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Welcome!



Just another inter airport Europe in Munich? No! Not by far. The 20th inter airport Europe marks the beginning of a new era: Goldhofer and Schopf are presenting their first mutual "baby": the new AST-2P/X. However, the merger goes far beyond this innovation and also means a tremendous boost in terms of engineering, testing know-how, capacity, experience, service and assistance.

We are therefore proud to present to you a real highlight, developed not only for this year's exhibition but also for a lifetime: the 4th generation of the AST-2. We took a blank sheet of paper and designed the next generation from scratch in order to build a new tractor that will definitely excite you! Based on a unique compact and modular vehicle concept, it includes a broad range of novelties.

Our proven hydrostatic drive system, now combined with a differential lock, offers a new level of maneuverability and – thanks to the ideal load distribution of the vehicle – best traction and, of course, the well-known high-class driving performance of Goldhofer aircraft tractors.

But what about the handling of this new vehicle? The best solutions are always easy: Simple operator guidance provided by our new central touchscreen enables effortless and errorless handling of aircraft up to 352t. Sit down in our brand-new fully glazed cab and enjoy an amazing overview not only over the pick-up device but also over the whole AST-2P/X.

Learn more about our solutions for your daily challenges: Emission standard – just choose it. Handling – just do it. Reliable performance over the whole lifetime – rely on it.

Have interesting and exciting days at the inter airport Europe 2015 in Munich and always keep in mind: Goldhofer and Schopf – this means Lifetime Performance, designed and made in Germany.

Hubert Schaller  
Chief Operating Officer



## TWO EXPERTS, ONE GOAL GOLDHOFER=SCHOPF

For the second time, the companies Goldhofer and Schopf are presenting themselves as strong partners at the inter airport Europe. The integration process that started two years ago is now completed and the result is quite impressive: GOLDHOFER=SCHOPF. Goldhofer and Schopf have joined forces in the business area Ground Support Equipment (GSE) to continue to grow and expand their leading market position according to the motto "Lifetime Performance". This motto does not only reflect the lifelong performance

of the equipment but also its high quality, reliability, innovative design and timelessness. At the inter airport Europe in Munich, the group exhibits its newly developed and advanced products in the field of GSE. In addition to the three towbar tractors F70, F110e and F396, the military towbar tractor STT, the towbarless tractor AST-1X and the cargo tractor ZH5, Goldhofer and Schopf are showcasing a special product highlight at the exhibition: the 4th generation of the AST-2 (see pages 4 and 5).



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# AT YOUR SERVICE ALL AROUND THE WORLD

## AIRPORT TECHNOLOGY SALES

Your contacts at Airport Technology Sales are familiar with your needs. Our long-serving personnel and trained specialists offer an individual response to your situation and requirements and guarantee a first-class comprehensive advisory service. On this page, we present the new organizational structure at Airport Technology Sales. Get in touch with your contact directly! We are looking forward to hearing from you.



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## A MULTI-TALENT THAT MEETS YOUR NEEDS THE NEW AST-2P/X

From the very beginning, the name Goldhofer has stood for reliability, efficiency and innovation. Today, we are proud to present to you the latest generation of the AST series at the inter airport Europe 2015: the towbarless (TBL) tractor AST-2P/X. This intelligent model is the 4th generation version of the successful AST-2 – with a P for top Performance. It fully satisfies all the requirements of a modern aircraft tow tractor and is also available as an X-tended version with more horsepower for operators looking for better acceleration and a higher towing speed.

### Technological advancements:

The AST-2P/X is characterized by a completely new, compact and modular vehicle concept. The most notable feature is its hydrostatic steering drive axle for best traction even with lighter loads. The vehicle can either be designed with a 228kW (320hp) or 283kW (396hp) engine for high-speed towing or active runway crossing. Both engines are available with Tier III or Tier IVf compliance. The newly developed 3-cycle brake system allows the optimal distribution of the brake force for best possible stability and safety. The entire safety

concept, both in terms of mechanics and software, fulfills current machinery directives and was tested and certified by TÜV (German Technical Inspection Agency).

### Performance:

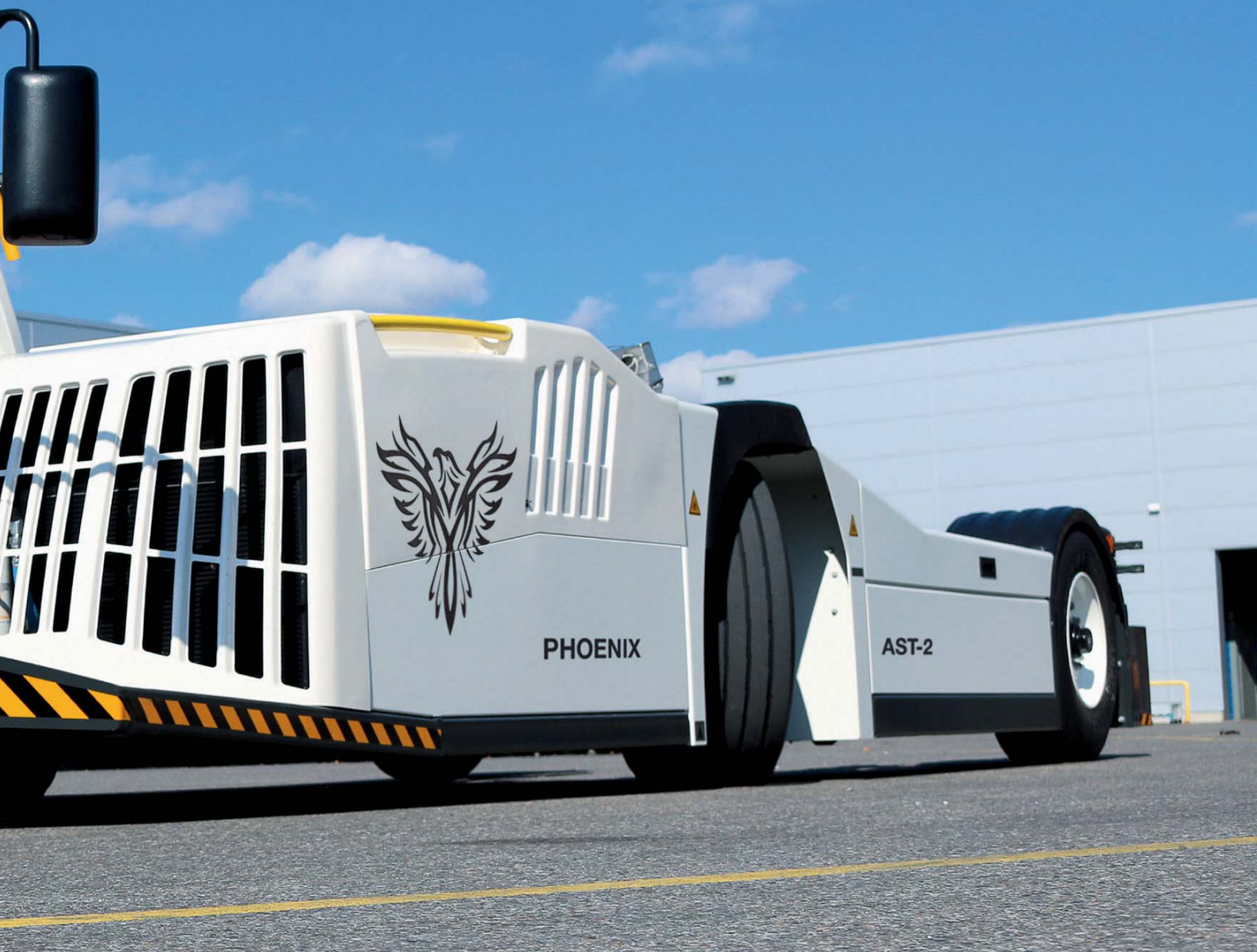
All Goldhofer vehicles are designed with a strong focus on performance. The safe pick-up of aircraft (platform lifted, lowering, pulling up, closing the swivel arms, tightening and lifting to driving position) takes less than 1 minute. In order to ensure operation for at least one working shift, our vehicles have been equipped with a diesel tank that makes intermediate refueling unnecessary, achieving a smooth workflow. The hydrostatic drive system with a combined steering drive axle guarantees seamless acceleration. The new differential lock can be activated for best traction even in adverse weather conditions, thus also allowing for reliable winter operation. The power supply of the aircraft during towing operation is a must for many customers. We are now able to build a ground power unit (GPU) into each of these vehicles, which can also be retrofitted at any time. For retrofitting, we offer a special kit that provides maximum flexibility for our customers.

### Operation:

In order to ensure good visibility of the pick-up device, the standard driver's cab is installed in a higher position. This provides a unique all-round view and thus achieves a maximum level of safety for man and machine. For so-called underbelly operations, i.e. the pushing or towing of aircraft with the tractor driving under the fuselage, the cab can be lowered and brought to a position that allows this kind of operation (e.g. nose-in hangar towing).

### Maintenance:

New standards have also been set regarding maintenance. The maintenance plan for the new AST-2P/X is based on the 1-shift principle, i.e. standard maintenance can be carried out by one person within one shift. This reduces downtimes and ensures highest availability in operation as well as little planning effort in the workshop. The maintenance points are combined in a clearly arranged way and easily accessible from the outside, making maintenance even more convenient. An entirely new plain text fault diagnosis in the display completes the tasks to be done. If, however,



support from Goldhofer is required, remote access via GPRS, Wi-Fi or LAN connection is possible at all times according to prior arrangement with the customer.

#### **Driver convenience:**

The driver's cab is equipped with a completely new cab suspension, which can be delivered with an optional lifting and lowering function. The fully air-conditioned cab provides sufficient cooling/heating and is thus able to withstand all weather conditions.

#### **Training/service/safety:**

As with all Goldhofer vehicles, we are glad to offer in-house trainings and trainings at your site. Thanks to the simplified vehicle concept, the operation of the vehicle can be learned quickly.

#### **Safety highlight:**

In case of an emergency, the nose wheel can be lowered and released by the use of one switch only and the operator does not have to enter the danger zone.

#### **Environment:**

Today, efforts to protect the environment are constantly intensified and Goldhofer, of course, supports this by all means. By fulfilling the emission standards Euro 3b/Tier IVf, we meet all current international requirements. As an option, an engine fulfilling Euro 3a/Tier III is still available. Airport apron operation is associated with many waiting periods that open up a high cost saving potential regarding fuel consumption. Another Goldhofer innovation taps this potential: The start-stop system not only significantly reduces diesel consumption but, even more importantly, also lowers maintenance costs as the maintenance intervals are based on the operating hours. This is yet another step towards maximum TCO reduction.

The expansion of the range of suitable aircraft, from the ERJ 175-195/C100 all the way to the Boeing B777-300ER, is another reason to choose the latest generation of the AST-2 from Goldhofer.



# TAKING A CLOSER LOOK OTHER EXHIBITS AT THE INTER AIRPORT EUROPE

## AST-1X – SETTING THE BENCHMARK



Flexible, fast and safe – with Goldhofer's towbarless aircraft tractors, apron operations at modern airports can be handled more economically than ever before. Increased traction, smooth travel and reliable maneuvering are just some of their strengths. Higher travel speeds help to reduce aircraft handling time for maneuvers such as pushbacks, gate-to-gate and maintenance tows to as little as one third. In addition, no one is needed to activate the brakes in the cockpit of the aircraft to be moved, which greatly reduces personnel costs.

Providing all-round visibility and an efficient air conditioning system, the AST-1X offers optimum working conditions. Thanks to its ergonomic and efficient design, it can be operated by just one driver without causing fatigue – even over longer periods of time. The optimum position of the cab and a driving seat that swivels through 180° ensure that the driver has a perfect view in every situation. Effective cab suspension, modern air suspension seats and a hydropneumatic suspension for the front axle with automatic leveling on most models take the strain off the driver's vertebral column.

The AST-1X sets new standards for moving wide-body aircraft reliably, quickly and safely. From the A300/B767 to the B747-8/A380, the AST-1X can handle all standard aircraft in the 600t MTOW class. The basic model with a 360kW (490hp) engine guarantees maximum flexibility and efficiency for pushback, gate-to-gate and distance towing. The powerful 500kW (680hp) version is designed for long-distance and high-speed towing. A permanent hydrostatic drive ensures the best traction in its class – even at high speeds, on steep gradients and in difficult weather conditions. While the maintenance-free pick-up system engages the aircraft's nose gear safely and reliably and in record time, the steering angle of 60° on the front wheels puts the AST-1 in a class of its own in terms of maneuverability.

## F70 – SMALL TRACTOR, BIG POWER



Thanks to decades of experience, Schopf is the only manufacturer that is able to offer a complete range of aircraft tractors for all weight classes. Since 2013, the F70 has extended the aircraft tractor range between 8t and 16t. Do not let yourself be fooled by the dimensions of the vehicle: The F70 is small in size but big in power. The 16t version can push aircraft up to class B767.

The F70 is cut from the same cloth as its big brothers. Proven, high-quality components make the tractor a milestone in terms of reliability and comfort. The ergonomically designed cab offers the driver a convenient place of work at operating conditions from -30 to 50°C. Regarding fail-safe operation, in particular concerning electrics and hydraulics, the vehicle design reflects many years of experience. Maintenance of the electrical components does not require any special know-how. In comparison to the competition, the hydraulic circuits are based on a unique concept that puts safety as well as reliable steering and braking first. Meeting the needs of the driver, the F70 offers different steering modes and the centering of both axles is automated.

The F70 is the logical next step in the development of Schopf tractors: It is a very compact, modern vehicle of the latest generation, which has been built with proven components in the new design.

## F110e – EMISSION-FREE SINCE 2009



The workhorse F110 is the best-selling tow tractor in the world. Since 2009, it is also available with a pure electric drive. With its high-frequency loading technology, the Schopf F110e is the only all-electric aircraft tractor that can safely perform a multi-shift operation and can generally be used as a 1-to-1 replacement of a diesel aircraft tractor. Based on the proven robust design, it can move aircraft with an MTOW of up to 120t (e.g. A321).

In addition to its ecological benefits, the F110e is also characterized by its minimum maintenance requirements. Only the battery water has to be refilled. Cost-intensive maintenance of engine and transmission is completely avoided and, thanks to the recuperation, maintenance of the brakes is reduced to a minimum.

The technical and operative reliability is currently also verified within the funded project [e-fleet](#). As one of the projects of the "Electric Mobility Showcase Baden-Württemberg", [e-fleet](#) started in 2013 at Stuttgart Airport. From the beginning of the project, up to 25% of all pushback jobs have been carried out with the F110e. The benefits of the emission-free and low-noise drive as well as the air conditioning system in the driver's cab, which works independently of the drive, made a great impression on the drivers from the start. Initial doubts concerning the performance, capacity and functionality were quickly dispelled after all drivers had made their first experience with the F110e.

Thanks to the lower operating costs of the electric drive compared to conventional drives (up to 40%), the F110e will replace conventional tractors of its class in the medium term.

## ZH5 – HYBRID IS KEY



It only took a few years until the first airports realized that existing problems could be solved with hybrid vehicles. Due to the expansion of airports, the newly developed baggage halls as well as regulations demanding emission-free driving in halls, using only diesel tractors was no longer possible. Electric tractors were an alternative but had one crucial disadvantage: Their operating time was limited. They therefore required the acquisition of a higher number of vehicles than necessary for operation as one part of the tractor fleet either stood at the charging station or was in the workshop for a battery change. These downtimes are almost completely avoided with hybrid tractors: They only have to be connected to the charging station once a month for an equalization charge, which ensures a battery lifetime of up to 7 years.

Schopf hybrid tractors, such as the ZH5 presented at the inter airport Europe, offer another key benefit: They achieve the often required speed of 30km/h even with heavy loads. This is important for coping with the increasingly shorter turnaround times of the airlines and also ensures that the tractors do not become an obstacle on the driveways, consequently saving time and money. Since 1998, hundreds of Schopf hybrid vehicles have been in use at Frankfurt Airport and have been optimized in close cooperation with the Fraport AG. In addition to maintenance and operation-specific changes, a measure to reduce fuel consumption was implemented for the presented ZH5. In maximum operation, at maximum engine power, the engine reduces the speed to a level that maintains the current driving state. In future, this unique drive concept, which is the first of its kind worldwide, will continue to be used where baggage has to be transported over long distances in a fast, safe, reliable and cost-efficient manner.

## F396 – NO COMPROMISES

All types of the F396 are now completely adapted to the new design and available with the latest engine technology. Since 1968, F396 tractors have been used around the world, always representing the state of the art. Once again, the next generation of the F396 has been tailored to meet all customer needs, offering maximum reliability, long lifetime and low operating costs at highest flexibility.

With the three available types F396E, C and P, customers can find the product best suited for their application without having to make compromises. No matter if generally used for pushbacks or long-haul towing or a mix of both, the new F396 generation offers all you need.

Already in the development stage, the powertrain components engine, transmission and axles have been optimally matched with the support of our suppliers' experts. Thanks to the close cooperation with DEUTZ, ZF and Kessler, we have achieved our goal to make no compromises with the powertrain and can offer all F396 types with the most efficient drive.

Schopf therefore brings more power to the apron with lower engine output or, to put it differently: Providing equal power, the F396 has the lowest consumption. No compromises also means jolt-free transmission shifting. Moreover, the suspension of the front axle has also been optimized. Here, Schopf has again applied an almost completely maintenance-free concept with semi-elliptical leaf springs, which has proven its effectiveness in over 40 years of use and offers a lifetime of over 30 years. If maximum convenience for the driver is desired, a hydropneumatic suspension is optionally available.

The F396 also offers quick maintenance: The drive shafts do not have to be removed and no complex lifting mechanism is required for the powertrain. The customer feedback is very positive: Customers have reported that the F396 requires less than 50% of the maintenance time needed for the most modern vehicles of the competitors.

In terms of safety, the F396 also makes no compromises. Fallback solutions in the steering system – even in case of two driver's cabs or all-wheel steering – make the vehicle as safe as never before. The braking power exceeds the strict German safety guidelines. The tractor is designed for a temperature range between -30 and +50°C – and even more in special applications.

What else could a customer ask for? There is even more. With the optional suspended Schopf Tow Hitch, the scope of application is extended to include the lower level with the most aircraft movements: The A320 and B737 can also be towed with the F396 if equipped with this hitch. Flexibility without compromises!



### BAVARIAN BREAKFAST

We cordially invite you to our special exhibition highlight, the "Bavarian Breakfast". Come to our booth and enjoy a delicious breakfast with Bavarian pretzels and white sausages. Don't miss it!

Date: October 9th, 2015, 10.00 a.m.  
Location: Booth B50, outdoor area

## SUPPORTING YOU ALL THE WAY OUR SERVICE TEAM



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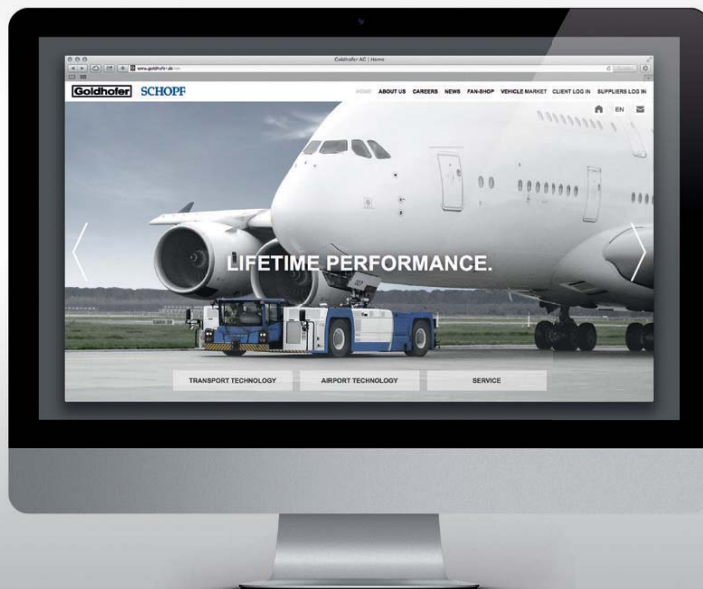
## NEW WEBSITE CHECK IT OUT

Just in time for the inter airport Europe 2015 in Munich, the Goldhofer group has launched its brand-new website, which replaces the websites of the Goldhofer Aktiengesellschaft and the Schopf Maschinenbau GmbH.

In addition to its modern design, the website impresses with its clearly arranged structure and intuitive navigation. With just a few clicks, you can find all relevant information on our products as well as the sales or service contact responsible for your concerns.

The new website is optimized for use on any device. No matter if you sit in front of a large screen, go online with your tablet or access the website via your smartphone, the handling and clear arrangement of the website always ensures the best possible user experience.

See for yourself and discover our new platform:  
[www.goldhofer.de/en](http://www.goldhofer.de/en)  
[www.schopf-gse.com/en](http://www.schopf-gse.com/en)



## SPECIAL MERCHANDISE REPRESENT THE NEW PHOENIX

For the launch of the 4th generation of our proven towbarless aircraft tractor AST-2, we offer you a compilation of high-quality merchandise. Pick your favorite merchandise and become a part of the Phoenix crew!

For ordering, please check out our brand-new shop on our website!



## LINKEDIN CHANNEL STAY INFORMED

For the inter airport Europe, we also want to introduce you to our new LinkedIn channel. Follow us at [www.linkedin.com/company/goldhofer-and-schopf---ground-handling-equipment](http://www.linkedin.com/company/goldhofer-and-schopf---ground-handling-equipment) for the latest news. We will keep you up to date and inform you about trade fairs, conferences, innovations as well as company and industry news.



### JOIN US AT THE FOLLOWING TRADE FAIRS



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