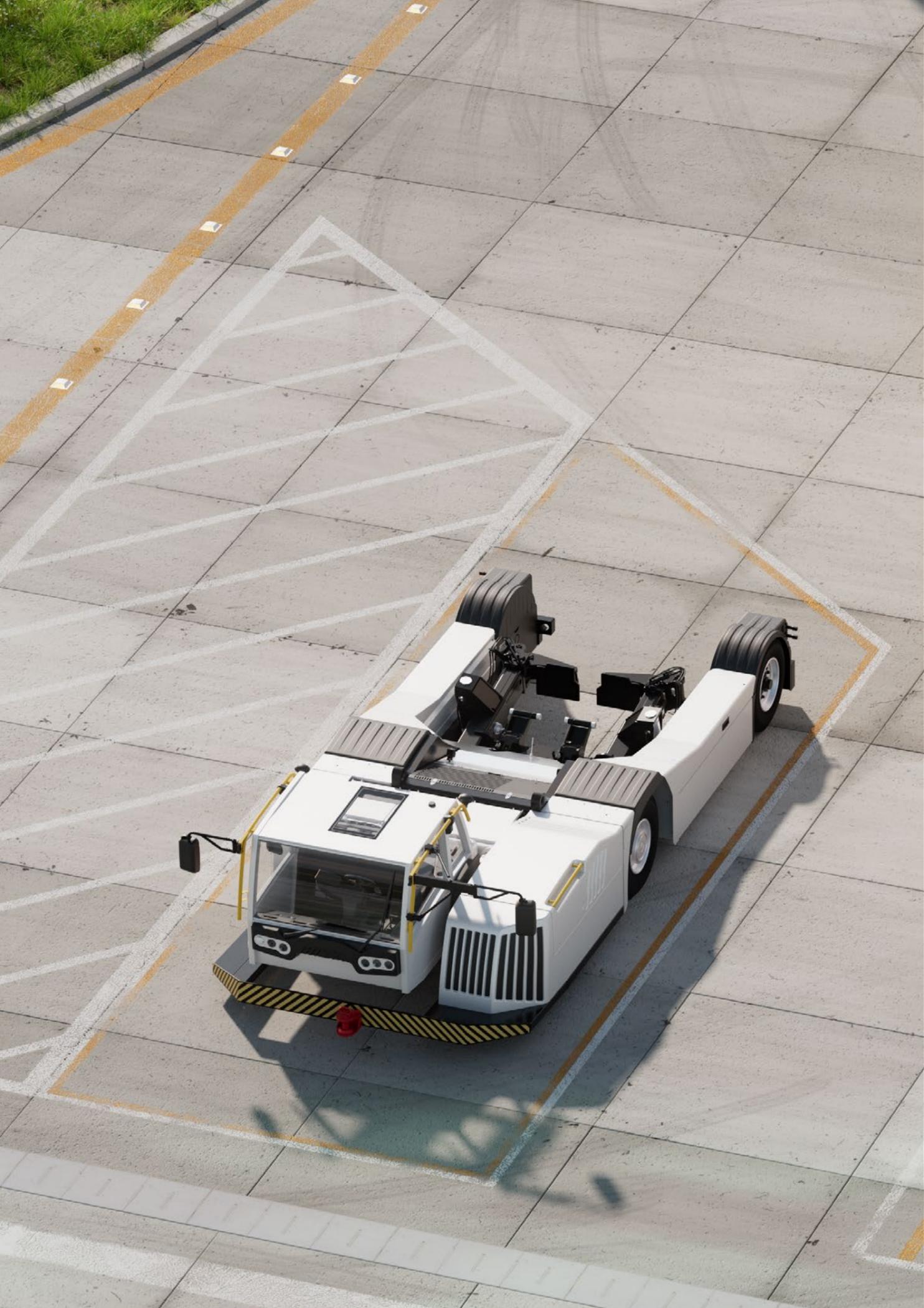




» PHOENIX « FAMILY
YOUR TRACTORS
FOR THE FUTURE



TOWBARLESS TRACTORS



»PHOENIX« FAMILY

TOWBARLESS TOW TRACTORS
FOR THE FUTURE.

The »PHOENIX« E turns the best-selling towbarless aircraft tractor into a future-oriented, zero-emission apron vehicle.

With it, the »PHOENIX« family now comprises a wide range of enormously powerful vehicles that can be individually configured.

Regardless of their power train, they are capable of handling all common passenger and cargo aircraft on the market, from the ERJ170 to the B777.



ALWAYS AHEAD.

Goldhofer has established itself as a leading provider of sustainable and highly efficient aircraft and cargo towing solutions, aligning with global "Green Initiatives" and "Blue Sky Policies" adopted by airports worldwide.

However nowadays, aircraft belong to the most secure means of travel due to extremely high safety standards, extensive staff training, advanced engineering and strict maintenance procedures. To ensure that these high standards are met, as part of the "airport machinery" vehicles and employees on the apron must also contribute to making air travel and cargo movements safe and sustainable. This is where Goldhofer is always one step ahead and synonymous with »SAFETY« on the apron. With a history of building aircraft tractors dating back to the 1960s and electric vehicles in the 1980s, Goldhofer has established itself as one of

the pioneers within the industry. During this time, Goldhofer has amassed extensive expertise and unrivaled experience.

Today, among others, this is reflected in an extremely high ratio of employees in R&D. This continuous competence build-up has led to numerous ground-breaking products, such as the »PHOENIX« series or the »IonMaster« high-voltage technology for E-vehicles. For Goldhofer, »SAFETY« is not just a theoretical concept but a culture that is deeply rooted in the company.

GOLDHOFER SAFETY



EXPERIENCE,
COMPETENCE,
CONTINUITY.

EXCEPTIONAL SERVICE

- » Goldhofer provides maintenance plans, general overhauls and modifications
- » Spare parts: 15-year supply at least or provisioning of alternatives (equivalent parts, overhaul, etc.)
- » High-quality components from long-term partnerships with suppliers
- » Remote error detection enables fast, time- and resource-saving help for minimum TCO

EXTRAORDINARY EXPERIENCE

- » Highest experience for both, towbarless and conventional tractors in the market
- » One of the pioneers in E-vehicles starting 1986 with the Schopf F356
- » Pioneer in high voltage technology with the »IonMaster« Technology
- » Long standing employees with outstanding advisory competence

GOLDHOFER »LINK«

- » The tool for digitization on the apron
- » Enables continuous monitoring and condition-based maintenance
- » With »LINK«, long-term investments are more likely to pay off: Higher efficiency due to reduced downtime.
- » Tracking and evaluation of operating and usage data enables optimal consulting and optimization of the fleet



»PHOENIX«
SERIES:
THE SAFEST
TOWBARLESS
TRACTOR IN
THE MARKET.

»SAFETY« AT IT'S BEST

- » ERGNOMICS AND OPERATOR SAFETY
- » UNBEATABLE RELIABILITY
- » SOPHISTICATED TECHNOLOGY

With a fleet of thousands of tow tractors, millions of aircraft all around the world have been moved safely and reliable. Well thought-out technology helps preventing damage on both humans and machines.

Constant optimization, innovation, research and development improve Goldhofer tractors in an ongoing process to make them the most reliable tugs. The human interface provides relevant information for the respective operation and an extremely good 360° visibility makes the »PHOENIX« a safe and ergonomic working place.



MODULAR PLATFORM OVERVIEW

»PHOENIX« E and »PHOENIX« D are powerful, flexible partners on the apron that can be adapted to individual requirements:

As a battery-electric alternative, the »PHOENIX« E is zero-emission and sustainable, while still delivering the same high performance as the diesel tractor.

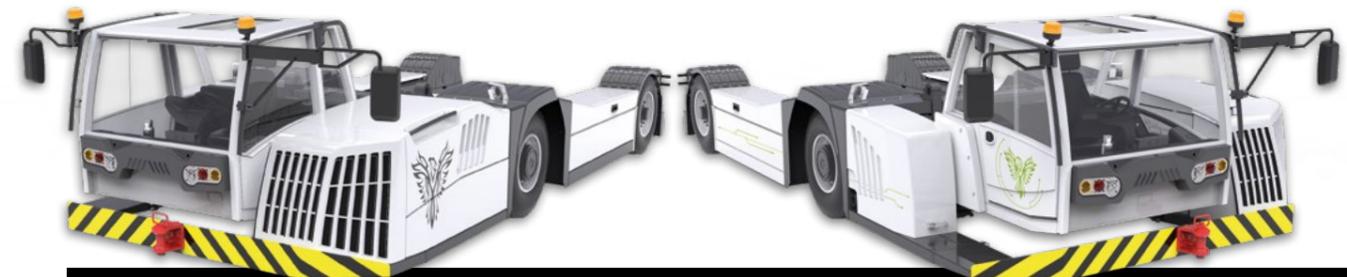
- » Uniform design and handling:
One vehicle, independent of the power train
- » Geared to your needs:
Whether with a diesel engine or modular battery system
- » Same performance – same aircraft range:
Long-distance towing and pushback with up to 352 t MTOW



RETROFITTABLE GPU

AST-2P/X DIESEL ENGINE

AST-2E E ENGINE



»PHOENIX« P/X

»PHOENIX« E



352t AST-2P | 25 km/h | 231 kW

AST-2E | 32 km/h | 80kWh 352t



352t AST-2X | 32 km/h | 291 kW

AST-2E | 32 km/h | 160 kWh 352t



AST-2E | 32 km/h | 240 kWh 352t





INDIVIDUAL VALUE

»PHOENIX« AST-2E



**MODULAR
EXPANDABLE
BATTERY SYSTEM**



**AIRCRAFT RANGE UP TO
352T MTOW**



**GOLDHOFER
»IONMASTER«
TECHNOLOGY**

»PHOENIX« AST-2E

80 kWh | 160 kWh | 240 kWh
32 km/h | MTOW ≤ 352 t



»IONMASTER« TECHNOLOGY

- » Active thermal management for cabins and all high-voltage components
- » Heating and cooling for optimal temperature conditions, even during charging, for long battery life
- » Modularly expandable battery system, configurable for individual deployment requirements

CHARGING AND INFRASTRUCTURE

- » All standard charging plugs available: CCS Typ 1, CCS Typ 2 and GB/T
- » Infrastructure consulting on charging points
- » Rapid DC charging and intermediate charging up to 150 kW
- » Optional AC charging at up to 22 kW

VEHICLE-SPECIFIC ADVANTAGES

- » Retrofittable E-GPU
- » Almost maintenance free high-voltage components cooled by environmentally sustainable water glycol mixture: Consistent performance, even under extreme environmental conditions
- » In use on every continent and in all environmental conditions, from -30°C to +52°C¹⁾
- » Goldhofer »LINK« telemetry and maintenance system
- » 700V lithium-ion batteries, tried and tested from the commercial vehicle industry for certified, maximum safety, top performance and service life
- » Second-life applications for battery systems possible in future, e.g. as stationary storage systems

¹⁾ Standard version from -20°C to +42°C, other temperature range with Arctic- and Tropical-Kit



INDIVIDUAL VALUE



DIFFERENT
DIESEL ENGINES



AIRCRAFT RANGE UP TO
352T MTOW



COMMON PARTS
CATALOGUE FOR THE
»PHOENIX« FAMILY

»PHOENIX« AST-2P

231 kW | 25 km/h | MTOW ≤ 352 t
EU Stage IIIA | EU Stage IV | EU Stage V

»PHOENIX« AST-2X

291 kW | 32 km/h | MTOW ≤ 352 t
EU Stage IIIA | EU Stage IV | EU Stage V



CONCEPT FOR SUCCESS

- » In use on every continent and in all environmental conditions, from -30°C to +52°C ^[1]
- » More than 300 vehicles in use worldwide
- » High-speed maintenance towing up to 20 mph
- » Mixed operation: All conventional passenger and cargo aircraft, from the ERJ170 to the B777, whether pushback or long-distance tow

VEHICLE-SPECIFIC ADVANTAGES

- » Various engine power classes
- » Optional GPU
- » Hydrostatically driven steering axle with limited slip differential:
No shift shocks, hydrostatic deceleration

DIAGNOSTICS AND MAINTENANCE

- » Information and error messages as plain text in the multifunction display
- » Minimal maintenance costs thanks to high-quality, low-maintenance components
- » Maintenance-free mounting device for nose wheels
- » Sophisticated maintenance access
- » Goldhofer »LINK« telemetry and maintenance system

^[1] Standard version from -20°C to +42°C, other temperature range with Arctic- and Tropical-Kit



Lufthansa

Airbus A320-200
Sindelfingen

ZG

35 393

Lufthansa LEOS

63

Air Dolomiti

»PHOENIX« FAMILY

GET IN TOUCH WITH US!

GOLDHOFER INC.

7401 Riviera Boulevard, Miramar, FL 33023, USA
Telephone: +1 954 433 5617, Fax: +1 954 433 5445
Web: usa.goldhofer.com, E-Mail: info.usa@goldhofer.com

GOLDHOFER AKTIENGESELLSCHAFT

Donaustrasse 95, 87700 Memmingen/Germany
Web: www.goldhofer.com, E-Mail: info@goldhofer.com

SALES

Telephone: +49 8331 15-343
E-Mail: sales-airporttechnology@goldhofer.com

SERVICES AND SPARE PARTS

Telephone: +49 8331 15-660 , Fax: +49 8331 15-247
E-Mail: service-airporttechnology@goldhofer.com