



Airport Solutions



Dabico, Airports

Powering, cooling and fuelling aircraft.

Dabico is a leading Ground Support Equipment (GSE) specialist, engineering a wide range of state-of-the-art systems and services for contact gates, remote aprons and Maintenance Repair and Overhaul (MRO) hangars for commercial and military applications.

Working closely with customers and industry bodies, Dabico is a solution provider for fully integrated gate and remote apron systems that minimize the use of auxiliary power units, thereby reducing fuel costs and emissions.

Dabico's comprehensive range of systems meet all aircraft requirements including the New Generation Aircraft Generation (NGA) such as the A380, B787 and A350. Our innovative solutions include 400Hz and 28VDC Ground Power Units (GPU), Pre-Conditioned Air (PCA) systems, wet services and fuel systems integrated under passenger boarding bridges, as well as in-ground pits and tunnel systems.

Our integrated airports solution, DABiConnect, connects all GSE assets including GPU, PCA, Visual Docking Guidance

Systems (VDGS), passenger boarding bridges, potable water, sewage and blue water systems, in-ground pit systems and other aircraft stand equipment.

This fully integrated and automated solution includes automatic billing for airlines, thereby reducing human errors and operating costs. This results in an increase in efficiency and airport revenues.

Who works with us:

- | | | | |
|---|--|---|---|
| » Adelte Group | » Bahrain Airport Company | » ThyssenKrupp | » ShinMaywa Industries LTD |
| » Airbus | » Airbus Helicopters (former Eurocopter Group) | » Paris Charles de Gaulle Airport | » Hong-Kong International Airport |
| » Beijing Capital International Airport | » The Emirates Group | » Munich Airport GmbH | » Shenzhen CIMC-TianDa Airport Support CO.LT |
| » Boeing Corporation | » Frankfurt Airport | » Shaanxi Aircraft Company | » GMR Group and the US Air Force among others |
| » Bombardier | » Heathrow International | » Shanghai Pudong International Airport | |
| » Dubai International Airport | » Lufthansa AG | | |

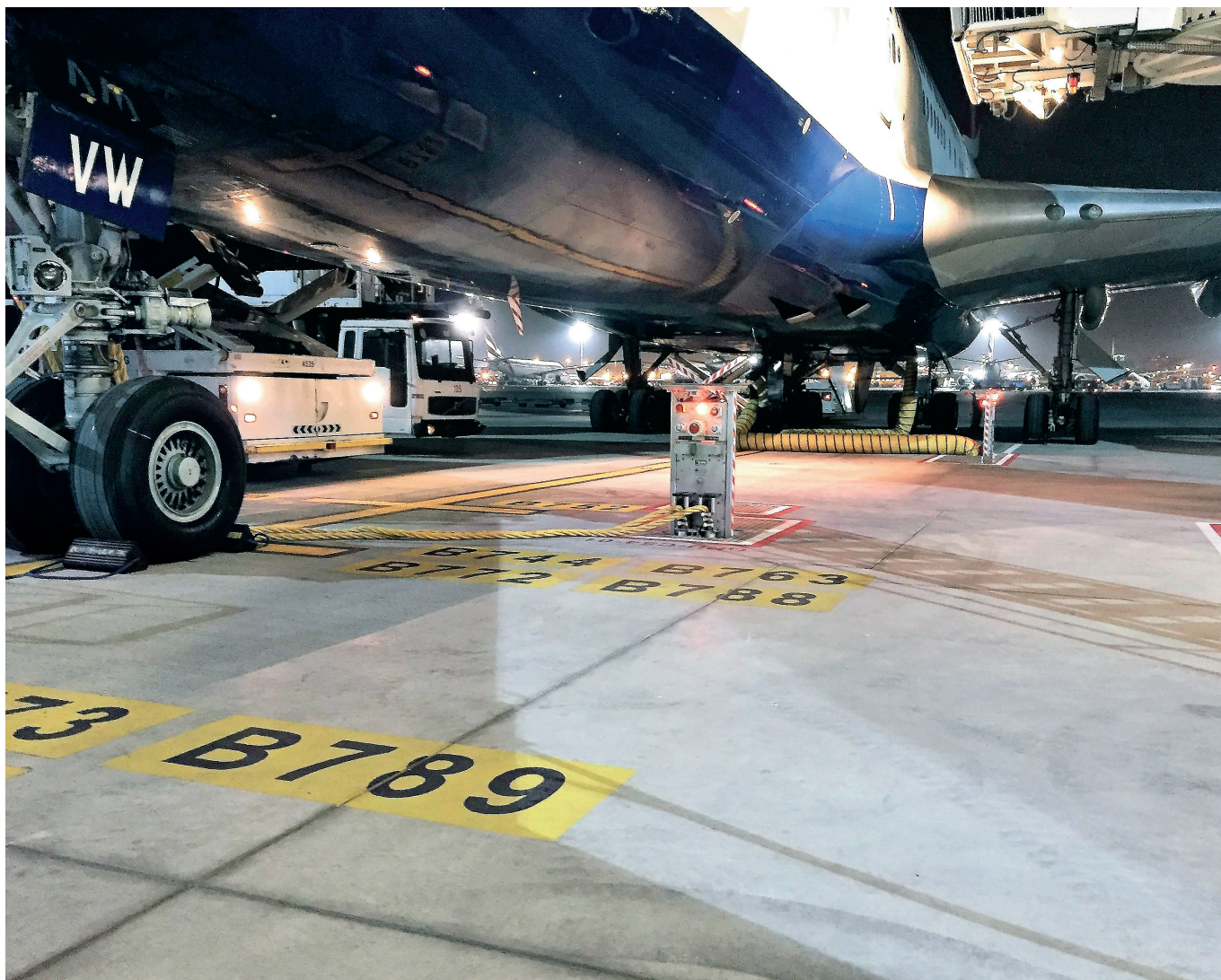
Dabico is a leading GSE specialist, developing state-of-the-art systems for gates, remote aprons and MRO hangars for commercial and military applications.



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Our Offering

Dabico's vital role as a trusted partner in aviation is defined with its vision statement **Accelerating our journey towards a sustainable future, and mission to bring innovative solutions to the aviation industry that safeguard people and protect the environment, while increasing productivity.**

As a leading ground support equipment manufacturer and service provider, Dabico Airport Solutions offers a comprehensive range of state-of-the-art, turn-key systems for contact gates, remote aprons, and maintenance repair and overhaul hangars for commercial and defence applications.

We help Airports to reduce environmental impact by engineering turnkey solutions for contact gates that simplify aircraft servicing and ensure that aircraft APU are switched off as soon as possible. Dabico offers decades of expertise in providing comprehensive civil aircraft services in 400Hz , PCA and fuelling.

Dabico's comprehensive range of systems meet all aircraft requirements including the New Aircraft Generation (NGA) such as A380, B787 and A350.

Our innovative systems include:

- » 400Hz and 28VDC Ground Power Units (GPU)
- » Pre-Conditioned Air (PCA)
- » In-ground utility pits
- » Wet services
- » Fuelling
- » DABiConnect
- » eGPU

Our solutions are engineered based on Point of Use or Central systems and integrated above ground, as well as in-ground and tunnel systems.

Applications

Dabico's cutting-edge products and solutions provides alternate system to APU and reduces tarmac congestion, improve overall performance, safety and efficiency, reduces the environmental impact and increases the profit to the customers



Gates

The airports sector continually looks for ways to improve airport capacity and connectivity, reduce environmental impact, and improve the service it offers to airlines and passengers. Dabico supports these aims with systems that ensure critical aircraft services are available directly at the gate, guaranteeing that aircraft are serviced quickly and efficiently. Dabico offers decades of expertise in providing design and engineering turnkey solutions for Point of Use or Central 400Hz GPUs, PCA and fuelling.

Remote aprons

Dabico's advanced 400Hz, PCA, wet services and fuelling systems ensure safe and efficient aircraft servicing at passenger, cargo and military remote aprons. We seek to reduce the amount of mobile equipment present on the apron, thereby improving service of aircraft, reducing maintenance and operating costs and ultimately improves airports profitability.

Our in-ground pit systems minimise tarmac congestion, improve efficiency and reduce environmental impact. This helps airlines and airports to enhance passenger movement and achieve safety and environmental targets.

In addition, in-ground pit systems reduce the incidence of collisions between mobile GSE and aircraft, which represents a substantial risk for high cost for the industry.

Hangars

Dabico offers unrivalled expertise and an extensive systems portfolio for commercial and military MRO hangars. Our advanced GSE systems support modern facilities to provide a full spectrum of maintenance and overhaul services for fixed and rotary-wing aircraft.

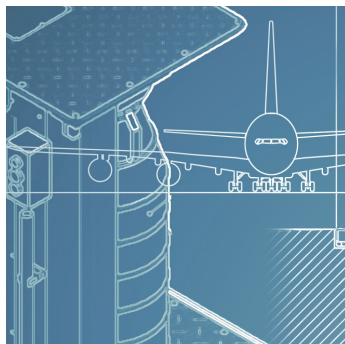
We also support a wide variety of customers with the design and engineering of maintenance base layouts, including Point of Use or Central 400Hz ground power, PCA handling units and fuel exhaust systems.

Dabico holds one of the largest customer base of commercial and military MRO facilities and assembly lines. Our systems are used in Airbus A350 and A380 and Boeing 787 hangars and assembly lines, at Lockheed Martin and Eurocopter assembly lines, and by air forces and naval bases.

Dabico's E³ Gate is a fully integrated design that minimises APU usage and increases operational efficiency by providing 400 Hz power, PCA, wet services and fuelling services via in-ground pits.

Design support for Special Aircraft Services (SAS)

- » Feasibility study and ROI.
- » Gate and hangar layout – aircraft accommodation by type, now and in the future.
- » Planning, design and system integration.
- » System validation for Ground Power, PCA, wet services, fuelling, in-ground pits, delivery hoses and cables, connector.



Dabico E³ Gate

Integrated ramp designed to minimise APU usage and reduce ramp equipment clutter.

E³ stands for:

Ergonomics, Economy, Environment.

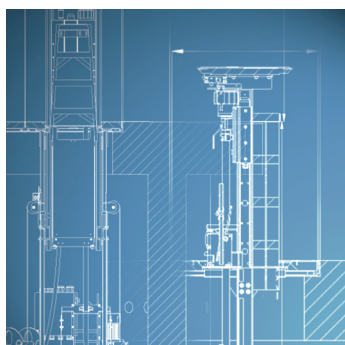
We have designed the E³ Gate System in response to increasingly demanding performance standards set out by airports,

airlines, aircraft manufacturers and aviation authorities. The industry is required to service aircraft more safely and efficiently, with a quicker return on investment than ever before, while minimising environmental impact.

Please visit our website to see the E³ presentation video.

Benefits of Dabico E³ Gate System

- » Represents substantive progress towards sustainable, highly efficient airports.
- » Reduce OPEX and maintenance costs.
- » Improved ergonomics, economy and reduced environmental impact.
- » A unique tool with which to drive gates efficiency.
- » Reduced Airport congestion.
- » Faster turnaround times (TAT).
- » Reduced use of APU and GSE vehicles.
- » Reduced incidence of mobile GSE accidents.
- » Reduced damage to aircraft, lower airport premiums.
- » Improved efficiency and safety of ground operations.
- » Fewer personnel required on the tarmac improves safety around aircraft.



Design

Dabico's Airports Market Unit offers expert Airport Electrical & Mechanical Design Services. We design advanced, specialised systems – including 400 Hz, PCA, wet services, fuel hydrant and tank farm systems – for airports and MRO hangars

for all types of operations and aircraft. Dabico consulting services provide advice on in- and above-ground GSE systems, and plays a keyrole in reducing operational costs, improving ramp safety, and reducing environmental impact.



Simplified operations: our system delivers five services that can be operated by just one single ground operator.

System overview

We design advanced, specialised systems – including 400Hz, PCA, wet services, fuel hydrant and tank farm systems for all types of operations and aircraft.

400Hz Systems

The Dabico E3 Gate System can use either Solid State Frequency converters (Dabico 2500+) or Central 400Hz System (Motor Generator) to deliver 400Hz electrical power to aircraft. This is currently distributed via underground ducts and in-ground pits each fitted with up to four 400Hz connectors (i.e. A380).

PCA/PCAir Systems

Based on our PCA expertise and wide product range, we are able to propose to our clients the best suitable PCA design combining the required efficient cooling performance within the budget.

Our engineering is based on our long experience in cooling aircraft, taking into considerations the ASHRAE and aircraft cooling requirements such as the IATA, AHM and ground operation processes.

Our PCA Unit capacities are from 30T to 150T with one or two PCA outlets.

As per AHM974

Dabico PDX Series is a complete and self-contained unit designed for Point of Use installations. Whereas, the PAC series PCA Units are designed to be central system,

which required Chilled Water / Glycol Chilled Water to cool the Air.

These Units are capable of providing discharge temperatures down to -5°C (23°F) and designed to meet the requirement of mass-flow and static inlet pressure for effective cooling of all commercial aircraft in compliance with AHM974.

As per AHM974 & AHM997

The introduction of the new AHM997 standard for Sub-freezing ground cooling is a result of several years' development and testing, carried out primarily by Dabico and Airbus. It covers the development of necessary safety devices, as well as required operating procedures.

Dabico pioneered the Sub-freezing PCA technology capable of providing discharge temperatures down to -25°C (-13°F). The Sub-freezing PCA connector and an automated control system continuously measuring the temperature and static pressure at the aircraft inlet.

Dabico has two types of Sub-freezing PCA System in compliance with AHM997. "Sub-Z" & "PCAir" models with a minimum discharge temperature of -25°C (-13°F).



E³ Gate system overview

- | | | |
|-------------------------------------|---|--|
| 1 VDGS | 5 Central Wet Services plant room
Central PCA plant room
Central system Rotary Motor
Generators (RVA MGs) | 6 400Hz pop-up pits |
| 2 Gate Operator Terminal | | 7 PCAir / PCA pop-up pits
with potable water |
| 3 400Hz frequency converters | | 8 Blue water and sewage pop-up pits |
| 4 PCAir/PCA Systems | | |



1 VDGS

Visual Docking Guidance System for aircraft parking assistance and connected to the Dabico Gate Operator Terminal, via a data server for semi-automated ground operations.



2 Gate Operator Terminal

Gate Operator Terminal communicating to the VDGS via a central server in order to get live information from the Flight Management System.



3 400Hz frequency converters

400Hz power conversion either with 90kVA Solid State Frequency converters (Dabico 2500+) equipped with Dabico Skyway.



4 PCAir / PCA Systems

PoU DX PCA or Centralised PCA system (Pre-Compressed Air units / AHU with CW/EGW or DX-Hybrid PCA units).



5 Central system Rotary Motor Generators (RVA MGs)

In a Central System configuration the Rotary Motor Generators are located in a technical room and include a transformer at each gate (gate box) that steps down the voltage to the required 115/200V power. Motor Generators include the Dabico advanced control panel equipped with a touch screen which ensures a live monitoring of the central 400Hz plant.



Central Wet Services plant room

Central plant room for potable and blue water, and sewage, equipped with pumps, vessels, filters, chlorine dosing station, potable water tanks, pressure increase systems, UV disinfection, and raw water treatment.



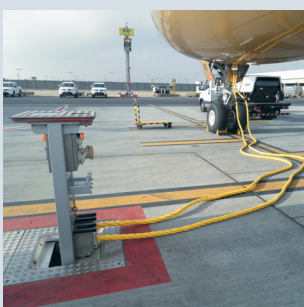
Central PCA plant room

Central plant room for PCA with compressors or PCA chillers and glycol water (located at the airport or inside the basement of the terminal building).



6 400Hz pop-up pits

- » Delivering 400Hz power.
- » The pit includes up to four 90kVA aircraft jet cables and plugs.
- » Counter balance opening mechanism for ease of maintenance and operation ergonomics.



7 PCAir / PCA pop-up pits with potable water

- » Includes flexible PCA and potable water hose and coupling fixed on the pop-up pit assembled on a hose reel inside the pit chamber.
- » A380 = 2 pop-up pits.



8 Blue water and sewage pop-up pits

- » Includes 2 flexible hoses (one for blue water and one for sewage) and coupling fixed on the pop-up pit.
- » Hoses are assembled on a hose reel inside the pit chamber.





Power Conversion Systems – 400 Hz, 28 VDC

Dabico has been at the forefront of innovative Central and Point of Use 400 Hz systems, including Solid State Frequency converters, Rotary Motor Generators, in-ground 400 Hz utility pits and cable coilers for 50 years.

This diversity of experience with systems and products has made us the leader in power distribution and delivery.

The Group designs and engineers turnkey 400 Hz solutions from the 50/60 Hz

converter input power up to aircraft 400 Hz connection points, 400 Hz in-ground pits and cable coilers that deliver required power through Dabico 400 Hz jet cables.

More than 10,000 Dabico 400 Hz systems are installed worldwide. Our equipment has been in operation at international hubs, in the harshest of ambient environments for many years. Our systems meet the power requirements of new generation aircraft (A350, A380, and B787).

Dabico's 400 Hz Power System complies with all relevant industry standards, including DFS-400, MIL-STD-704F, and exceeds ISO-6858. Dabico guarantees complete system performance at the aircraft connector for its turnkey solution.





Dabico's 2500+ Series 400Hz ground power units integrate outstanding electrical performance with advanced communication capabilities.

400Hz GPU – Point of Use Solid State Frequency converter

Dabico 2500+ Series

Dabico 400Hz solid state GPUs are based on its advanced 2500+ Series.

A self-contained unit designed to global standards for a global market, the 2500+ Series is a single product that meets the needs of airports, airlines and ground handlers. These units are installed at gates, remote aprons or MRO facilities, and in fixed or mobile configurations.

Electrical performance

Dabico 2500+ standard technical characteristics:

- » 90kW GPU.
- » Up to 500 per cent overload capacity.
- » Continuous power factor 1.
- » Operational temperature up to 60°C / 140°F, ambient at all load conditions.

The 2500+ technology platform ensures our customers can use one standard solution at their facility and for their various operations:

- » Horizontal design mounted under the PBB or on a cart for mobile applications.
- » Vertical design mounted on the ground.
- » Horizontal design integrated with a 400Hz cable coiler (PowerPack I-Connect).

Advanced communication

Featuring Dabico intuitive Skyway Interface and communication platform, the 2500+ helps airports to make considerable improvements in operational efficiency and data collection. It provides operators with easy access to the procedures that they use most frequently and increase the product serviceability.

Dabico 2500+ PowerPack I-Connect

The Dabico 2500+ PowerPack I-Connect is a complete 400Hz system fixed on PBB to power parked aircraft at the gate. The integrated 400Hz system is a stand-alone unit including the unique technologies of Dabico Series 2500+ converter and a motor-driven reel, distributing 400Hz power to aircraft with automatic reeling of the 400Hz aircraft cable.

Dabico 2500+ Combi

A Solid State Frequency converter that integrates a 28VDC / 600A rectifier to service regional aircraft.

Dabico 2500+ Converter caddy

The Dabico Converter Caddy is a mobile unit on which the 2500+ GPU is mounted with 50/60Hz input cables and 400Hz jet cables and plugs. The caddy is either manual or battery-driven to reduce operational costs and emissions.





Simplified operations: our system delivers five services that can be operated by just one single ground operator.

400Hz GPU – Central system Rotary Motor Generators

Series RVA

Dabico designs fully integrated 400Hz centralised systems. Our strong R&D capabilities gave powerful added applications to the original MG set designs as we developed the first vertical synchronous MGs for greater power, smaller size, higher efficiency, longer life and reliability and the first automatically parallelable 400Hz vertical synchronous MG.

Our 400Hz MGs can be supplied with 50Hz or 60Hz power input, 60kVA to 450kVA 400Hz and output voltages are available at 200V, 575V, 960V and 2,400V.

The long life synchronous vertical motor generator sets are configured for precision aircraft ground power systems and include a transformer at each gate (gate box) that steps down the voltage to the required 115/200V power.

Our 400Hz MGs meet all power requirements of the latest aircraft, as well as

400Hz avionics and radar equipment. To date, we have delivered more than 3,000 MGs, representing a total capacity of more than 600 megawatts.

Dabico advanced control panel, equipped with a touch screen, ensures a live monitoring of the central 400Hz plant and can be interfaced with the airport BMS and SCADA systems.

Benefits of Central system

- » The equipment is protected from environmental factors.
- » Reduce the total installed base according to the planned utilisation of the power therefore reducing the CAPEX and OPEX.
- » Easier access to equipment for maintenance or repair, limiting disruption of airport operations.
- » The Central system offers the possibility to easily upgrade the power output by adding more units as the airport capacity requirements increase.

400Hz GPU – Gate service boxes

Series ASC

Dabico Series ASC gate service cabinets are designed for use with the company's centralised 400Hz ground power systems that use a distribution voltage of up to 960V.

Each unit includes a continuously-rated step-down transformer to 200/115V, optional line drop compensator (LDC) and controlled outputs up to 90kVA each. The outputs have a contactor, E&F interlock and a full protection/alarm circuit. Units are available in continuous ratings of 45kVA, 90kVA, 140kVA and 180kVA, as used in labs, test stands and for certain military applications.

No-Break Power Transfer (NBPT) features on modern aircraft are fully supported and tested. RS485 remote monitoring is also available.





Dabico's in-ground power utility pits are designed and positioned to service all types of aircraft, and to allow for future flexibility. Our pit systems also reduce the incidence of vehicle collision with aircraft. Direct costs of ground collisions and ramp accidents amount to several billion dollars annually¹.

400 Hz in-ground connection systems

Dabico is the worldwide leader of in-ground pit systems.

Our in-ground pop-up and hatch pit systems are user friendly storage units for 400Hz jet cables and plugs (up to four), and other facilities such as 50/60Hz outlets. Located very close to aircraft 400Hz receptacles, they are the optimum solution for reducing APU use at parking positions.

Benefits of Dabico in-ground 400Hz pit systems

There are a number of operational advantages to installing 400Hz power supply pit systems in the apron in the vicinity of the aircraft service connection point:

- » Easy, ergonomic access of the 400Hz-connector due to the pit's high operating position, limiting physical effort for ground operators and reducing accident risks.
- » Reduced maintenance costs, extended service life for the 400Hz cable and aircraft connector.
- » Only one Pop-up pit is required for Code F aircraft, (A380-800 is serviced with one popup pit including four connectors or 2 hatch pits). Load class EN124 Class F900
- » A gate can be provisioned for aircraft upgrades: e.g. one Pop-up pit with 2x400Hz plugs for Code E can be upgraded for Code F with the addition of two connectors.
- » No need to lay 400Hz cable between the PBB and the aircraft 400Hz receptacles: longer service life for cables, improved safety for ground operators, eliminating the issue of the 400Hz cables blocking the path between the PBB and the aircraft (on the left-hand side).
- » A 400Hz pit can be provisioned with 1x125A socket for B787 in order to connect Dabico 2500+ 90kW mobile Solid State Frequency converter in case of starting the APU with the third 90kVA aircraft plug located under the aircraft

Tunnel systems

Existing aircraft parking areas at terminals and hangars typically have not been designed for optimal use of ground support services.

When using a full-scale tunnel system with in-ground services from Dabico, all essential ground support services are available close to parked aircraft. 400Hz GPU, PCA, Wet Services are located inside the tunnel below the aircraft body and connected via in-ground pits.

These systems offer airports improved operational efficiency and reduced environmental impact. Our tunnel systems also allow additional services to be added over time, i.e. potable water and blue water reducing the number of vehicles around the aircraft.





Dabico's extensive range of 400 Hz ground connector solutions are used by all types of airports, airlines and ground handling companies worldwide. Dabico supplies solutions based on specific client requirements and budgets.

400 Hz above ground connection systems

400 Hz cable coilers

Dabico 400Hz modular coilers are motorised reeling systems fixed either under the PBB or on the ground. They ensure fast and ergonomic reeling and storage of 400Hz cables and plugs. Our user friendly cable coilers improve the safety of ground handling, and are equipped with 28m of usable 400Hz service cable.

400 Hz cable reelers

Dabico 400Hz cable reeler connect and power parked aircraft. Integrated on the side of PBB, the units are a new solution for operators wanting to create space underneath PBB, and improve ground level clearance.

400Hz cable hoists

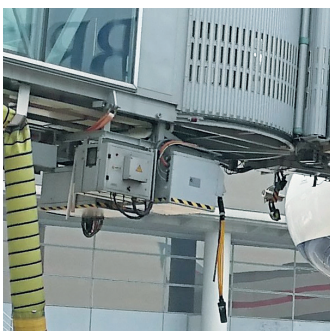
Dabico cable hoists provide elevated stowage for 400Hz and 28.5VDC load cables and connectors, thereby removing cables from the tarmac and away from ramp operations. Using an included limit switch, hoists can be interlocked with PBB to prevent bridge movement until 400Hz cable is fully elevated.

Caddies

Dabico caddies are mobile manual or battery driven carts equipped with or without a 400Hz Solid State Frequency converter. They can either be used as a cable extender when connected to a converter or as a mobile electrical 400Hz GPU when equipped with a converter. They provide a unique mobile zero emission solution for airports.

400Hz jet cables and plugs

Dabico 400Hz plugs have changeable nose and contacts for a longer service life and reduced maintenance costs. Our popular SP model can be integrated with our 400Hz in-ground pits or cable coilers





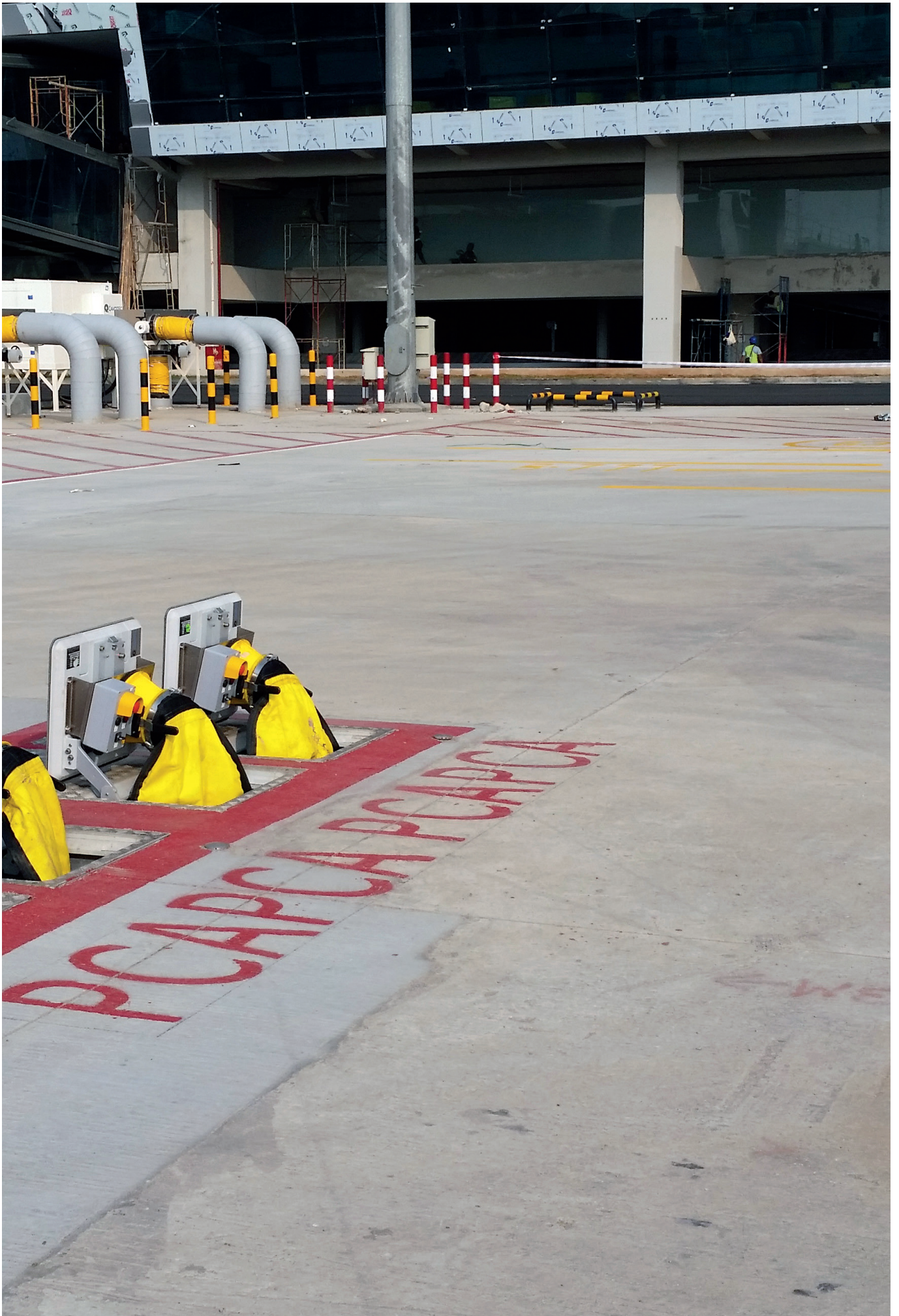
Ground Cooling Systems— PCA

Dabico is the only supplier of fully integrated PCA systems, and has led the development of ground cooling systems for five decades.

We offer one of the broadest ranges of Central, (AHU and DX-Hybrid), and Point of Use, (DX PCA), PCA systems, in full compliance with IATA AHM974, AHM997, ASHRAE. Indeed, our PCA systems were the world's first to gain AHM997 approval.

With 8,500 PCA units installed worldwide, Dabico helps ensure that all types of aircraft APU — including on the Airbus A380 — can be switched off even in harsh ambient conditions in Asia and the Middle East.

Dabico engineers optimise entire system design, including power requirement, air flow distribution, and temperature from PCA outlets to aircraft inlets.





Dabico manufactures a wide variety of Central and Point of Use PCA systems, including fixed, mobile, above-, in-ground, and subfreezing, all of which meet or exceed performance requirements.

PCA systems – AHM974

Dabico has been at the forefront of airport PCA technologies for decades. Based on IATA AHM974, Dabico designs and manufactures two types of systems: PoU, based on Direct Expansion (DX), and Central systems incorporating two technologies: DX-Hybrid and Air Handling Units (AHU).

Integrated with Dabico PCA in-ground pits, these systems ensure highly efficient aircraft cooling.

PoU PCA – Direct Expansion (DX)

Dabico Series DX PCA are self-contained fixed or mobile electrical air handlers with vapour cycle direct expansion. Ranging from 30T to 120T, they are in compliance with AHM974 and designed for cooling up to A380 under the Middle East ambient conditions with multiple cooling stages. Mounted on a simple chassis for towing, or truck-mounted, they can also be used on remote aprons.

Central PCA – DX-Hybrid

Dabico Series DX-Arctic PCA are hybrid air handlers with two cooling stages, (water circuit with central chilled water plant and vapour cycle direct expansion). Designed according to AHM974 ratings from 30T to 90T, these units service a full range of aircraft, from narrow-body to the A380 configuration.

Central PCA – Air Handling Unit (AHU)

Dabico Series PAC are lightweight air handlers, connected to a centrally chilled water plant with one or two water circuits (EGW or CW+EGW).

Designed according to AHM974 ratings from 30T to 90T to service a full range of aircraft from narrow-body to the new A380 configuration.





PCA systems – AHM997

Working closely with the industry, Dabico has improved the performance of PCA cooling in demanding ambient conditions.

Dabico was instrumental in the development of the IATA AHM997 standard; and our PCA systems installed at Bahrain International Airport in 2009 were the first in the world to be approved under the standard.

Our subfreeze PCA systems have opened new scope for efficient aircraft cooling, including A380 Code F aircraft in warm climates.

Central PCA – DX-Hybrid Sub-Z

Dabico Series DX-Arctic Sub-Z are Hybrid Air handlers with multiple cooling stages (water circuit with central chilled water plant and vapour cycle direct expansion).

Designed as per AHM997 in ratings to service a full range of aircraft from narrow-body up to the A380 configuration with a minimum discharge temperature of -25°C (-13°F).

Located on the apron and connected to Dabico PCA in-ground pits, Dabico PCA technologies play a pivotal role in cooling aircraft in order to achieve the highest levels of service, readiness and passenger comfort.

Central PCA – Pre-compressed Air (PCAir)

Dabico Series PCAir are engineered based on the Brayton cycle with expanded pre-compressed air system generated from a central compressed air central room and distributed to PCA expanders.

Designed as per AHM997 and with less than 1.7g water/kg dry air and in ratings to service a full range of aircraft from narrow-body up to the A380 configuration with a minimum discharge temperature of -25°C (-13°F). A further advantage of the system is the use of air as a working medium, environmentally benign as opposed to refrigerants, totally safe and nontoxic.





Dabico PCA pits are designed and positioned to service all types of aircraft up to Code F, and allow for future flexibility.

PCA in-ground connection systems

Dabico's in-ground PCA systems are a proven and cost effective collision avoidance solution. Whether at single-aircraft or Multiple Aircraft Ramp System (MARS) gates, our in-ground pits protect PCA hoses and reduce airflow losses. They can also be adapted for future configurations, reducing capital expenditure.

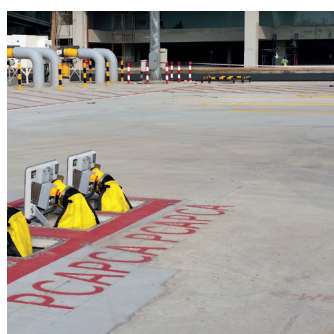
These systems also store up to two PCA hoses and other facilities, such as potable water supply. Located close to aircraft PCA inlets, these systems reduce cooling losses and the incidence of pressure drops, ensuring a faster and efficient aircraft cooling.

Dabico's in-ground PCA technologies are a key way for operators to cut TAT times, eliminate emissions, improve safety, and reduce the risk of accidents.

Benefits of Dabico PCA in-ground pits

Dabico PCA in-ground pits installed at the apron in the vicinity of aircraft service connection points, improve ground handling operations in the following ways:

- » Reduced hose length reduces heat gain and airflow loss.
- » Improved air quality for passengers in the cabin due to vertical PCA hose storage in the pop-up pit. Vertical storage enables efficient draining of condensed water and ventilation of the hose, avoiding potential sanitary risks such as fungus and bacteria growth inside the hose.
- » Vertical storage of the PCA hose allows efficient storage of flexible hoses with a steel spiral, this guarantees a constant cross section in bends thereby eliminating loss of mass flow due to stalling blowers.
- » Storage of flexible PCA hoses in pit- systems minimises contamination risk and FOD entering the hose.
- » Reduces the sanitary risk for aircraft passengers.
- » Pit systems provide efficient and safe operation for MARS compliant with the new AHM-997 Subfreezing ground cooling standard.
- » Option to include potable water for refilling aircraft, (no need for potable water trucks). The system also improves the quality of water discharged to aircraft, (circulating water loop permanently chemically treated).
- » Collision avoidance for Wet Services (potable/blue water and sewage).





PCA above ground connection systems

PCA hose reel

Dabico PCA hose reel is a motorised device that connects PCA to parked aircraft. These units are mounted on PBB or pillars. Their design ensures optimal PCA flow and limits air loss, thereby improving PCA cooling. The motor-driven coiling drum is equipped with insulated 14" Layflat PCA hose, and is operated by Radio Remote Control of bridge panels.

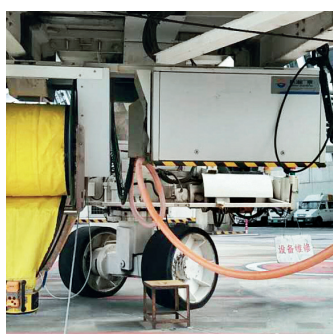
Telescoping Air Duct (TAD)

Dabico Series Telescoping Air Duct (TAD) transports hot and cold PCA across telescoping sections of apron-drive PBB. The duct is fully insulated, flame-proof and smoke retardant, and prevents air loss and drops in pressure. TAD is comprised of sections of fibreglass and internal insulating urethane foam.

PCA connector/nozzle/hose

Dabico manufactures customised PCA hoses and connectors that maximise the cooling effect between PCA handling units and aircraft inlets.

Dabico's patented sub-freeze PCA connector, designed according to AHM997, allows monitoring of temperature and pressure at the aircraft inlet. Our PCA hoses can be insulated or non-insulated, and our connectors feature handles to speed ground operations.





Wet Services System

Dabico's Wet Services pit system is engineered in partnership with Aqseptence Group and Roediger Vacuum.

The system manages potable and blue water, and sewage, via in-ground pits and connected to aircraft.

The system comprises two main parts: a central treatment plant — (including potable and blue water generation and storage, and a sewage vacuum system) — connected to Dabico in-ground pit systems, they avoid the use of three sets of mobile GSE vehicles, thereby improving safety.



Dabico's Wet Services System has been adopted by several airports. Its implementation has resulted in more efficient ground handling, reduced emissions and TAT.

The Wet Services System is based on a central plant with three services provided to aircraft via inground pits:

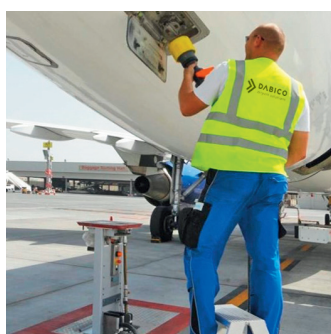
- » Potable water — for cabin drinking water.
- » Blue water — for flushing of aircraft toilets.
- » Toilet sewage removal.

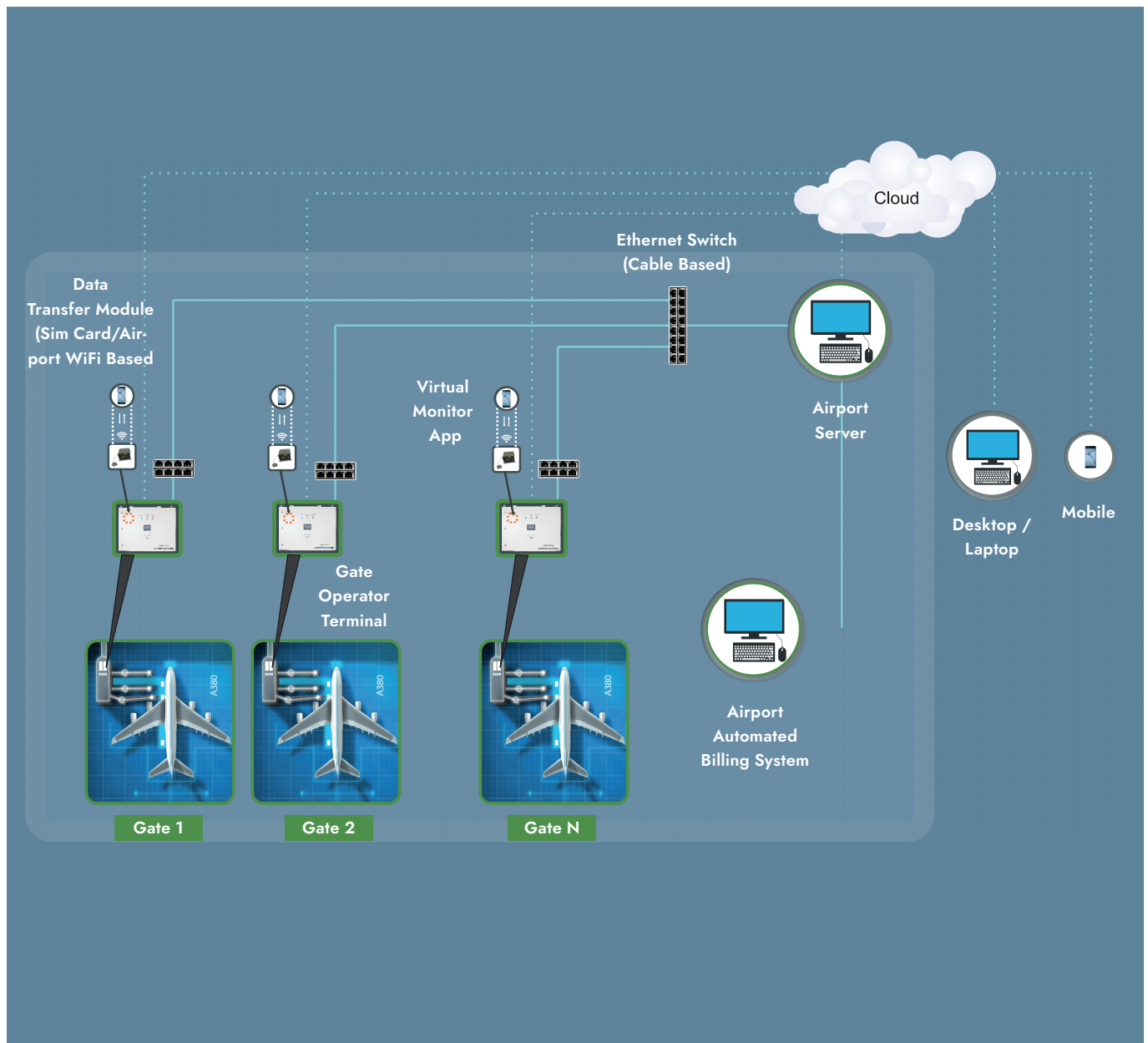
Main components

- » A central treatment plant where potable and blue water is generated and stored before distribution.
- » Sewage is discharged from the aircraft by vacuum and subsequently either collected in storage tanks or discharged directly to the airport or municipality network. Potable and blue water is distributed to each aircraft parking position through underground pipes from the central wet services plant.
- » At each aircraft parking position, there are one or two pits: one for potable water, (included in the PCA pit), and one for sewage and blue water. Flexible hoses are stored in the pit, and are connected to the aircraft as required.

Benefits

- » Improved flight punctuality due to no longer relying on service vehicle availability.
- » Reduced noise and emissions from the electrically driven system.
- » Security and safety: reduced security and safety issues and indirect investment to control heavy flow of personnel working at gates or aprons.
- » Reduced risk of collision: reduction of insurance premiums as underground pits reduce incidence of collision between mobile wet services GSE and aircraft.
- » Faster TAT: increased gate utilisation with faster aircraft TAT and services already available at the gate.
- » Prevents runway incursion as no mobile GSE are required.
- » Reduced operational and maintenance due to fixed systems and one ground operator in contrast to mobile GSE.
- » No requirement of mobile GSE capital investment for servicing aircraft wet services.
- » No fleet management system investment required.





DABiConnect

Dabico's integrated airports solution - DABiConnect - reduces operational costs and increases efficiency and revenues.

Our integrated airports solution, DABiConnect connects all GSE assets including GPU, PCA, Visual Docking Guidance Systems (VDGS), passenger boarding bridges, potable water systems, sewage and blue water systems, in-ground pit systems and other aircraft stand equipment.

DABiConnect is a cloud-based solution with enhanced cybersecurity that integrates with airport operator databases (AODB) and airport billing systems to enable automated billing for airlines. The technology monitors and records all operational parameters and actions of gate equipment for all aircraft. It is an innovative and powerful remote operations management solution that enables users to monitor real-time data and operational status remotely.



DABiConnect provides:

- » Geo-location, live operational parameters, fault warnings, diagnostics, real-time alarms or notifications
- » Storage of operational and maintenance history, service history management, breakdown service and AMC including online monitoring
- » Pre-alerts in line with OEMs' recommended preventive/predictive maintenance schedules
- » Estimated costs, manpower and duration requirements on daily and weekly maintenance
- » Option to integrate with spare parts ordering based on O&M spare parts manual through existing ERP solution

DABiConnect enables:

- » Predictive maintenance, spare parts and resource management optimization
- » Maintenance based on actual equipment use
- » Improved reliability, reduced downtime
- » Continuous monitoring and analysis of equipment performance using real-time and historical data
- » Failure analytics to automatically identify previous events and provide solutions to significantly reduce Mean Time To Repair
- » Minimum level of inventory and direct integration with ERP
- » Improved training of technicians and operators based on historical data and advanced diagnostics systems
- » Asset management and KPI-based personalized dashboards for different user groups
- » Smartphone and tablet operation
- » Integration with third-party equipment
- » Integration of multiple airports under one group





Airport Fuelling Systems

Dabico's engineering and systems integration expertise has seen the Group lead the development of aviation ground fuelling solutions for military and civil applications for many years.

Dabico revolutionised the aviation sector with its introduction of the fuel hydrant pit box that enables refuelling via an under-

ground fuel hydrant line. All major airports have adopted the fuel hydrant system, improving productivity, reducing airport congestion and improving safety.

Dabico E³ Fuelling illustrates our wide fuelling portfolio engineered and manufactured based on the highest industry standards (ATA, EI, JIG, STS-M, TÜV, UFGS).





Dabico is an advanced fuel system designer, integrator, and commissioner.

Commercial fuelling

Fuel System Design and Integration

Dabico's commercial and military hydrant systems have been in use in the industry for more than 40 years.

We work closely with major oil companies, airports and defence organisations to test innovations, and meet and exceed customer requirements and standards.

Commercial fuel hydrants

Dabico's commercial fuel hydrant pit assemblies provide on/off and pressure/flow control for a wide variety of commercial applications.

These units are available in one and two-piece (environmental) designs, with bottom or side entry pipe-work, and pits manufactured in either high-grade fibreglass GRP, or fabricated, coated or steel.

All our fuel hydrant pit systems comply with relevant industry standards, including JIG 90 Bulletin.

High-/Low-Point pit assemblies

Dabico's Low-Point drain pit assemblies remove any non-fuel fluids and other contaminants from fuel lines. Our High-Point vent pit assemblies remove air pockets from fuel lines, thereby preventing compressed air build-up.

Cathodic Protection Systems

Current industry standards mandate that aviation fuel hydrant systems should be provided with Cathodic Protection systems to prevent pipeline corrosion. Dabico has a long experience of providing in-ground test stations to monitor cathodic protection systems or to provide access to buried anodes. Available with a variety of cover options to suit customer requirements pits can be custom designed to suit on-site conditions.

Emergency Stop Systems

The emergency stop system is an essential safety system installed at airports with underground aviation fuel hydrant systems and enables the hydrant system to be depressurised in the event of an emergency. Dabico manufactures a variety of different emergency stop system components (call point posts, cable draw pits, manhole covers etc.) to suit customer and project requirements.





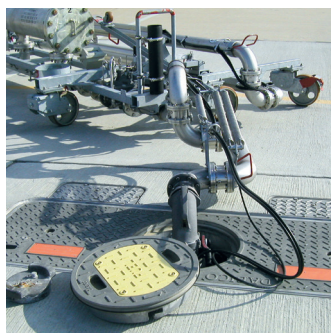
Military fuelling

Military Fuel Hydrant pit assemblies

Dabico's innovative military fuel hydrant pit assemblies efficiently dispense fuel to tactical and strategic aircraft. The assemblies provide on/off or pressure/flow control.

Unique waterproof covers and frame assemblies, fitted with aluminium doors, prevent fluids and debris from entering pits when closed. Patented torsion spring actuated covers maximise available workspace within the pit assembly.

These assemblies are also spring actuated or have counter weighted covers.



Pantographs

Dabico pantographs refuel aircraft safely, quickly and efficiently without the need for dispensers or tank trucks. Our pantographs directly refuel wide-body aircraft, tactical aircraft, helicopters and tank trucks at airports and airfields throughout the world.

Since 1980, Dabico's stainless steel fueling arms have seen service in military and commercial applications around the globe.

Dabico's pantographs are compatible with military and commercial aircraft, and perform fuselage and under-wing refueling operations.

Our pantograph systems service all types of military aircraft, and can be operated by a single person. The innovative design eliminates the need for hoses, and it allows refuelling with engines running and hot brakes.



Isolation valve chambers

Dabico isolation valve chambers are pre-fabricated and aircraft load rated - to a maximum of 900kN - and are sand-, dust-, and water-proof.

Their unique cover design provides full overhead access, allowing one hand opening, (without the need for any electric, hydraulic or external mechanical lifting equipment), and enable easy on-site installation.

Unique design features ensure long-term mechanical protection for valves in the pit assembly. They are also compatible with military and commercial fuel systems.

Vault Access Pit Covers

Prefabricated vault access pit covers provide easy access into prefabricated fibre-glass vaults or concrete chambers for operational and maintenance requirements of in-ground systems. The covers are dimensioned for easy entrance and exit of personnel (max. cover lift weight 12kg), allowing for easier routine

maintenance access or emergency access for removal of personnel overcome by fumes.

Dabico's vault access covers have a waterproof cover frame preventing fluids and dirt/debris from entering the vault/pit area.

All our covers are aircraft load rated with a 4:1 safety factor.

Fuel Isolation Valve Pit Assembly

Dabico's fuel isolation valve pit assemblies house isolation valves - DBBV, butterfly, ball, gate – valves up to 600mm (24") in diameter. They allow routine and emergency shut-off.

A unique waterproof cover and frame assemblies, with aluminium covers, prevent fluids and debris from entering the pit once the cover is closed.







Defence Systems

Dabico's innovative GSE technologies are used in defence applications world-wide.

We design, make, integrate and support with the aim of ensuring mission success. Air forces, navies, and domestic defense services trust Dabico for quality of service, engineering excellence, and flexibility and reliability.

We support our customers around the world.





Powering and cooling

Solid State Frequency converters

Dabico manufactures advanced solid state frequency converters for defence applications. Our systems can be designed with single or double output power. Our converters can either be fixed or mobile, and have 50Hz or 60Hz input power.

Motor Generators (MG)

Dabico developed the first vertical synchronous MG for greater power, reduced size, improved efficiency and reliability, and longer service life.

There are currently several thousand of Dabico MG in use worldwide, by services such as the US Navy.

In-ground pits

Dabico's in-ground pits are in use around the globe for supporting defense operations. Located either on the aprons or inside MRO hangars, they ensure a fast connection and service to aircraft.

PCA

Dabico PCA systems can either be designed as Point of Use or Central systems.

We engineer DX-Hybrid or High and Low pressure central systems that operate under harsh ambient conditions and guarantee optimal cooling performance.

Our PCA units are electrically driven, fixed or mobile. Dabico PCA AHU and in-ground pits are already in use with a variety of aircraft, including the F-35 Lightning.





After-sales service

Dabico's Services division helps customers to maximise the availability of their assets, reduce operating costs and extend equipment lifespan.

With 70 service experts in more than 30 countries, Dabico supports customers with a range of service offerings, including:

- » inspection, training and preventive maintenance
- » spare parts
- » repair and replacement
- » equipment renovation and upgrades

Furthermore, four service level agreements have been developed to support the maintenance of the 18,000 Dabico units currently in service worldwide:

- » Dabico Care
- » Dabico Care Enhanced
- » Dabico Care Enhanced Plus
- » Total Dabico Care

References

Aircraft manufacturers

- » Airbus France, Toulouse
- » Airbus Germany, Hamburg
- » Airbus China, Tianjin
- » Boeing Assembly lines, Seattle
- » Dassault Aviation, France
- » EADS Spain, Sevilla
- » Eurocopter France
- » Eurocopter Germany
- » Lockheed Martin Assembly Lines
- » Shaanxi Aircraft Corporation, China

MRO hangars

- » Air France A380, Paris
- » Aeromexico, Mexico
- » AMECO A380, Beijing
- » AMMROC, UAE
- » DHL Leipzig
- » Emirates Airline A380, Dubai
- » Fedex, Memphis
- » Lufthansa A380, Frankfurt

- » Newark
- » Qatar Airways A380, Doha
- » Qantas A380, Sydney
- » Oman Air, Oman
- » Riyadh & Jeddah MoF
- » US Airways, Philadelphia

Airports

- » Anchorage, Alaska
- » Atlanta, Georgia
- » Athens Airport
- » Bangalore Airport
- » Bahrain Airport
- » Barcelona Airport
- » Beijing Airport
- » Brasilia Airport
- » Buenos Aires Airport
- » Charlotte, North Carolina
- » Chicago (O'Hare), Illinois
- » China Eastern Airlines, Shanghai
- » Dalian Airport
- » Dallas / Ft. Worth, Texas
- » Dakar New Airport
- » Denver, Colorado

- » Detroit (Metro), Michigan
- » Dortmund Airport
- » Dubai DXB Airport
- » Dubai JXB Airport
- » Fiumicino Airport
- » Frankfurt Airport
- » Guangzhou Airport
- » Helsinki-Vantaa Airport
- » Hong Kong Airport
- » Hongqiao Airport
- » Houston (Intercontinental)
- » Hyderabad Airport
- » Kunming Airport
- » Las Vegas, Nevada
- » Leipzig Airport
- » London Heathrow Airport
- » Los Angeles Airport (International)
- » Macau Airport
- » Madrid Airport
- » Manchester Airport
- » Miami, Florida
- » Minneapolis / St. Paul,
- » New York (JFK), New York

- » Mumbai Airport
- » Munich Airport
- » New Delhi Airport
- » New Doha International Airport
- » New Islamabad Int' Airport
- » New Oman Airport
- » Noi Bai Airport, Vietnam
- » Orlando, Florida
- » Paris CDG Airport
- » Philadelphia, Pennsylvania
- » Phoenix, Arizona
- » Qingdao Airport
- » San Francisco, California
- » Santiago de Chile Airport
- » Sao Paulo Airport
- » Seattle (Seatac), Washington
- » Singapore Airport
- » Shanghai Pudong Airport
- » Shenzhen International
- » Shermetjevo Airport
- » Soekarno-Hatta Airport
- » Stockholm Arlanda Airport
- » Sydney Airport

We are present in:

- | | | | |
|-------------|-------------|-------------------|----------|
| » Australia | » Germany | » The Netherlands | » Turkey |
| » China | » Hong Kong | » Singapore | » UAE |
| » Denmark | » India | » Spain | » UK |
| » France | » Italy | » Sweden | » USA |

