

# Fly further

## Saft batteries for aircraft



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# Fly with the battery expert



Saft is the world's leading designer, developer and manufacturer of advanced technology batteries, with expertise covering a wide range of nickel-based, primary lithium, rechargeable lithium and specialised-technology batteries. Saft batteries provide the energy and power necessary for high performance applications found in air, rail and marine transportation, industrial infrastructure, space and defence. Saft is also a leader in lithium-ion technology for new applications in HEV and energy storage systems.

## Innovation – the cornerstone of Saft's continued success

Research and development are part of an ongoing movement at Saft. The Group is constantly building on its achievements and continually working to improve existing products and implement new technologies as its customers' needs evolve. Around 400 people work in two research centers, enabling Saft to lead the way in battery innovation.

## Saft is the premier battery supplier to the global civil and military aerospace industry

Saft designs and manufactures high performance batteries for both civil and military aircraft. The company has earned a reputation for performance, reliability and durability through its mastery of nickel technology specifically developed for aircraft. Beyond its legendary products, Saft is also known for being a dedicated partner that delivers quality products, technical expertise, professional service and around-the-clock support, all for the lowest total cost of ownership.

# Fly proven technology



Commercial aircraft



Military aircraft



Regional jets



Turboprops



Business jets



Helicopters



General aviation



Drones

## A Saft battery takes off every 2 seconds!

Saft's first aircraft program dates back to 1932 when the Aeropostale Company requested batteries that could ensure the easy start of their aircraft engines. More than 80 years later, Saft is proud to be the world leader in this activity, with batteries on board two-thirds civil and military aircraft.

Almost the entire aircraft industry has placed their trust in Saft. An incredible number of Saft batteries are currently

flying all over the world. Indeed, most OEMs worldwide have chosen Saft to be their preferred battery supplier.

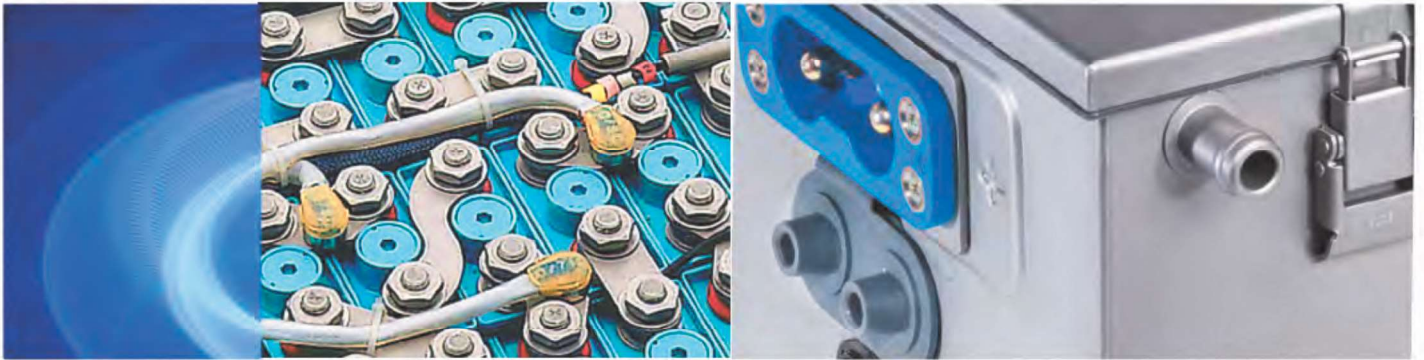
## Fly safely

### The battery, a crucial link in aircraft safety

Batteries are flight-critical components that play a key safety role onboard an aircraft. Choosing a Saft battery means benefitting from three essential functions:

- **High peak power** for autonomous engine or APU starting, essential on the ground and especially important in the event of an in-flight engine flame-out
- **Back-up power** in case of an in-flight electrical generation system failure where the battery must be able to supply the energy for essential avionic instruments until landing
- **Regulation** of the aircraft's DC network voltage

# Fly a custom-engineered design



Saft batteries are custom-engineered to the specifications of a variety of aircraft programs. As a result, Saft offers over 400 different battery designs suiting virtually every requirement, all optimised for energy and power.

## The full range of Saft aviation cells

Saft Ni-Cd cells meet the evolving needs of the market, and are designed for both energy and power:

- ULM® energy & power cell (12-53Ah)
- VXP Extra high power cell (23-41Ah)
- VHP energy & power cell (17-45Ah)
- VP power cell (6-40Ah)
- VO energy cell (12-40Ah)



## Ultra Low Maintenance®

ULM® technology – first developed by Saft – is the newest generation of Ni-Cd batteries. ULM® batteries cut the need for maintenance events in half, all while providing our usual levels of performance and quality. Saft ULM® batteries are ideal for both new installations and upgrades since they are directly interchangeable with standard products in form, fit and function.

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## Keep your batteries flying!

Saft ULM® batteries usually require only one annual maintenance check. Lead-acid batteries most often need to be replaced after one year, which means buying a replacement battery for a much greater sum than the cost of maintenance.

You have the choice – invest in inexpensive maintenance or spend on replacements.

# Fly financially smart



Only the Total Cost of Ownership (TCO) represents the true value of owning a battery. Beyond just the one-time purchase cost, consider the following factors when you choose batteries for your aircraft:

#### Service life

Saft batteries last at least 3 times longer than competing lead-acid batteries. Lower your TCO with Saft by using fewer replacement batteries.

#### Maintenance costs

Saft has developed optimised maintenance procedures for its batteries to ensure safety, maximum service life and superior performance. Consequently – and even with the cost

of maintenance included – Saft provides a lower TCO compared to other types of batteries.

#### Performance

Saft batteries offer unmatched performance and safety under all conditions. They outperform lead-acid batteries in both power and reliability, and offer a long and predictable service life with no risk of ‘sudden-death’ failure.

#### Impact on aircraft engines and APU

Up to 85% of the life of an aircraft engine or APU is consumed during start sequences. Although other batteries initially provide adequate power, their performance declines rapidly, resulting in the generation of higher temperatures and greater wear and damage to parts. Because Saft batteries consistently deliver superior power, engines and APUs always start faster and at cooler temperatures – preserving their life and drastically reducing your TCO.

#### Reliability

A battery failure can be financially catastrophic especially if it leads to an Aircraft On Ground (AOG) incident. Thanks to the highest quality materials

and the possibility to perform preventative maintenance, Saft batteries have unprecedented reliability. Other technologies, such as lead-acid batteries, can dry-out and corrode, which can lead to a thermal runaway and sudden-death failure, resulting in significant financial penalties that affect your TCO.

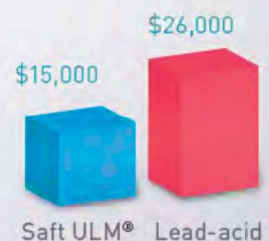
#### Availability of spare parts

Saft batteries are designed to ensure that cells and components can be easily replaced individually. By avoiding the need for complete replacements, you reduce your TCO.

## Save up to \$11,000 per Falcon with Saft ULM®

Over the course of 8 years, the resultant savings for operators choosing 405CH10 Saft ULM® batteries versus lead-acid amount to \$11,000 per Falcon.\* Multiply this by the number of Falcons in your fleet and you’ll immediately understand why Saft is the financially smart solution – even if you just own one Falcon.

\* These figures are representative of batteries on Falcon jets – two batteries are required. Saft batteries are assumed to last 8 years and lead-acid batteries 1.5 years. Results will vary according to aircraft utilisation, battery start frequency, maintenance capability, and ambient temperature.



Contact us to obtain a detailed TCO comparison for your fleet

# Fly with a life-long partner



For guaranteed performance, always check for the Saft brandname

World-class, high quality manufacturing and mastery of key processes

All Saft aviation cells and batteries are manufactured in Saft production facilities in France and the United States.

Our unrelenting focus on quality ensures complete control of each step of the manufacturing process.

Fully compliant with aviation, safety, environmental, and quality standards:

- Global Quality & Environmental standards: ISO 9001, ISO 14001
- EASA regulatory authority (plant in France): EASA part 21, EASA part 145, EN 9100
- FAA regulatory authority (plant in the USA): FAR 145, AS 9100
- All batteries are tested and approved to recognised aviation standards: N2570, IEC60952, RTCA DO-160, MIL-PRF 81757



Certificat AEO  
n°FR00000942

More than 130 OEM-approved batteries

Saft batteries receive OEM approval only after intensive system integration testing in accordance with FAA/EASA regulations.

## Saft's experience at your service

### From the start

Saft is cooperating since the R&T and demonstration phase, design, qualification and certification of the aircraft, supporting system designers with custom-tailored battery solutions.

### Once in service

Saft supports you through all phases of aircraft operations with its dedicated, full-time product support team and expert engineers.

### Right to the end

Saft has created a worldwide network dedicated to recycling batteries that have reached the end of their long life.

### Available 24/7

Our website provides access to all our technical documentation along with many other resources free of charge. Be informed pro-actively by subscribing to our free technical e-mail service updates.

### Sharing knowledge

Saft offers an FAA approved Ni-Cd battery training course in our facilities. The course aims to further assist operators in service life optimisation and associated operational costs control by promoting proper use and maintenance.

# Fly innovation



Saft's high-performance Ni-based batteries are meeting the expectation of today's aircraft. But did you know that our engineers are already putting their 15+ years of experience with Li-ion applications to work on developing cutting-edge battery systems to meet the increased power and energy demands for tomorrow More and All Electric Aircraft?

Li-ion batteries are of particular interest for the development of advanced aircraft and UAVs where weight considerations are critical to the success of the mission and control over costs. A lower weight results in reduced fuel burn and CO<sub>2</sub> reduction benefits that represent bold steps toward eco-efficiency while reducing operating costs.

Saft has been selected to provide advanced Li-ion battery systems for the following programs:

- Airbus A350XWB for starting and emergency power
- F-35 Lightning II Joint Strike Fighter (JSF) for APU starting and flight control service power back-up
- Unmanned military aircraft where the battery is required for emergency load applications
- In cooperation with aircraft manufacturers, these projects respect the highest development assurance levels (DAL A according to D0178) as required by the FAA and the EASA to ensure safety and compliance.

## Worldwide distribution network

Saft's worldwide network of Partners/Distributors ensure AOG services and aim to efficiently deliver the batteries you need, on time, every time, anywhere in the world. For exact geographical coverage, please consult our website:

[www.saftbatteries.com](http://www.saftbatteries.com)

# Fly eco-friendly

## Environmental benefits of Ni-based batteries:

- Unmatched long life reduces the need to transport new/used batteries and associated environmental impact
- Reliable thus requiring fewer replacement cells over the life of the battery
- Over 75% of the components can be recycled including the electrolyte, the plastic casing, connecting components, cadmium, nickel and steel

## Saft is committed to the highest standards of environmental stewardship

Saft works with a worldwide network of collection partners for the recycling of its industrial batteries. By bringing their end-of-life batteries to this network, users of Saft batteries are ensured that they will be received, stored and shipped to recycling facilities in full compliance with local, national and international laws and regulations which regulate trans-boundary waste shipment and recycling. A list of our collection points is available on our website.

