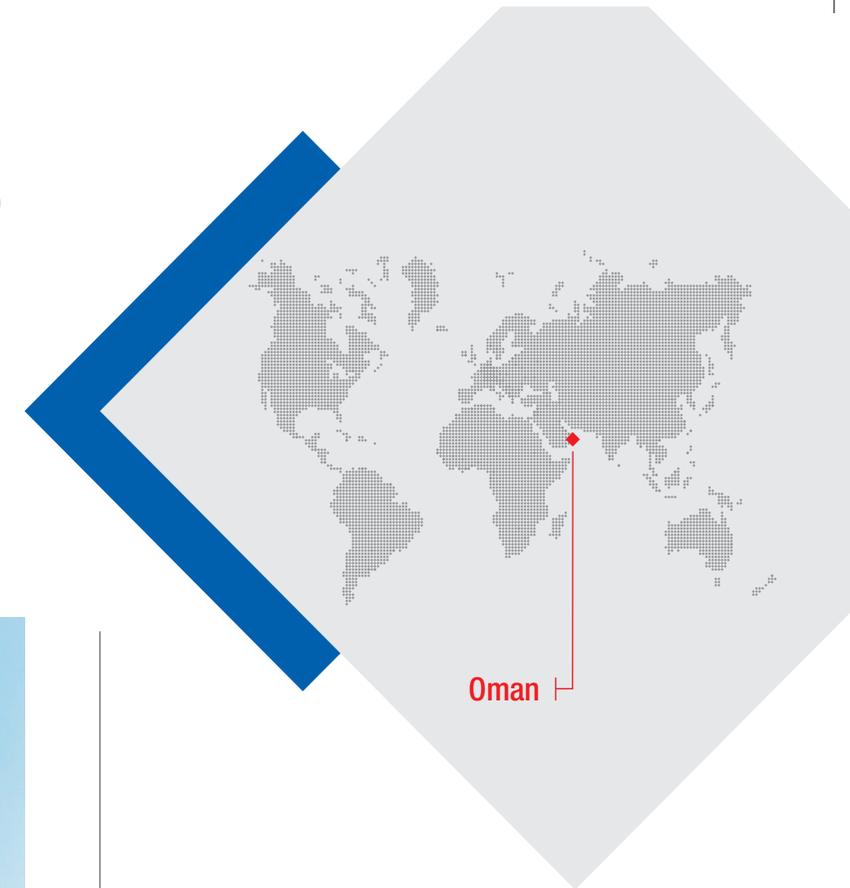
The Sultanate of Oman wanted to drastically reduce the number of people injured and killed in road traffic. In order to achieve this goal, the government decided to shorten the term of the periodic technical vehicle inspection from eight to three years. Due to the increased testing volume, the testing facility network needed to be expanded and modernised.

In a global call for tenders, MAHA was granted the contract. The reasons for this decision were good contacts and references from similar projects in the Middle East. The state police bureau of the Royal Oman Police (ROP) and the MAHA partner Khimji Ramdas (KR) are the partners in this project. Since the project started in 2014, MAHA has delivered 83 test lanes and two test containers to 25 testing facilities in different locations. A further 23 test lanes for eleven additional testing facilities have already been commissioned.

In addition, MAHA implemented nationwide networking of the testing facilities with the government database – with the online data management system VIMAS. This software solution bundles all the data collected in vehicle inspections and saves it centrally on an external server. The data is promptly available to all authorised parties



for various evaluations. VIMAS is modular in design and provides the test engineers with current target values and vehicle information in real time for the testing process. The national testing facility network in Oman is one of the largest projects to date in MAHA's corporate history.



Installed MAHA product(s)
Complete test lanes for trucks and cars

Facts and figures
83 test lanes and a further
23 lanes planned

Project client
Khimji Ramdas/Royal Oman Police

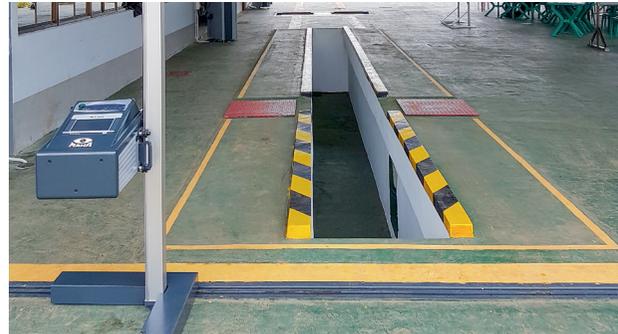
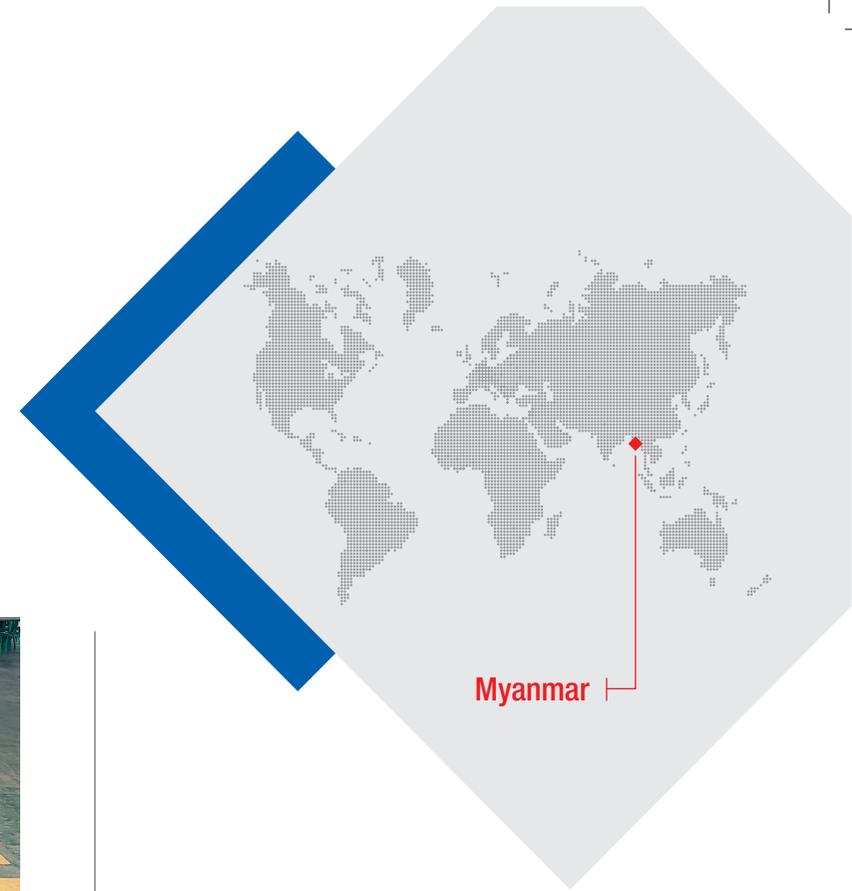
Company/dealer
MAHA Maschinenbau Haldenwang
GmbH & Co. KG



MAHA Representative Office Bangkok (Sotungruang)

All challenges overcome

Eight test stations in Myanmar



Thanks to the active support of the MAHA Bangkok Representative Office and our MAHA partner in Myanmar, the last of eight new test centres in Myanmar opened on 15 May 2017.

After long and intense preparations, it was finally time in the middle of May. The new test station went operational in Mandalay, the second-largest city in Myanmar with a population of 1.6 million people. In the preceding weeks, a total of 24 test lanes (16 motorcycle test lanes and eight truck test lanes) at eight testing facilities in seven different cities and provinces in Myanmar were equipped with MAHA technology. The operator, the Road Transport Administration Department (RTAD) in Myanmar, has

been relying on testing technology from the Allgäu region for many years.

The first analogue MAHA test lane was put into operation under the RTAD in 2004. Especially in the 20 days available for the installation, Theeradech Soirungrueng (Head of the MAHA Representative Office in Bangkok) and his team at SMART Electrical Services Ltd. (MAHA's partner in Myanmar) had to deal with the adversities of one of the poorest countries in the world. Twelve-hour overland journeys on the night bus, roads with poor tarmac conditions – or no tarmac at all – were the order of the day, as were daily power cuts lasting several hours.

Installed MAHA product(s)

Test lane for lorries,
test lane for motorcycles

Facts and figures

First infrastructure project for vehicle testing following the embargo being lifted and Myanmar opening for business

Project client

Myanmar Road Transport Administration Department

Company/dealer

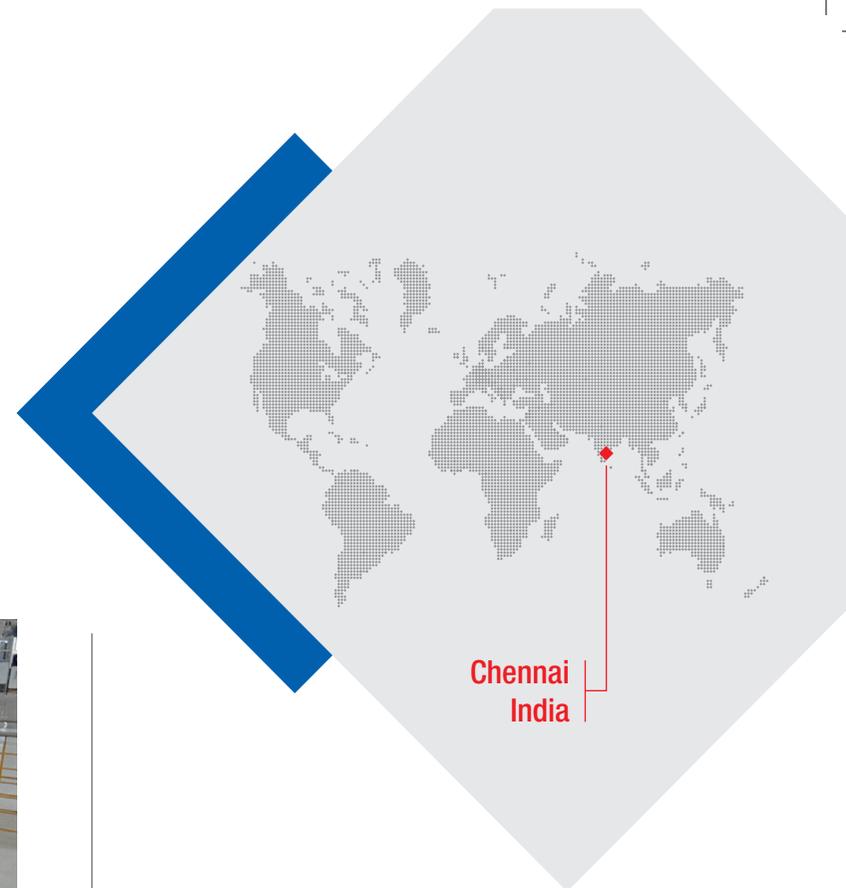
SMART Electrical Trading Co., Ltd.



MAHA India Automotive Testing Equipment Private Limited

Ready-to-use, highly flexible end-of-line testing

Test system for Daimler subsidiary in India



Daimler India Commercial Vehicles Pvt. Ltd. is a subsidiary of the German company Daimler AG. The company headquarters are in Perungudi, Chennai, and the plant is located in Oragadam, Kanchipuram district, Tamil Nadu.

The company designs, manufactures and distributes commercial vehicles – specifically adapted to the requirements of Indian clients and the terrain conditions in India. The vehicles are distributed under the brand names “BharatBenz”, “Mercedes-Benz” and “Fuso (Mitsubishi)”. Production began in June 2012 and the first

heavy truck was launched in September 2012. Daimler India Commercial Vehicles aspires to exclusively offer the highest product quality to its customers.

MAHA India delivered the ready-to-use solution for the EOL test system including the following elements: roller brake testers, tachometer testers, emission testers, mobile wheel engaging column lifts, hydropneumatic pit jacks and wheel aligners for trucks. These elements provide Daimler’s subsidiary in India with a state-of-the-art, highly flexible end-of-line solution for all the vehicle models on offer.

Installed MAHA product(s)

Roller brake testers, tachometer testers, emission testers, mobile wheel engaging column lifts, hydropneumatic pit jacks and truck wheel aligners.

Facts and figures

Project client

Daimler India Commercial Vehicles Pvt. Ltd.

Company/dealer

MAHA India Automotive Testing Equipment Private Limited



MAHA India Automotive Testing Equipment Private Limited

State-of-the-art technology in a secluded location

Fully automatic test lane in southern India

In the Indian cities of Thiruvananthapuram and Muttathara, the Kerala Motor Vehicles Department initiated a pilot project. The goal was to develop a fully automated vehicle test centre. In the 2.45 INR core centre set up by Keltron, the vehicles are subjected to seven tests in three sections according to government requirements.

MAHA India supplied the test equipment necessary for this. The vehicle's tachograph and noise level are inspected in the first section and the chassis and brakes in the second, with the third section involving a visual inspection and headlight test.

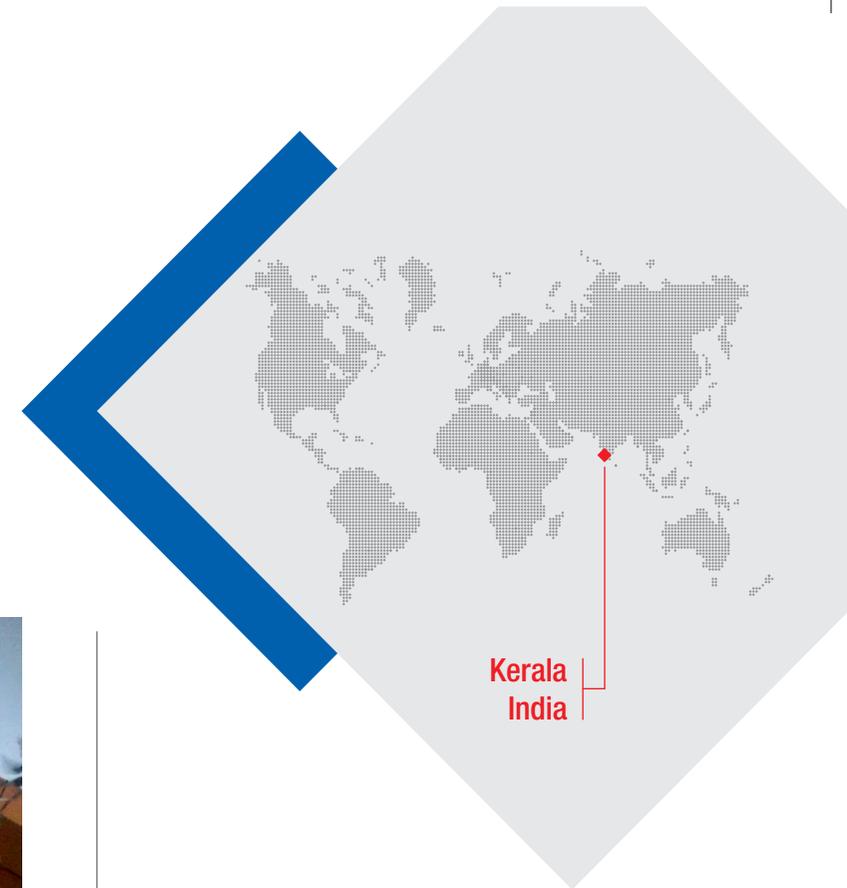
The three-section structure of the test lane enables all these inspections to be performed on three vehicles in parallel, with inspection certificates issued once all the tests are completed.

This has brought about a significant improvement on the previous test procedure. The test lane is fully automated so the measurements it provides are exact, making it more reliable than the manual vehicle inspections that used to be performed.

One of the major problems in the past was that inspections



were not performed correctly and significant defects were not detected in test drives. Thanks to cutting-edge MAHA technology, safe vehicle testing is possible even in the most secluded locations.



Installed MAHA product(s)

MBT 2250, MSD 3000, MINC I EURO, TPS I EURO, 3M-SE-402, automatic MLT 3000, visual inspection with HD camera

Facts and figures

Project client

Keltron and Kerala State Government

Company/dealer

MAHA India Automotive Testing Equipment Private Limited



MAHA India Automotive Testing Equipment Private Limited

German standards for Indian tests

Pilot project for TÜV SÜD South Asia

TÜV SÜD South Asia is a wholly-owned subsidiary of the TÜV SÜD Group. It is the leading company for certification, testing, auditing, inspection and training – with a strong presence in India, Bangladesh and Sri Lanka.

In those three countries, TÜV SÜD South Asia has a network of more than 32 offices, including 19 laboratories. Its client base consists of more than 10,000 companies from various sectors, including the automotive industry, plant engineering, environmental technology, food safety, textiles and leather, hardware, healthcare, infrastructure consulting and non-technical training.

The TÜV SÜD team of specialists works closely with its clients to enable them to reinforce their competitive edge. The main goal is to offer the clients ideal solutions – in terms of reliability, safety, quality, environmental protection and cost efficiency.

Absolute objectivity and neutrality, as well as avoiding conflicts of interests, are vitally important to achieving this goal. This applies to all activities in the areas of management system certification, testing, inspection, auditing and training. In the context of the pilot project,



MAHA India installed a complete test lane for cars and trucks for the client in New Delhi.

In doing so, TÜV SÜD laid the foundations for nationwide uniform testing according to German standards. There is therefore nothing more in the way of legally prescribed testing, as is the case in Germany.



Installed MAHA product(s)
Safety test lane

Facts and figures

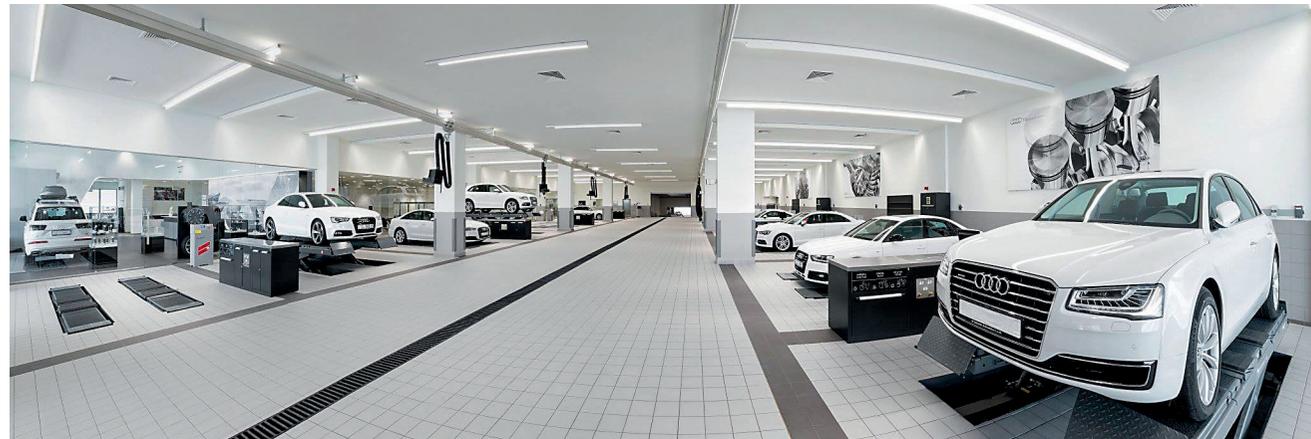
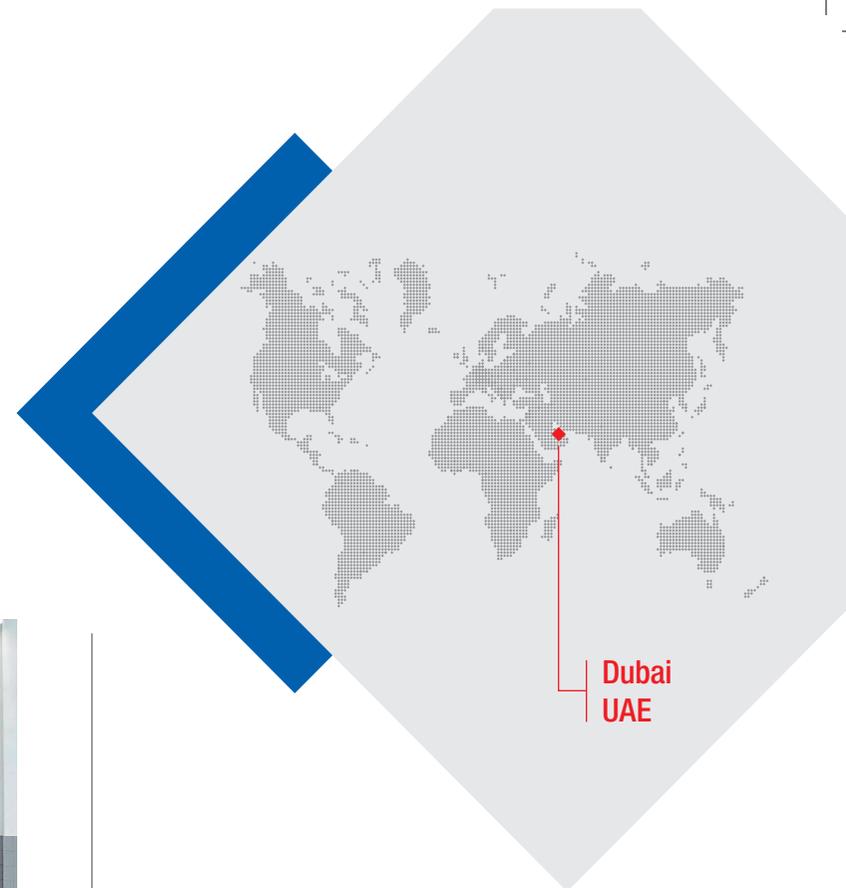
Project client
TÜV SÜD South Asia
(formerly TÜV SÜD – India)

Company/dealer
MAHA India Automotive
Testing Equipment Private Limited



A workshop project of superlatives

MAHA kits the world's biggest AUDI Centre, based in Dubai, out with workshop equipment



In 2016, Al Nabooda Automobiles L.L.C. opened the world's biggest AUDI Centre in Dubai. On a total area of 31,000 m², the three-storey workshop kitted out with MAHA equipment takes up floor space of 11,000 m².

As many as 400 customer parking spaces are available. The total investment for this project was around EUR 34 million. EUR 720,000 of this sum was used for a whole range of MAHA products. MAHA covered all the original fields of application for a total of 93 workstations in the car dealership's service area. More than 86 lifts, test

lanes and diagnostic products such as headlight testers are in use there. The total test run capacity is 170 vehicles per day, which only represents a utilisation rate of 60 to 70%.

The project was implemented by MAHA's regional partner in Dubai, Al Zarouni International Equipment L.L.C. It was supported by the central planning departments of the plant in Haldenwang. The AUDI Centre in Dubai is one-of-a-kind in terms of its size and the modernity of its equipment.

Installed MAHA product(s)

More than 86 lifts, test lanes and diagnostic products

Facts and figures

The world's largest independent AUDI Service Centre

Project client

Al Nabooda Automobiles L.L.C.

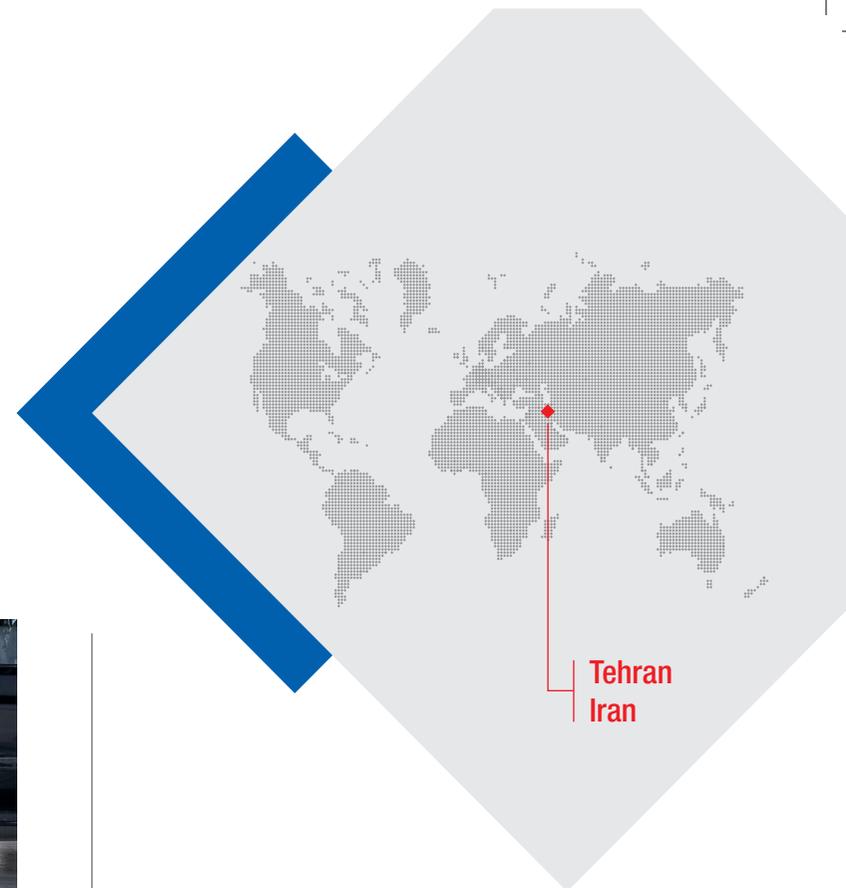
Company/dealer

Al Zarouni International Equipment L.L.C.



Double shifts for 17 years

Test lanes with MAHA equipment in Iran



The Beihaghi Municipal Technical Vehicle Test Centre is the first mechanised test centre in Iran. It was established in the capital Tehran in the year 2000. For more than 17 years, over 1,000 vehicles have been tested in this facility in two shifts per day.

The centre has six test lanes, which are completely kitted out with MAHA equipment: a gas analyser, a headlight tester, a side slip tester, a shock absorbertester, a roller brake tester, lifts and axle play testers. More than 200 technical test centres for cars and trucks in Iran are provided



with MAHA test equipment at present. Cars have to be tested annually, while public vehicles and buses have to be tested every six months.

All the equipment is exposed to extremely high working pressure. In every test lane, almost 150 vehicles are tested per day. The modern MAHA products are characterised by their high production quality. They therefore continue to work flawlessly, even after a long time in use, despite extremely tough requirements.

Installed MAHA product(s)

MGT5, MINC I, MSD 3000, IW2, DUO-1

Facts and figures

Test centre with six test lanes;
daily throughput approx. 1,000 vehicles;
17 years old

Project client

Municipality of Tehran

Company/dealer

Tavan Sazan Iran Co. Ltd.



Amidst war and extreme climate conditions

MAHA equips test centre in Iraq

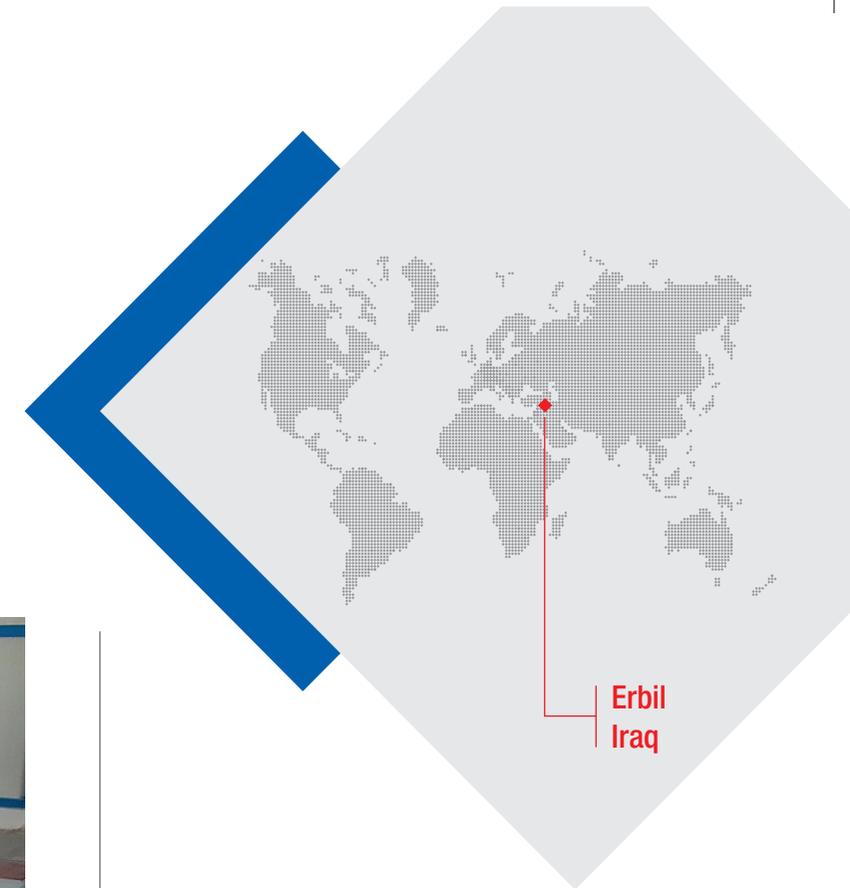


The Erbil New Centre was built in the north of Iraq during one of the worst Iraq wars with the terrorist group ISIS. It includes seven test lanes for cars and four emission test stations.

The centre was established to reduce the test load of other centres featuring MAHA equipment in the north of Iraq, because in those centres, more than 350 cars and vans per day are tested on each test lane. And all of this takes place in extreme climate conditions with temperatures ranging between $-3\text{ }^{\circ}\text{C}$ and $+48\text{ }^{\circ}\text{C}$.

At the beginning of 2017, there was heavy fighting between the Iraqi army and Peshmerga forces on the one side and ISIS militia on the other. This happened only about 20 kilometres from the test centre location and on the roads from Mosul to Erbil and other war zones.

The equipment therefore had to be shipped by sea and also had to cross several Iraq borders with complicated clearing procedures. After all, the risk of kidnappings had to be avoided at all costs.



Installed MAHA product(s)
T2250, MSD 3000, MINC I,
3x MET 6.1, 1x MET 6.3

Facts and figures

Project client
PVI Company

Company/dealer
EDGE Middle East Offshore



© MAHA USA LLC

Individual solution for special-purpose vehicles

Mobile lifting device for mine locomotive maintenance

MAHA USA developed and produced mobile lifts for the mining company Walter Energy. These lifts were intended for use in mine no. 4 in the maintenance of special mine locomotives made by Brookville Equipment Corporation. The heavy special-purpose vehicles meant that individual adjustment was necessary.

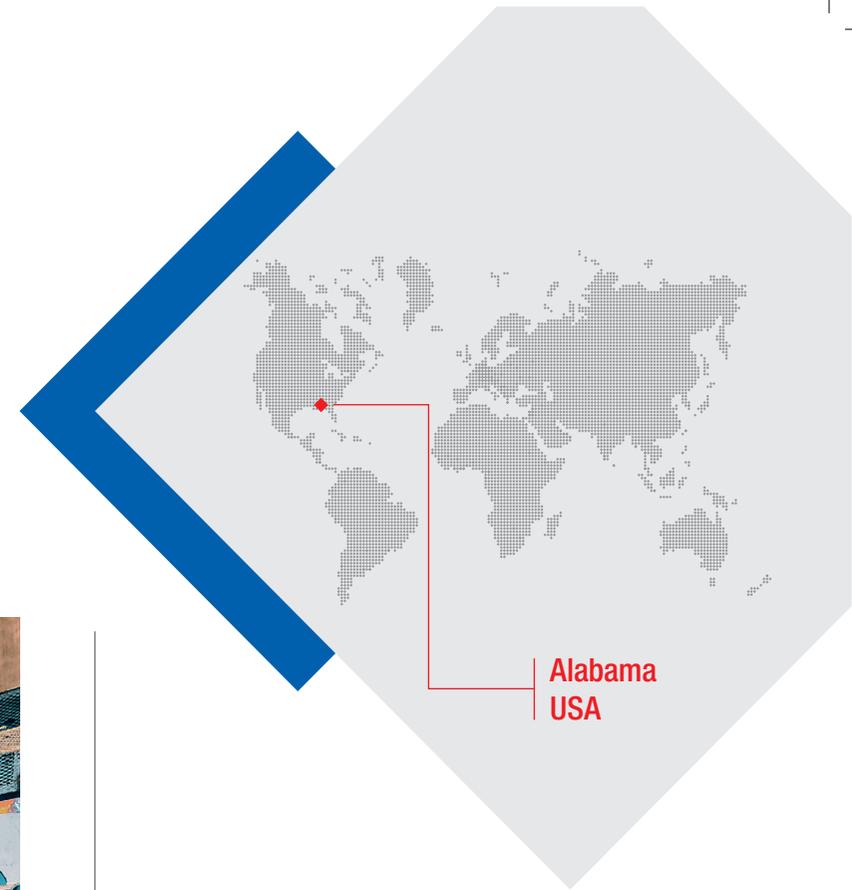
A lifting force of up to 30 t was required to lift the locomotives. The lifts were supposed to enable component (wheel and axle) replacement, track panel inspection, oil changes and maintenance of the chassis (including the engine). Following intense research, MAHA USA developed a special mobile lift. It was based on a lift design that had already been used in Europe for rail vehicles.

A total of four mobile lifting columns with a total load capacity of 32 t were produced. Every column was equipped with a flat fork with a hard-wearing rubber surface to protect the locomotive housing.

The height of the base framework for the mobile columns was reduced and small rollers were attached so that the columns would be able to fit under the low locomotive frame. MAHA USA's lift solution reduced the idle time and downtime due to maintenance work by over 50%.



Due to its great success, MAHA USA was commissioned to build another custom-made mobile lift system for the client Shook & Fletcher Supply, a company that manufactures mining equipment.



Alabama
USA

Installed MAHA product(s)
Custom-made, mobile
lift system

Facts and figures
Lifting mine locomotives
up to 30 t in weight

Project client
Walter Energy, mine no. 4

Company/dealer
MAHA USA L.L.C.



© MAHA USA L.L.C.

Suitable even for the heaviest loads

Mobile lifting system for tram maintenance

For the Toronto Transit Commission, a customised lift system was devised in cooperation with Karlift Solutions, MAHA's branding partner.

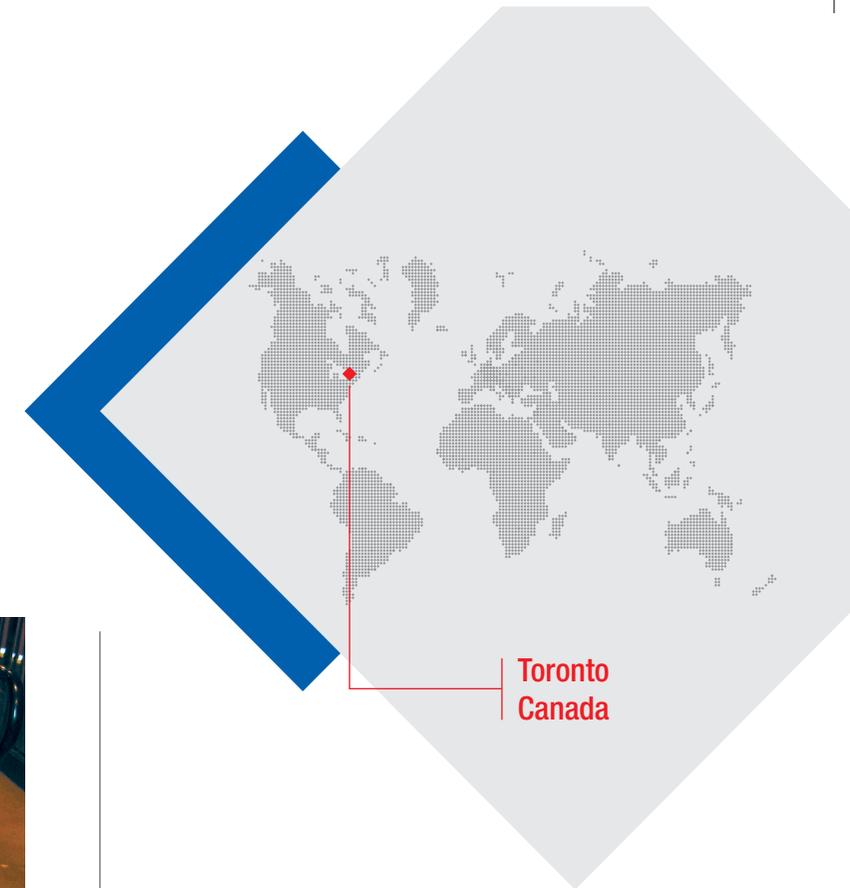
It was used to maintain the Bombardier trams. Due to the tram's length and its lift points, a twelve-column lift solution was necessary. The Toronto Transit Commission chose a mobile lifting solution, since that way the current system could still be used without expensive modifications. Furthermore, the tram maintenance works are not limited that way.

MAHA USA developed and produced a mobile twelve-column lift system for two maintenance facilities. The columns provide a load capacity of approximately 8.8 t each and a total load capacity of 117 t.

The lifting system lifts the Bombardier trams by their frame, enabling maintenance work to be performed at the motors as well as the replacement of wheels and axles. Each lift was fitted with adapter plugs, which fit exactly into the specific slots in the Bombardier trams.



What's more, MAHA USA designed an electronic control and a specific piece of software for the accurate synchronisation of the twelve columns.



Toronto
Canada

Installed MAHA product(s)

Mobile lifts for rail vehicles

Facts and figures

Twelve-column lifting system; approximate load capacity of 8.8 t per column

Project client

Toronto Transit Commission

Company/dealer

MAHA USA L.L.C.



© MAHA-Maschinenbau Halderwang GmbH & Co. KG, MAHA USA LLC.

A matter of maximum precision

Special lifting system for extremely fragile Boeing special components in Hawaii

Besides aircraft, Boeing also produces extremely expensive parabolic mirrors worth several million US dollars. In the case of this project, the product in question was the US Department of Defense's largest telescope mirror with a diameter of 3.7 metres, which affords a glimpse into the depths of space.

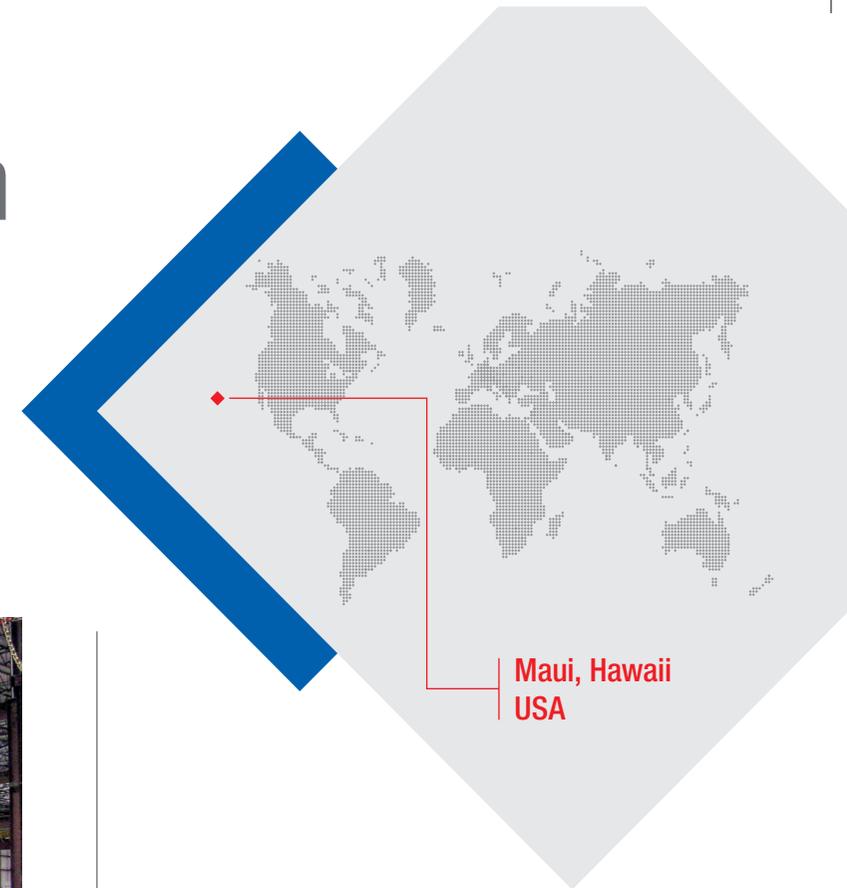
During the production process, the parabolic mirrors arrive at the finishing section on a conveyor belt below the hall ceiling. From there, they have to be lowered onto a skid on the hall floor. If there is even the slightest height difference between the support points, the parabolic mirror will be damaged. That is precisely why MAHA was commissioned to construct a special lifting system.

RGE columns whose motors were exchanged (EUR 3,000 per motor) served as a basis for the lifting and lowering system. The particularly high columns (4.2 m) were anchored to the ground with wire ropes to prevent them from bending out of shape under the weight.

In addition, a specific piece of software was developed to synchronise the columns exactly. Each column has its own computer, which is connected to a central computer.



This central computer has a display through which the exact lifting height can be entered. The closer the support points converge to the mirror, the slower they become, until they eventually approach a pace of 1/10 mm. This is to avoid any juddering caused by sudden lifting, and the extremely expensive and fragile mirrors can therefore be lowered to the hall floor safely.



Maui, Hawaii
USA

Installed MAHA product(s)

RGE

Facts and figures

Load capacity 20 t; lifting distance 330 to 3,150 mm; variable lifting speed between 127 and 508 mm/min; surface loading approx. 0.3 N/mm²

Project client

Boeing

Company/dealer

MAHA Maschinenbau Haldenwang GmbH & Co. KG, MAHA USA L.L.C.



Most certainly a successful cooperation

In-ground lift for the metro in New York

The New York Metropolitan Transportation Authority (NY MTA) is the largest transportation network in all of North America. In the last 30 years, it invested almost USD 102.4 billion in the restoration and improvement of the network.

The NY MTA commissioned Railquip, MAHA USA's branding partner, to produce a customised in-ground lift, which was developed by Neuero Corporation. Neuero delivers high-quality equipment for important projects in industrial facilities all over the world.

The in-ground lift is necessary for replacing components (unit, axles, wheels). It also facilitates the performance of checks and maintenance work for rail vehicles in one of the MTA's train maintenance facilities. The in-ground lifting system was designed with a capacity of approximately 8,618 kg per lifting element.

An electromechanical rotary disc was manufactured to ensure that the train system could be positioned correctly in the service area. The project was implemented in a production plant belonging to MAHA USA. The MAHA USA welders were aided by a team of about ten of Neuero's expert welders.



During the production process, MAHA USA created a special test station in which – before the lift was delivered to New York – each of the individual lifting segments were tested at full load. The lifting system and the electro-mechanical rotary disc were successfully installed in early 2009.



New York City
USA

Installed MAHA product(s)
Customised in-ground lifts
and electromechanical rotary disc

Facts and figures
Rail vehicles weighing up to 38,555 kg

Project client
New York Metropolitan
Transportation Authority

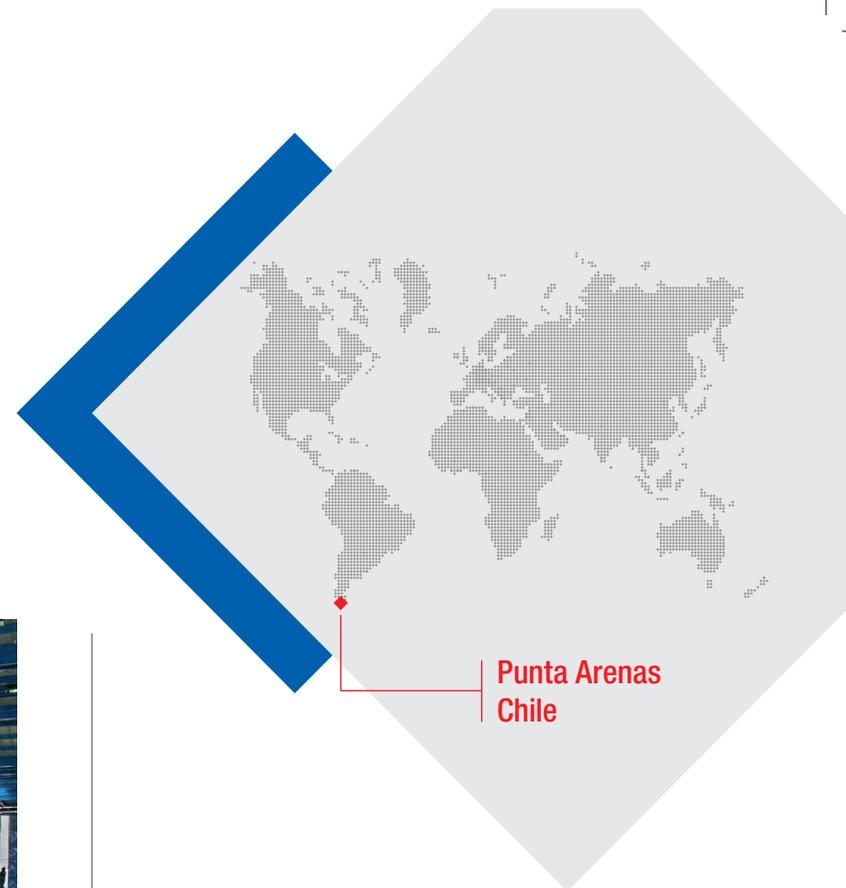
Company/dealer
MAHA USA L.L.C.



Fernando Herrera Toledo

At the southern tip of South America

MAHA equips testing facility in Chile



The Chilean enterprise Revisiones Técnicas Davison LTDA, based in Punta Arenas in the Magallanes y la Antártica Chilena Region, has been conducting technical vehicle checks since 1980. The city is located in the far south of the country, on the Strait of Magellan and on the Brunswick Peninsula.

Cars, trucks and buses are all checked in the most southern MAHA testing facility in the world. It comprises



three test lanes for cars and one test lane for trucks. The state-of-the-art plant also boasts a mobile test lane. It is used to service the region's various municipalities that don't have their own testing facilities. This particularly concerns facilities in Tierra del Fuego.

Due to the extremely high degree of reliability and the extraordinary quality of all the products, the company has relied on MAHA devices since it opened.

Installed MAHA product(s)
Mobile test lane, car and truck test lanes (3x car and 1x truck)

Facts and figures

Project client
Revisiones Técnicas Davison LTDA

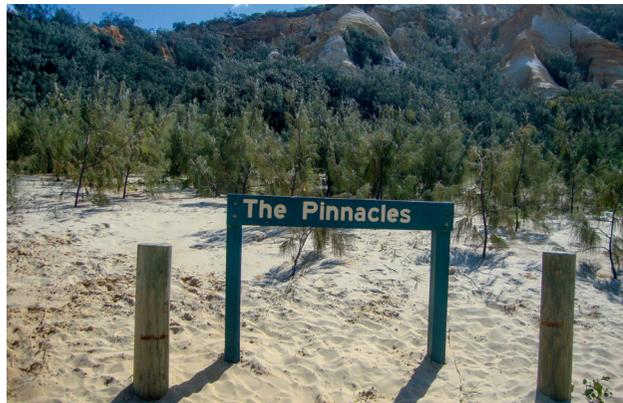
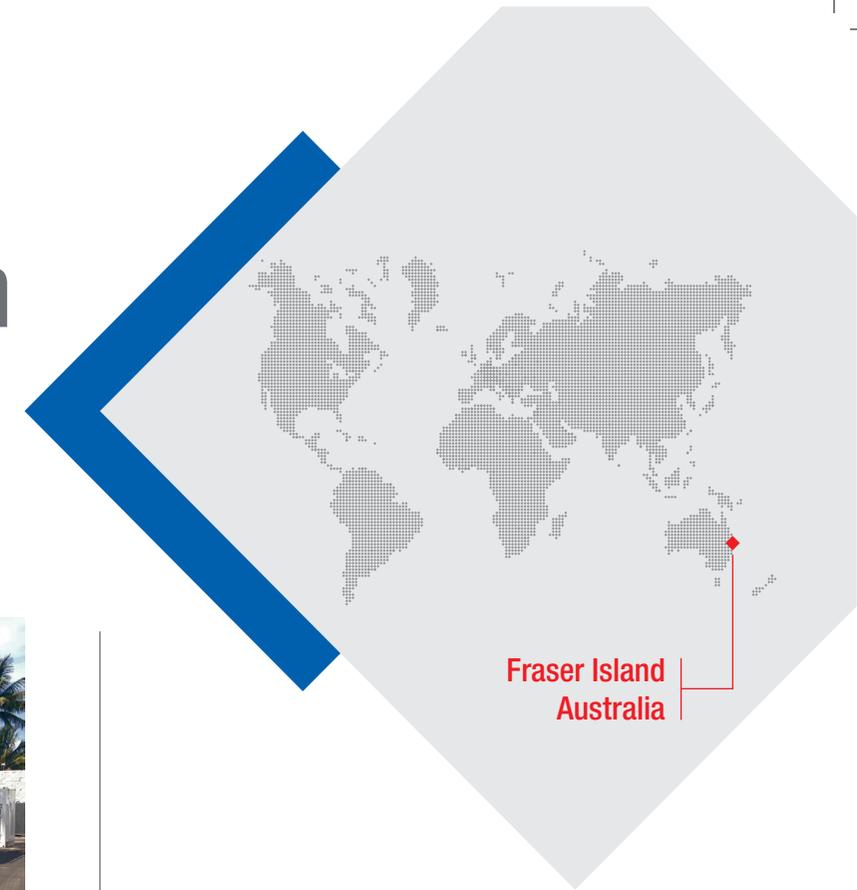
Company/dealer
MAHA CHILE SpA



© M/Y/A Australia Pty Ltd (Amit Patel)

Natural World Heritage site with mobile vehicle test station

MAHA brake tester on the world's largest sand island



The largest sand island in the world, Fraser Island, is listed as a natural UNESCO World Heritage site. A company called Kingfisher Bay Resort offers tours there every day. Since there are no paved roads, only four-wheel-drive buses can be used.

The problem with this situation is that, in Queensland, buses have to undergo a periodic technical inspection every six months. This is a huge challenge for the tourism operator, because each bus has to be transported from the island to the nearest testing facility on the Australian mainland by barge. This process lasts an entire day for



each bus. The tourism operator would benefit a great deal from having its own brake tester. An inspector could come in from the nearest testing facility and spend one or two days inspecting the entire bus fleet. This would save the tourism operator a great deal of time and money.

And it was for this very reason that, in 2008, the tourism operator Kingfisher Bay Resort purchased a refurbished IW7/2E brake tester. The brake tester was installed at sea level. No other brake tester could withstand the extreme humidity and the salt water – so this is a rather impressive accomplishment for a MAHA tester.

Installed MAHA product(s)
IW7/2E

Facts and figures
20 4WD buses

Project client
Fraser Island Tours

Company/dealer
MAHA Australia Pty Ltd.



MAHA Australia Pty Ltd & MAHA New Zealand (Pty) Ltd.

Well above Australian standards

New installation at one of the largest commercial vehicle dealers

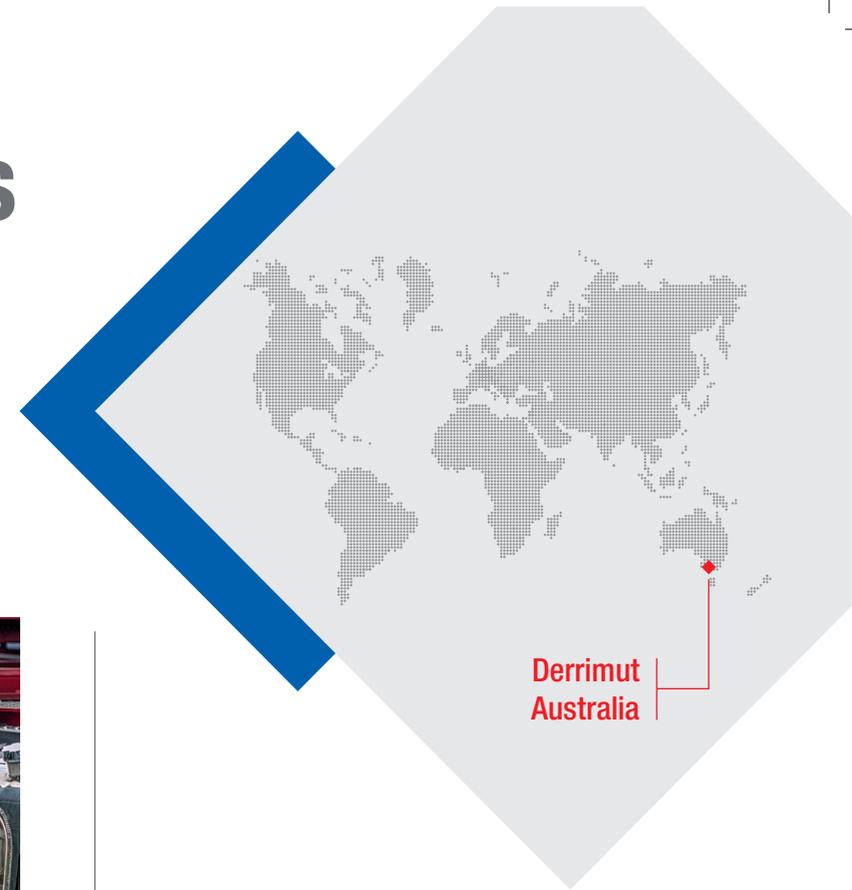
With over 1,200 employees and an annual turnover of AUD 1 billion, CMV Truck & Bus is an extensive dealer and service network for Mack Trucks, Volvo Trucks, Volvo Buses and UD Trucks. The company has six subsidiaries as well as ten authorised repair service partners all over Victoria. The new subsidiary in Laverton is one of Australia's largest commercial vehicle dealers – with 105 workstations in total.

The customer had two fully-equipped brake test lanes including roller set lift, load simulation and axle play detection installed. The subsidiary also has an integrated, digital MLT 3000 headlight tester. The equipment integrated in this test lane therefore significantly exceeds the usual Australian standards.

The front area of the test lane is used as a sighting station to detect problems with the suspension, the brakes or the headlights. The second test lane is located at the rear of the workshop pit. This is where all the defects are repaired and where the test report, which gives the customer an overview of all the repairs carried out, is printed. Following implementation of the first project with CMV, which was only made possible thanks to the commitment of our former Managing Director of MAHA New Zealand,



Bruce Hundley, we have received requests for further CMV subsidiaries. We are proud that we succeeded in implementing this fantastic project for our customer in Australia and look forward to receiving potential follow-up orders.



Derrimut
Australia

Installed MAHA product(s)

2x MBT 7250 EUROSYSYSTEM
with roller set lift
1x LMS 20/2
1x MLT 3000

Facts and figures

Client's major dealer and service network;
105 workstations

Project client

CMV – Mack Truck, UD Truck,
Volvo Truck & Volvo Bus dealer

Company/dealer

MAHA Australia Pty Ltd. &
MAHA New Zealand (Pty) Ltd.



MAHA New Zealand (Pty) Ltd.

Local adaptation par excellence

New development of a mobile test lane in New Zealand

The subsidiary MAHA New Zealand was founded in 2012. Its Managing Director, Bruce Hundley, had the idea of developing a new type of mobile test lane. It was intended for distribution mainly in Australia, but later also in New Zealand and all over the world.

Due to the sheer size of the country, there are already many workshops using mobile test lanes in Australia – consisting of a brake tester and an axle play tester. They are usually operated independently of a fixed power supply. The testers can therefore be used anywhere and everywhere. Mr Hundley had already worked for the competitors VIS (Napean Group) and bm, which is why he was so familiar with their solutions.

He wanted to develop a country-specific device, which did not have the same flaws as the VIS or bm testers, but which rather capitalised on the strong suits of proven MAHA technology. Consequently, the specifications were discussed and determined in late 2012, and the production of a prototype began in 2013.

In late 2013, the Research and Development Department in Haldenwang was brought on board, so that the development process was documented appropriately.



The mobile test lane was first presented to the public during the Sydney Bus Show and sold immediately. MAHA New Zealand therefore built two more mobile test lanes with an improved total weight and appearance.



Installed MAHA product(s)

MBT 5250

LMS 18/2

Facts and figures

Mobile test lane with its own power supply and a total weight of 3.5 t

Project client

Markets in Australia and New Zealand

Company/dealer

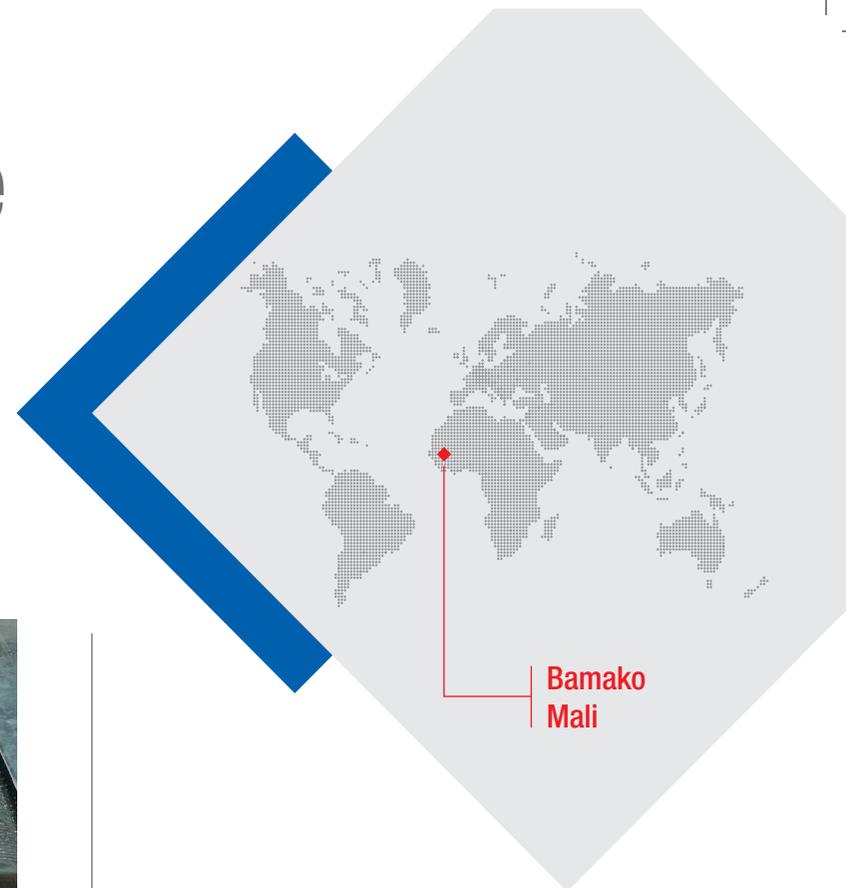
MAHA New Zealand (Pty) Ltd.



© C.A.S. EQUIPEMENT

Ready for operation despite the most adverse conditions

MAHA brake testers in Bamako, Mali



Bamako
Mali



Mali is a landlocked country which is situated in the north-west of Africa and has a tropical climate. There are two distinct seasons there: dry and wet. There are also different climate zones within Mali: in the north Saharan zone, the climate is hot and dry, while in the sub-tropic southern part of the country, the climate is hot and humid.

It is very hot in Mali, with the average temperature ranging between 24 °C and 32 °C. The amount of precipitation varies greatly, depending on the season and the region. If the wet season is short, there are regular droughts. The temperatures are lower between November and

February, The months from April to June, meanwhile, are extremely hot. Since 2009, three IW2 brake testers and one IW4 brake tester have been operated in the capital, Bamako.

120 vehicles per day can be checked per test lane, and a total of 500 vehicles per day is possible. The MAHA products defy the extremely adverse environmental and general conditions: temperatures and rain, as well as dust, mud and sand. Despite irregular maintenance, the brake testers work without any problems.

Installed MAHA product(s)

4 test lanes;
3x IW2, 1x IW4, MBT

Facts and figures

Installation in 2009;
max. 120 vehicles per test lane/day;
max. 500 vehicles/day in total

Company/dealer

C.A.S. EQUIPEMENT



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Made in Germany – used in Africa

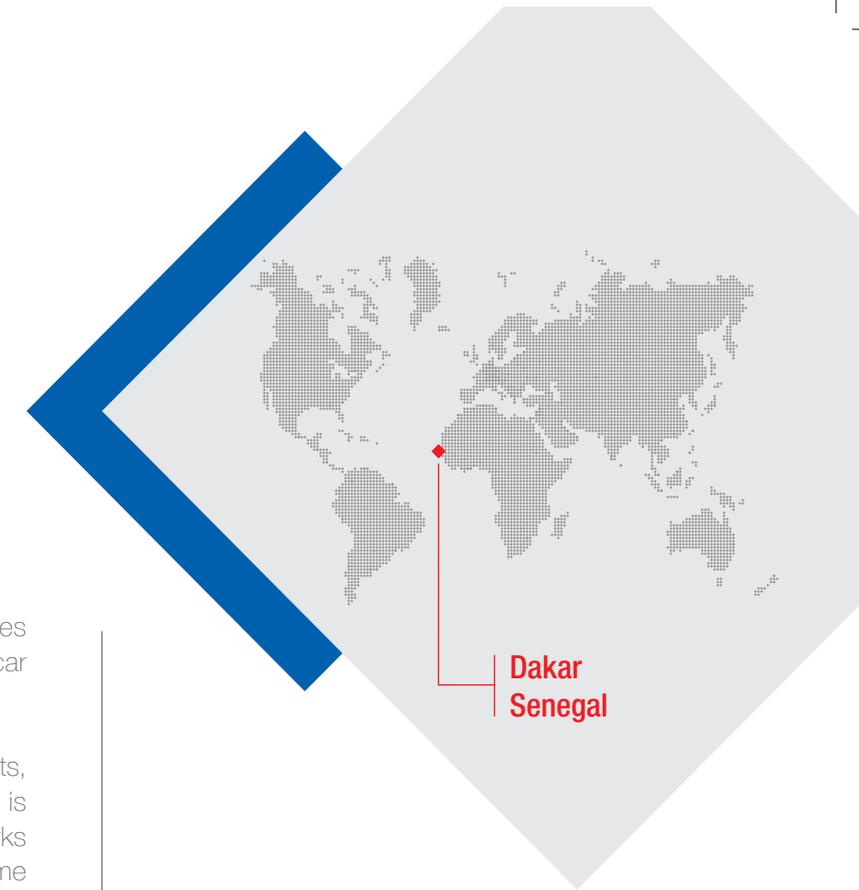
Large test centre in Dakar, Senegal

The Senegalese government had decided to make safety the top priority during vehicle inspections in future. For that reason, one of the largest test centres (Bureau Veritas) in West Africa was opened in the capital, Dakar.

It has five test lanes for cars and three test lanes for trucks. The company C.A.S. EQUIPEMENT, based in Abidjan in Côte d'Ivoire, performed all the installation work. The test centre is equipped exclusively with MAHA products and has a capacity of 1,300 vehicles per day. All the test lanes are in use six days a week from 7 a.m.

to 9 p.m. Usually, there is a very long queue of vehicles waiting. A traffic jam a kilometre long between the car park and the city streets is not uncommon.

There are regular tailbacks on the adjacent streets, but the drivers wait patiently. The MAHA equipment is neither handled carefully nor maintained, but it works faultlessly in spite of the heavy strain and the extreme climatic conditions. "Made in Germany" quality also stands the test in Africa.



**Dakar
Senegal**

Installed MAHA product(s)

A total of five test lanes:
2x IW2, 1x IW4, 1x IW7, 1x MBT 1000,
MBT MINC

Facts and figures

Installation in 2004;
vehicles per test lane
per day: max. 16;
total vehicles per day: max. 820

Company/dealer

C.A.S. EQUIPEMENT

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