

ELECTRICAL & POWER



# SAFRAN ELECTRICAL & POWER

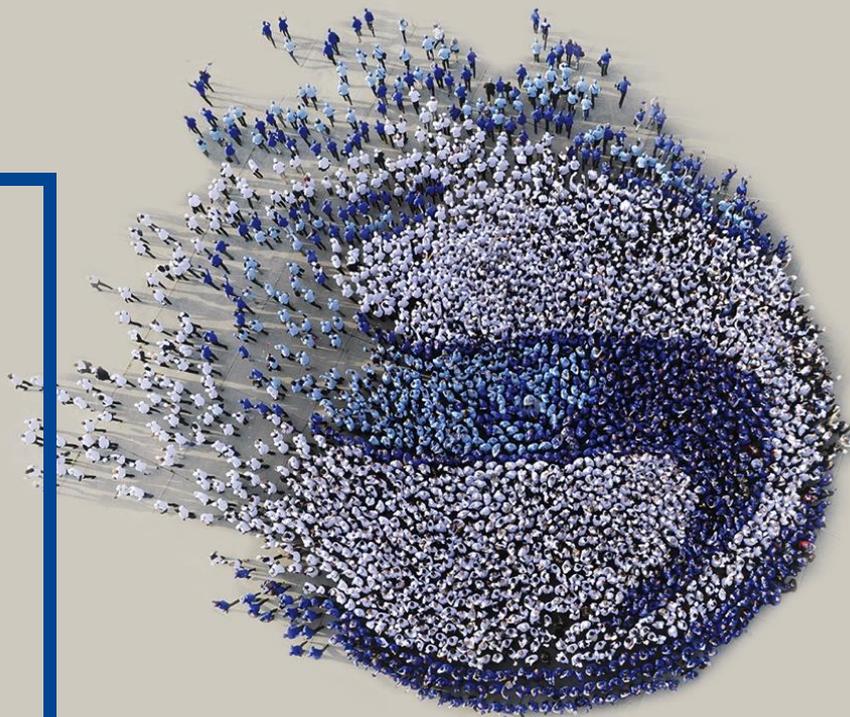
## *ELECTRO - MECHANICAL COMPONENTS*

August-2018



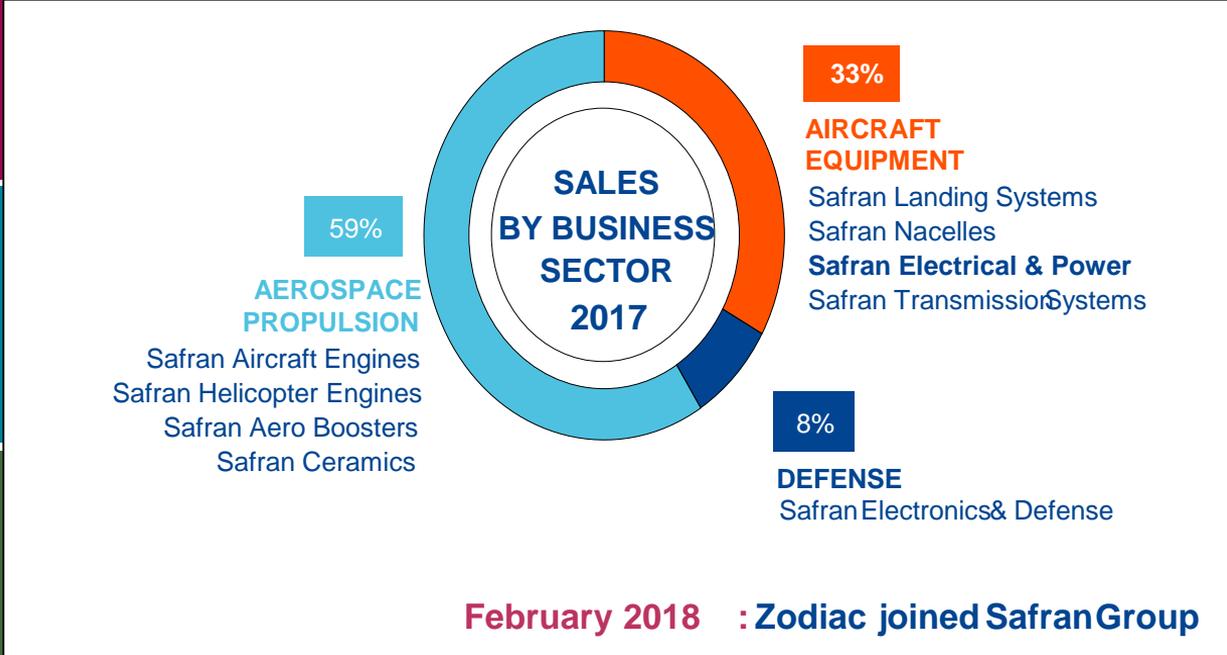
# 1

## SAFRAN AT A GLANCE



# SAFRAN GROUP – INTERNATIONAL HIGH TECHNOLOGY GROUP

<p><b>3 CORE BUSINESSES:</b> Aviation Space Defense</p>	<p>Over <b>58,300 EMPLOYEES</b> in more than <b>30 COUNTRIES</b> <b>6,700 New Hires</b></p>
<p><b>€1.4 BILLION</b> in R&amp;D expenditures*, equal to nearly 8% of sales</p>	<p>Over <b>850 INITIAL PATENTS</b> filed in 2015</p>
<p><b>€16.5 BILLION</b> in sales*</p>	<p><b>€2.5 BILLION</b> in adjusted recurring operating income*</p>



# Complementary businesses providing for a more comprehensive Safran offer



**Aerospace  
propulsion**



**Aircraft  
equipment**



**Defense**



**Zodiac  
Aerosystems**



**Zodiac  
Cabin**



**Zodiac  
Seats**

**Zodiac  
Aerospace  
Services**

**A GLOBAL LEADERSHIP POSITION  
IN THE AEROSPACE INDUSTRY**

# Safran and Zodiac Aerospace

An enlarged global footprint, in particular in North America

More than **91,000**  
**EMPLOYEES**  
in more than **340**  
**LOCATIONS**  
over **60**  
**COUNTRIES**

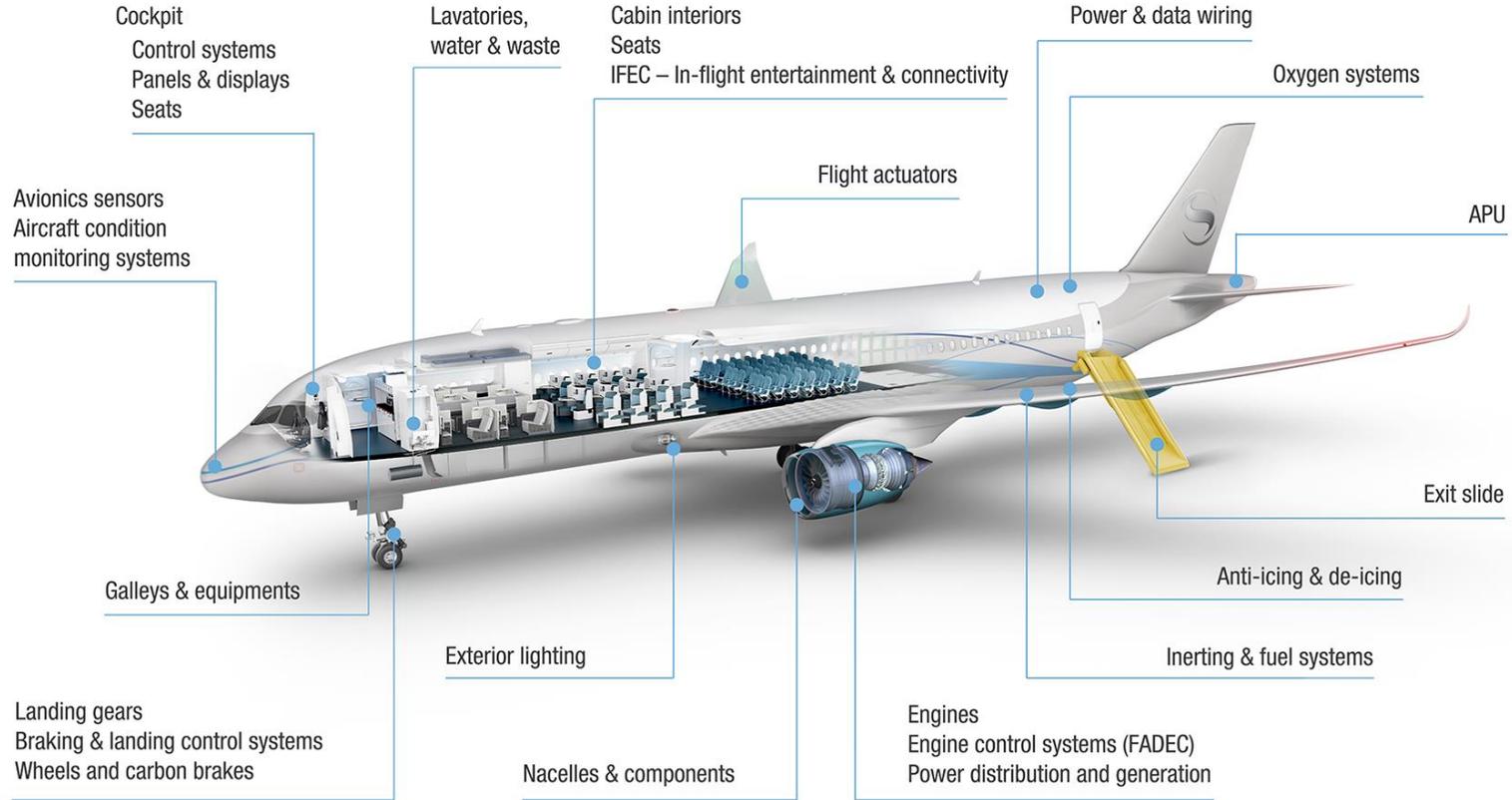
**25,500**  
28%

**55,100**  
60%

**4,700**  
5%

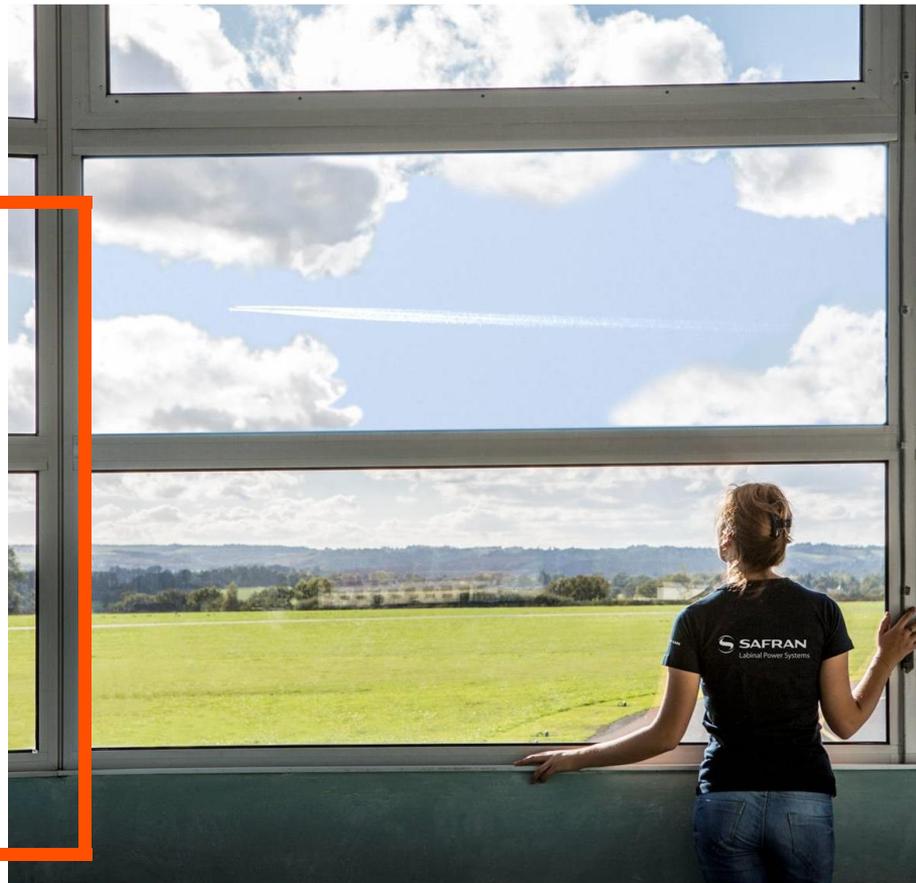
**6,400**  
7%

# A comprehensive offer in aircraft propulsion and equipment

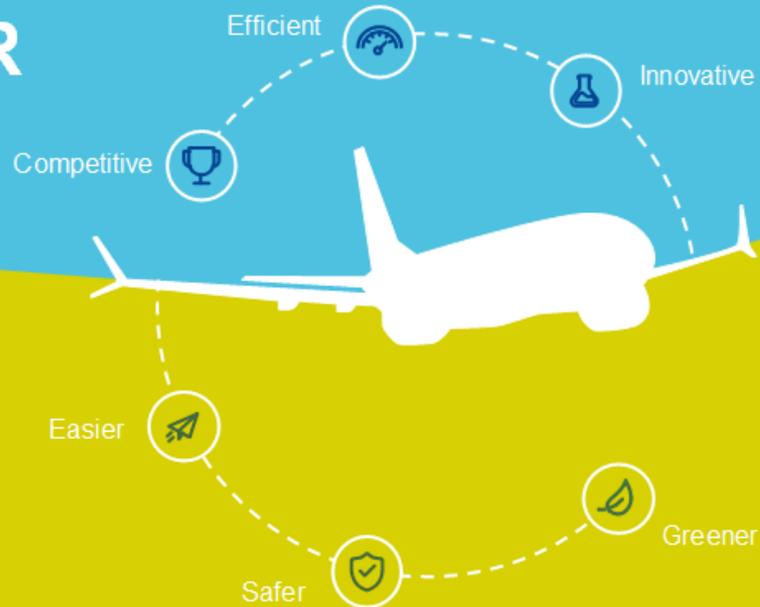


# 2

## SAFRAN ELECTRICAL & POWER



# SMARTER ELECTRICAL SOLUTIONS



FOR A BETTER  
FLIGHT



# SAFRAN ELECTRICAL & POWER CORPORATE OVERVIEW



# AN UNIQUE RANGE OF ELECTRICAL PRODUCTS AND SERVICES

## GENERATION

- > Variable and constant frequency AC Main generation
- > High speed APU generation
- > Turbogenerator
- > DC Brush and Brushless DC Generation and Starter-Generation



## DISTRIBUTION

- > AC and DC distribution
- > Secondary AC and DC Solid State Power Controller (SSPC)
- > Circuit Breaker Panels
- > Distribution components: Contactors, Circuit breakers, Relays...



## ALTERNATE POWER

- > Auxiliary Power Unit e-APU and MPG (Main Power Generators)
- > RAT (Ram Air Turbine) product policy from conventional deploy to integrated solutions



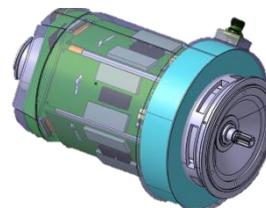
## WIRING

- > EWIS processes and Tools
- > All-ATA interface modeling & simulation
- > One-Stop Shop for configuration control



## ELECTRIFICATION

- > Green Taxiing (APU Supplied) and e-Brake
- > Electric Nacelle (eTRAS- Electrical Thrust Reverser Actuation System, VFN - Variable Fan Nozzle, Anti-Ice functions)
- > Electric Engine Start
- > Flight Controls EMA
- > Variable frequency fans
- > Smart Motors



## INTEGRATION & CERTIFICATION

- > Complete nose-to-tail electrical power systems for any size of aircraft
- > Integration of a complete electrical power generation and distribution system and certification process support



# SAFRAN ELECTRICAL & POWER AT A GLANCE

A WORLD LEADER FOR ELECTRICAL SYSTEMS

13,000 Employees  
12 Countries

N° 1 WORLDWIDE FOR EWIS\* AND VENTILATION SYSTEMS



Comprehensive product portfolio covering all on board electrical systems



N° 2 WORLDWIDE FOR ELECTRICAL POWER GENERATION



A WORLDWIDE CUSTOMER SERVICES NETWORK

GLOBAL ENGINEERING SERVICES

and innovative data & power interconnection systems



## CREATION OF A WORLD LEADER BY GATHERING SAFRAN ELECTRICAL CAPABILITIES AND STRATEGIC ACQUISITIONS



- Labinal
- Safran Power
- Safran Engineering Services
- Technofan



- Aerosource



- Power Distribution Management Systems



- Electrical Power Systems

JAN 02  
2014

## BEST-IN CLASS SERVICES AND EXCELLENCE IN QUALITY AND DELIVERY



\*EWIS: Electrical Wiring Interconnection Systems (2015 figures)

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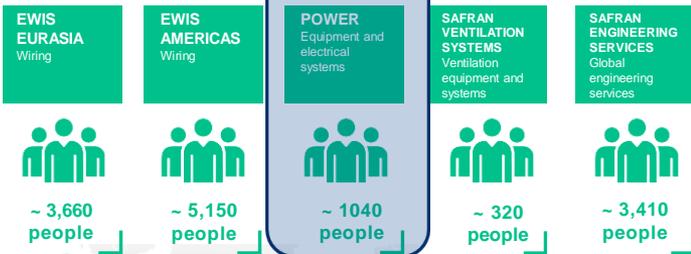


# GLOBAL PLAYER BALANCING CUSTOMER PROXIMITY AND COST-EFFICIENCY

## PROXIMITY TO OUR AIRFRAMER CUSTOMERS

> Circa 13,000 employees (incl. JVs) in 12 countries

> Five operational divisions



> Engineering and Operation at the closest to our Customers

> Production facilities in low-cost countries



## SUPPORT AND SERVICES

> Complete range of support services from a single spare part to a full support package

> Spares, Repair and Services

- 24/7 spare parts report, AOG (Aircraft On Ground)
- Global distribution network for spare parts
- Repair shops certified to EASA, FAA and CAAR PART 145  
FAA PART 145 and CAAR PART 145



> Aftersales support

- Preparation for Entry Into Service
- Technical support, publications, tools & training
- Operational monitoring, improvement proposals
- Integrated package offer, Flight By the Hour, Asset Management



# POWER DIVISION



\*\*Via Aerolec Joint Venture with Thales



Our high speed power generation systems with optimized liquid cooling provide the best of electrical energy to power the aircraft systems.

**MAIN  
& AUXILIARY  
GENERATION**

**EMERGENCY  
GENERATION**

**Generator & Starter-Generator:**  
AC & DC; Up to 250 kVA; 28 V DC,  
115 V AC, 230 V AC Variable Frequency;  
Air/oil cooled

**Generator Control Unit (GCU):** Analog  
& Digital, including Fault detection  
& Ground Power Control functions

Ram Air Turbines (RAT)

A COMPREHENSIVE RANGE OF PRODUCTS FROM  
**150A DC STARTERGENERATORS**  
**UP TO 150KVA AC GENERATORS**  
COVERING ALL THE ONBOARD  
ELECTRICAL  
REQUIREMENTS



**MOTOR  
DRIVE**

Our 2 lines of electrical  
motors (Air cooling or  
Liquid cooling /  
Concentric winding or  
Hair pin) are used on a  
wide range of needs.

From 1 KW to  
500 KW, using air  
or liquid cooling,  
Brushless or  
Brush electrical  
motors, aiming  
to the 1 MW  
capability.

Propulsion

Ventilation

Actuation

From very simple use, to smart motors  
and up to the most advanced future  
propulsion needs.

**More than 15 000**  
electrical motors  
produced per year

# POWER DIVISION



We design & assemble electrical distribution systems, **that centralize the on-board generated power, manage and distribute it** where and when needed, while protecting the aircraft's electrical network

## MAIN DISTRIBUTION

Smart Optimized Power Management Syst.

Primary & secondary distribution

Emergency distribution

AC & DC

## COMPONENTS & CIRCUIT PROTECTION

Circuit breaker, Remotely Controlled Circuit breakers (RCCB), Solid State Power Controllers (SSPC)

Relays & Contactors

## SWITCHES & PANELS

Toggles, Rockers, Push-buttons etc & all the associated switch guards & shields

**100+**  
MILLION ACCUMULATED  
IN-SERVICE FLIGHT HOURS



In partnership with its Safran sister companies, Safran Electrical & Power technologies allow the electrification of the aircraft. Mechatronics integration into smart motors and smart generators

## Electrical Braking System (EBAC)

787



## Electrical Back-up Mechanical Actuator (EBMA)

A400M



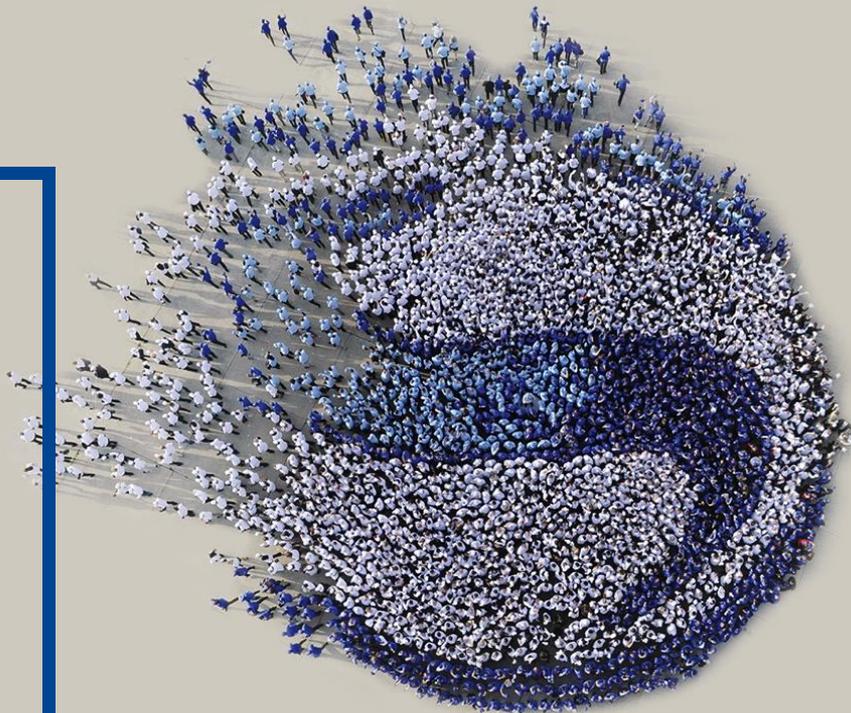
## Electrical Thrust Reverser Actuator (ETRAS)

A380



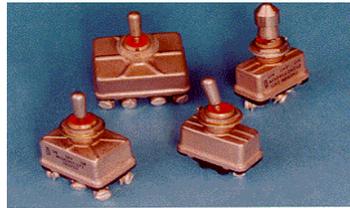
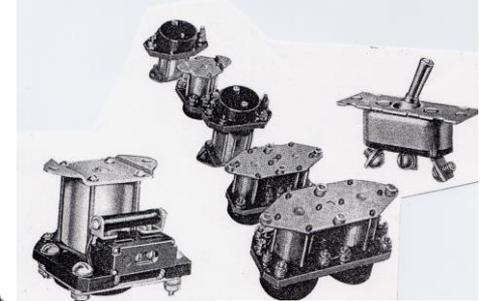
**UP TO 99%**  
POWER ELECTRONICS' EFFICIENCY

# SARASOTA OVERVIEW



# Sarasota from origins to today

- In 1977 Cutler-Hammer announced plans to build a new 100,000 square foot plant in Sarasota, Florida and ready for operation in late 1978.
- In 1978 Eaton Corporation acquired Cutler-Hammer with merger becoming official on January 2, 1979.
- 1990 – SM100 hermetically sealed lightweight introduced
- 2003 – Sealed circuit breaker invented
- 2009 - Plug-in Circuit Breaker invented
- 2012 – Advanced Power Distribution unit invented
- In May 2014, Safran acquired Sarasota Eaton PDMS business integrating in 2015
- In 2011, Safran acquired NJ based AES, Inc. and relocated to SRQ in July of 2017



Airbus & Boeing



APU Generators



# SAFRAN ELECTRICAL & POWER



## 6 CORE BUSINESSES:

Switches  
Circuit Breakers  
Contactors  
CBP & PDU  
ADG  
MRO / Repairs

**\$77 MILLION** in sales

Over **~340 TEAM MEMBERS** in **2 COUNTRIES**



**\$1.7 MILLION** in R&D expenditures\*

**7 NEW PRODUCTS** to be **LAUNCHED** in **2018**

\*FY 2017

# SARASOTA FACILITY

## ➤ Sarasota, FL

- 125,000 sq. ft.

## ➤ Satellite site

- Chihuahua, Mexico

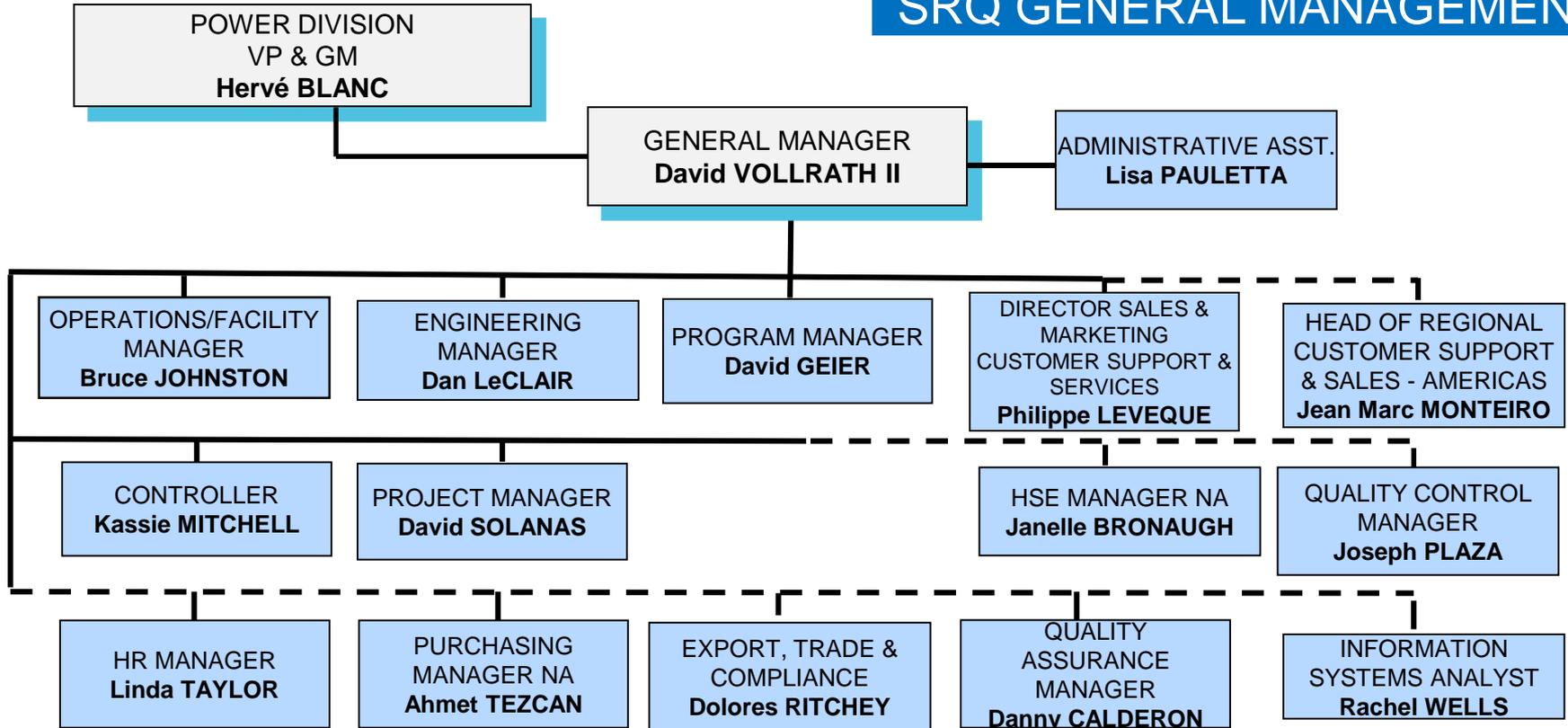


- Engineering Organization capable of supporting new product design / development programs and sustaining core products
- Expertise in ARC Science, Power and Logic Switching
- Proven Electromechanical Switching Mechanisms
- Creative High Density & Environmental Packaging Capabilities
- Unique on-site testing capabilities for OEM and MRO ( Wind Tunnels)

**A center for excellence in performance rated products centered around Safran Electrical & Power Sarasota's core technologies**

# SAFRAN ELECTRICAL & POWER SARASOTA

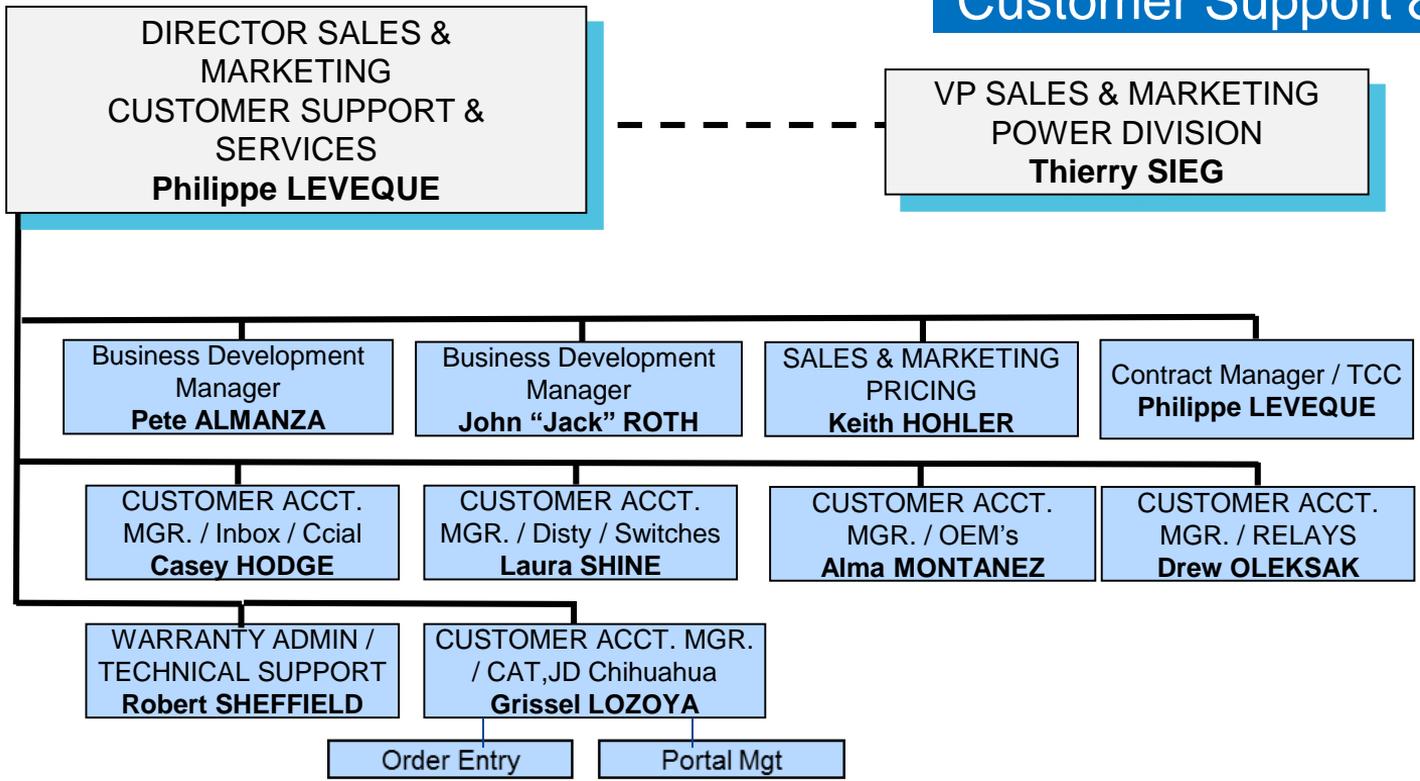
## SRQ GENERAL MANAGEMENT





# Safran Electrical & Power Sarasota

## Sales & Marketing Customer Support & Services



# SARASOTA OEM OVERVIEW



## Technical Strengths

- Power & Load Management
- Electro-Mechanical Switching
- Arc Fault Technology
- Expertise in Arc Science
- High Density Packaging
- Power Distribution

## Component Excellence



Toggle,  
Pushbutton, &  
Rocker  
Switches



AC/DC Contactors  
& Relays



270Vdc  
Contactors



Thermal Circuit  
Breakers



Arc Fault Circuit  
Breakers



Remote  
Control Circuit  
Breakers

## Value Added Subsystems



Phenom 100/300 Power  
Distribution Panel



Phenom 100/300 Power  
Distribution Panel



CSeries Plug-In Circuit  
Breaker Panels



Advanced Power  
Distribution Panel Concept

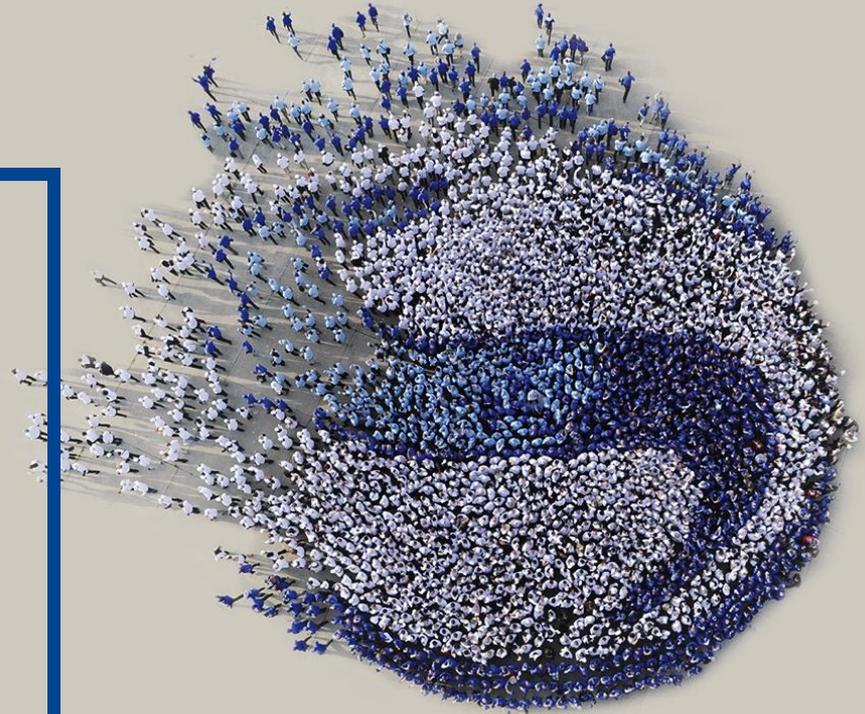
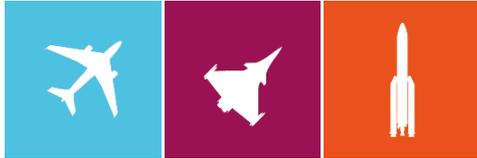
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# 1

## SWITCHES



# SAFRAN SWITCH OFFERING



Environmentally Sealed Switches



Illuminated Rocker Switches



Switch Guards & Multi-pole Locking Switches



Over 15,000 active switch part numbers



"Basic" Switches



H11 Position Switches



Joy Sticks



Used in relays as an auxiliary status indication or to drive other circuits

**Broad portfolio of non-illuminated switch products for various applications and markets**

# TOGGLE SWITCHES

## ENVIRONMENTALLY SEALED TOGGLE SWITCHES

- Water tight per MIL-STD-108 and Rated to IP68
- Ratings at 28VDC and 115VAC 60/400Hz
- 1, 2 & 4 pole configurations
- Toggle, lever lock and designer line Actuator
- Various Connector options are available

## VERSATILE, COST EFFECTIVE



## Multi-Circuit Switches

- Ratings up to 7 amperes
- 2, 4 & Pole Configurations
- Lever Lock or standard configurations

## LOTS OF CONTROL FROM ONE SWITCH



## Environmentally Sealed Positive Action Switches

- Meets MIL-DTL-8834 requirements
- Ratings at 28VDC and 115VAC, 60/400Hz
- One, two and four pole configurations
- Standard lever and lever lock Actuator

## HIGH RELIABILITY



## Miniature Positive Action Switches

- MS approved and QPL listed to MIL-DTL-8834
- Rating variation - power to logic levels
- One and two pole configuration
- Bushing sealed per MIL-DTL-8834
- Non-teasible mechanism
- Toggle and lever lock Actuator
- Dry circuit load up to 5A and as low as 25 $\mu$ A at 5mV

## HIGH RELIABILITY LOW LEVEL SWITCHING



# PUSH BUTTON SWITCHES

## STANDARD AND UPA PUSH BUTTONS

- Momentary and alternate action
- Ratings up to 40 amperes
- One and two pole configurations
- Single hole mounting
- Decorative Actuator in various colors
- Two moisture proof series

CUSTOMER CONFIGURABLE



## SUB MINIATURE PUSHBUTTON

- Snap action
- MIL approved
- Sealed or non-sealed
- Low operating force
- Small Size

FOR LIMITED PANEL SPACE



## HAND CONTROLS

- Control stick mounting
- Non "freeze "durable phenolic handle
- Heavy duty trigger switch
- Available with cord for remote operation
- Available with auxiliary switch

VERSATILE, COST EFFECTIVE



## FOOT OPERATED PUSHBUTTONS

- Foot operated microphone switches
- Switching mechanism sealed against dust and moisture
- Rugged construction with flush mounting design

VERSATILE, COST EFFECTIVE



# ROCKER AND LIMIT SWITCHES PRODUCT FAMILIES

## ENVIRONMENTALLY SEALED ROCKER SWITCHES

- Watertight seal per MIL-STD-108E
- Three types of panel mounting
- Ratings at 28VDC and 115VAC 60/400Hz
- One, two and four pole arrangements
- Multi-circuits
- Terminal variations - screw, spade and solder lug
- Variety of opaque Colored Actuators.



## ILLUMINATED ROCKER SWITCHES

- Watertight seal per MIL-STD-108E
- One and two pole arrangements
- Standard rocker and locking style actuation
- Switch is front panel mounted
- Lamps can be wired with circuit or independently
- Complete accessory package available



## LIMIT SWITCHES

- Ratings up to 7 amperes
- MIL-PRF-8805 Enclosure Design 5 (Hermetic)
- Stainless steel construction
- Inert gas filled
- Plunger or roller actuator
- Two and four pole configurations
- Custom designs available



## SWITCH GUARDS

- Qualified to MIL-DTL-7703
- For use with most Safran toggle switches
- For use with 2 or 3 position switches
- Lever covers molded in various colors
- Cover closure transfers toggle lever. See code number for details.
- Metal and molded covers
- Guard covers are spring loaded to either close or lock in open position



# APPLICATIONS

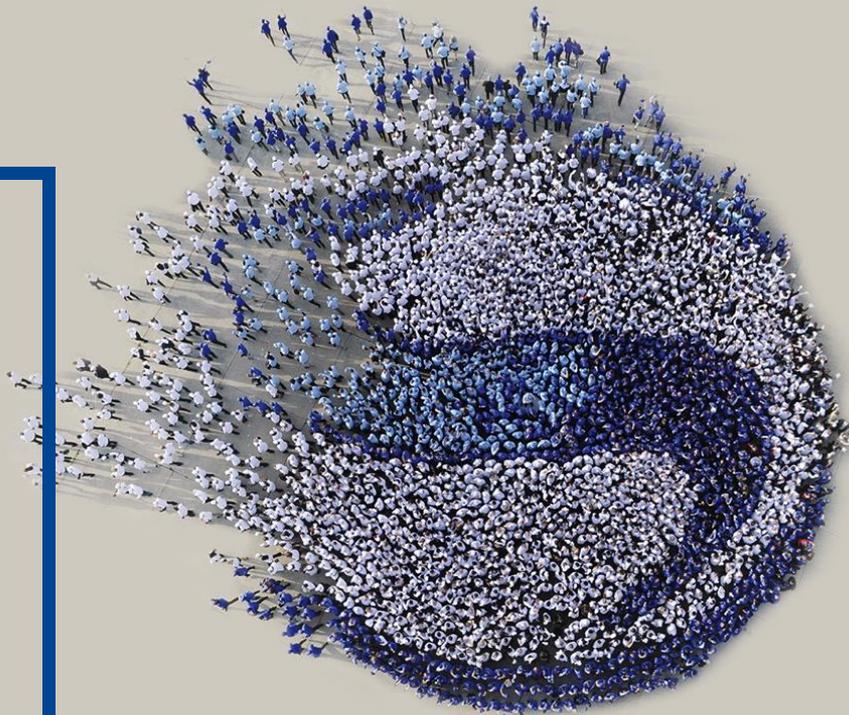
- Commercial /military fixed and rotary aircraft
- Cranes
- Trains
- Mining Trucks/Equipment
- Cement mixers
- Scissor Lifts
- Pumps
- Personal Water Craft
- Cargo Ships
- Nuclear Submarines
- Outdoor Machinery
- Military ground Vehicles
- Data Processing Controls
- Industrial Control Panels
- Computers
- Complex Switching Circuits
- Food Processing
- Front End loaders,motor grader,backhoes, Wheel Loaders

- Cargo Doors
- Chemical Processing plant
- Road paving Equipment
- Nuclear Plant Control Stations
- NASCAR
- Réfrigération Equipment
- Generators
- Hovercraft
- Tanks
- Forward Operating Base Equipment
- Mobile Ground Support Equipment
- JLTV



# 2

## CIRCUIT BREAKERS



# CIRCUITS BREAKERS

## SINGLE PHASE CIRCUIT BREAKERS

- Multiple Mil Spec Qualified Series
- 1/2 to 200 Amperes
- 120/115 VAC, 400Hz and 28VDC
- High Vibration and Long Button Options
- Auxiliary Circuits Available
- Sealed Circuit Breaker Options
- Plug in Versions Available



## THREE PHASE CIRCUIT BREAKERS

- Qualified to Multiple Military Specifications
- 1 to 200 Amperes
- 120 VAC, 400Hz
- Long Button Options
- Single and Ganged Bar Actuation
- Plug In Options Available



## ARC FAULT CIRCUIT BREAKERS

- AS5692 Qualified
- Arc Fault Circuit interrupters
- Models Range from 2-35 Amperes
- 3 Phase and Single Phase
- Optional Plug in Versions
- Arc Detection in Addition to Thermal Circuit Breaker Capability



# APPLICATIONS

## Single/Three Phase

- Main Distribution Systems
- Galley Panels
- Aft Panels
- Auxiliary Equipment
- Indicator/Control Units
- Cockpit Controls

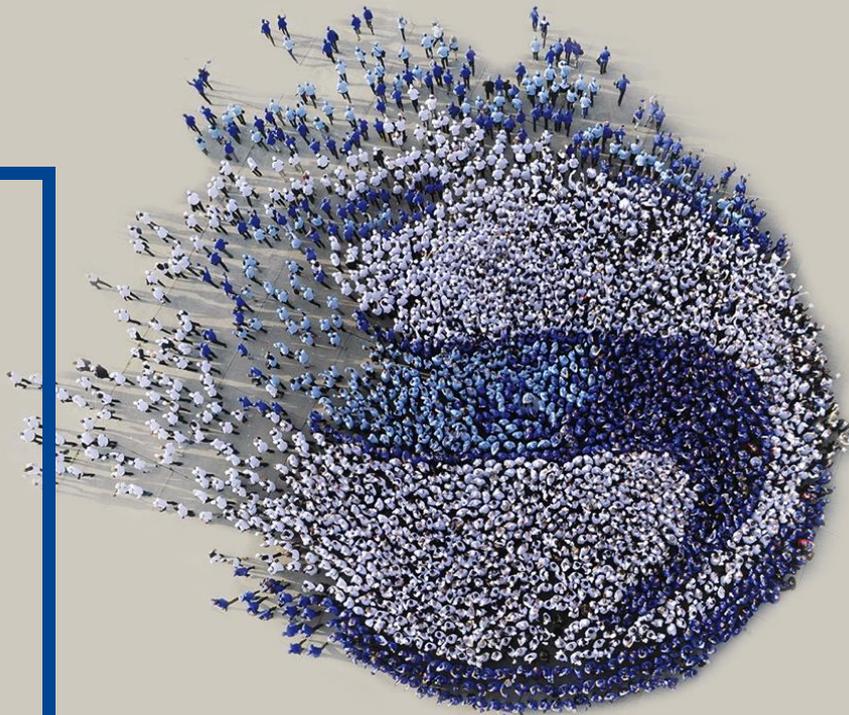
## ArcFault Where Arcs must be mitigated

- Aging wiring harnesses
- Cockpit Controls
- Galleys (Risk of wetting)
- High vibration areas prone to wire chafing
- Power lines close to
  - Oxygen line
  - critical hydraulic lines
  - fuel lines



# 3

## CONTACTORS



# Contactor current portfolio

## Single phase

P/N	Max V	In DC	In AC	Wght (lb)
SM100	28	100	n/a	0.60
SM150	28	150	n/a	0.75
SM200	28	200	n/a	0.75
SM300	28	300	n/a	0.75
SM400	28	400	n/a	0.75
6041H9	28 DC 200 AC	50	50	0.51
6041H14		100	75	1.30
6041H20		200	150	1.30
6041H21		400	n/a	2.43
6042H156	28 DC 200A C	50	50	11.04
6042H160		100	100	1.41



Gasket sealed



Unsealed thermal efficient



Hermetic



## 3 phases 115 V AC

P/N	In AC	Wght (lb)
6042H110	12	1.61
6042H141	25	1.61
6042H147	50	1.70
6042H289	100	3.60
SM15	60	0.62
SM 135Bx	135	3.16
SM 150Bx	175	2.21



Hermetic



Sealed



Generator relay

More than 21 000 contactors for aerospace industry produced every year for more than 30 years

# CONTACTORS

## TYPE I HERMETIC CONTINUOUS DUTY

- 12-400 Amperes
- Up to 80,000 feet
- Acceleration 15g's/Shock 25g's
- 

**HAZARDOUS  
ATMOSPHERE/HIGH  
ALTITUDE**



## TYPE II UNSEALED CONTINUOUS DUTY

- Designed to MIL-R-6106 Type II
- Double Break Contacts
- Auxiliary Circuits Available
- Gasket Sealed
- Continuous and Intermittent Duty
- Current Sensing

**VERY CONFIGURABLE**



## TYPE III INTERMITTENT DUTY

- Gasket Sealed
- Electronic control to compensate for low battery voltage during engine start.
- Low Level auxiliary contacts

**CUSTOM CAPABILITY**



## TYPE IV ENVIRONMENTALLY SEALED

- Light Weight 3 Phase contactors
- 100,000 Mechanical Cycles
- Rated up to 80,000 Feet
- Double Break Contacts
- Continuous Duty
- Bus mount/ cable mount

**5 DIFFERENT CIRCUITS**



# SPECIAL PRODUCTS

## GENERATOR CONTACTORS

- Meets MIL-R6106/42
- Rated up to 50,000 Feet
- Temperature Range up to 71°C
- Suitable for Ground Support and On-Board Systems
- Multiple Auxiliary Options
- Variable Frequency



## SPECIAL POWER PRODUCTS

- High Voltage DC switch Gear
- 100 to 1500 VDC at 300-700 Amps
- Uni-Directional and Bi-Directional Units
- Auxiliary Circuits Available
- Two Coil Controllers 24 to 48 Vdc and 77 to 110Vdc
- English and Metric Hardware Available



## REMOTE CONTROLLED CIRCUITBREAKERS

- MIL-PRF-83383 Qualified
- Can be used as a circuit breaker or a contactor or both
- Single phase and three phase
- 5 AMP to 100AMP
- Remote Power Controllers from 125 to 200 Amperes



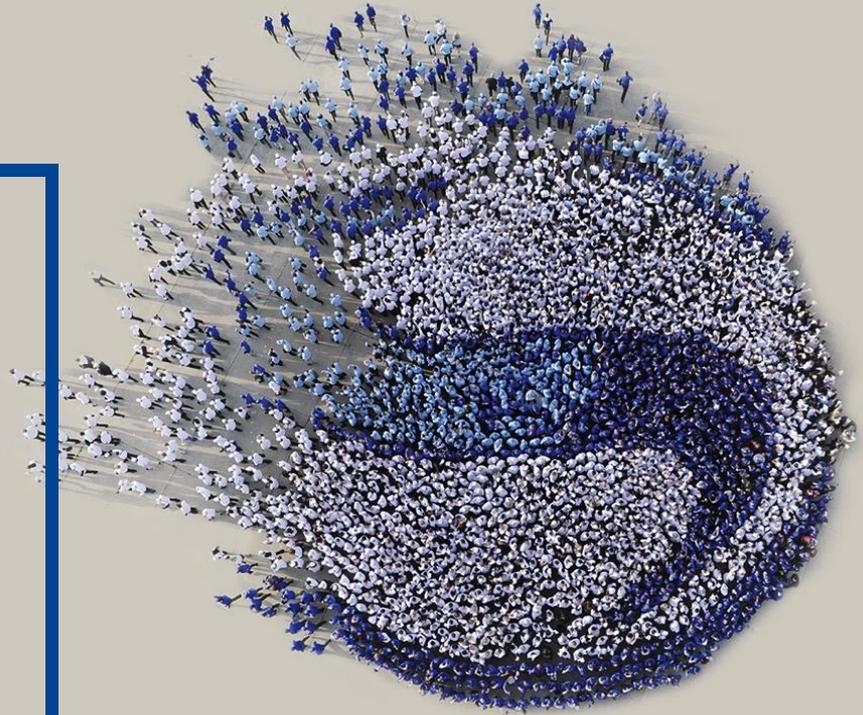
# APPLICATIONS

- Control relays
- Military & Commercial aircraft support equipment
- Control power relays
- AC power systems
- Cargo loaders
- Refineries
- Power Plants
- Trains
- High Altitude unpressurized applications
- Power Distribution units
- AC Panels
- DC Panels
- Forward Operating Base power Distribution
- Rocket Launchers
- Military Ground Vehicles
- Military and Commercial Aircraft
- Drones



# 4

## CB PANELS (CBP) AND POWER PLATE (PDU)



# SARASOTA POWER COMPONENTS AND SUB-ASSEMBLIES

- Sarasota is a champion in providing best cost and versatile subassemblies for power distribution cabinet



Airbus A350



Dornier Seastar



Embraer Phenom



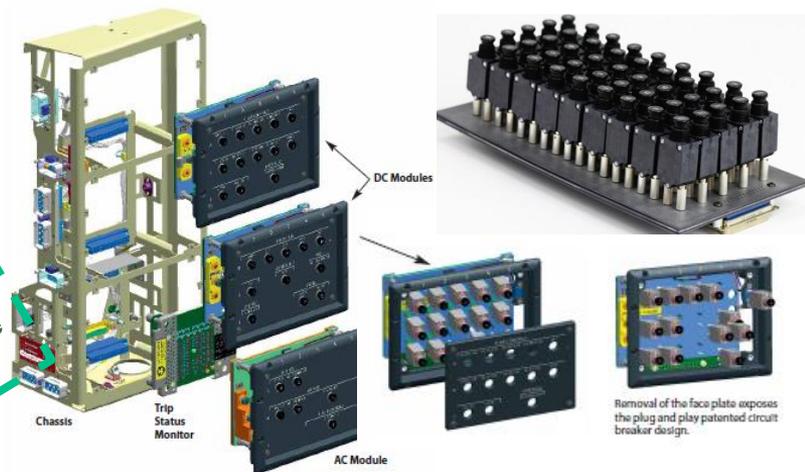
Bombardier C-Series

# FLEXIBLE & VERSATILE PANELS

## Secondary distribution:

- ❑ Modular panels
- ❑ Wireless and tool less 'plug and play' breaker installation
- ❑ Each load can be add or remove from the distribution in 1 to 2 seconds by manual plugging of a breaker
- ❑ Modular and error free assembly using integrated buss work
- ❑ Each breaker installs independently of the others
- ❑ No crimped connection
- ❑ Arc Faut Detection available in option
- ➔ Highly versatile and reconfigurable distribution panels

25% weight reduction  
30% volume reduction



## Primary distribution:

- ❑ Overmolded base plan in thermally efficient composite capable of wide range of current ratings
- ❑ Busbar mounted Contactor, Current Sensor and RCCB directly plugged on base plate
- ❑ PCB integrated in base plate to route signals and embed control/protection electronic
- ❑ Parameterable software to trim timing and current threshold
- ➔ Quickly reconfigurable primary distribution
  - without wiring /harness reworks
  - Without SW reload



# ADVANCE POWER DISTRIBUTION UNIT (APDU)

## APDU



- Combines relays, circuit breakers, and control logic in a single integrated package
- Innovative design and advanced packaging techniques allow 90KVA power distribution
- ~30% weight and ~40% volume savings; ~50°C lower operating temperature
- Virtually wireless design reduces assembly labor by more than 50% and increases reliability and maintainability
- Increased functionality
  - Voltage Sensing of circuit breaker position
  - Current Sensing of main feeder current
  - Common electronics module to provide contactor economizing, electronic auxiliaries, prognostics (contactor health)

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# NEW PRODUCTS



# NEW BUSBAR CONTACTOR OFFERING

## Single phase

P/N	DC rating (A)	Wght (lb)	Main Dimension HXLXW (mm)
SM1-200NG	200	0.3	86X76X68
SM1-400NG	400	0.44	86X76X68
SM1-500NG	500	0.55	86X76X68

## 3 phases 115/230 V AC

P/N	AC Rating (A)	Wght (lb)	Main Dimension HXLXW (mm)
SM3-60NG	60	0.5	82X4343
SM3-130NG	130	0.91	97X76X76
SM3-175NG	175	1.10	97X76X76
SM3-260NG	260	1.50	97X76X76
SM3-400NG	350	2.01	109X76X76
SM3-500NG	500	2.60	109X76X76

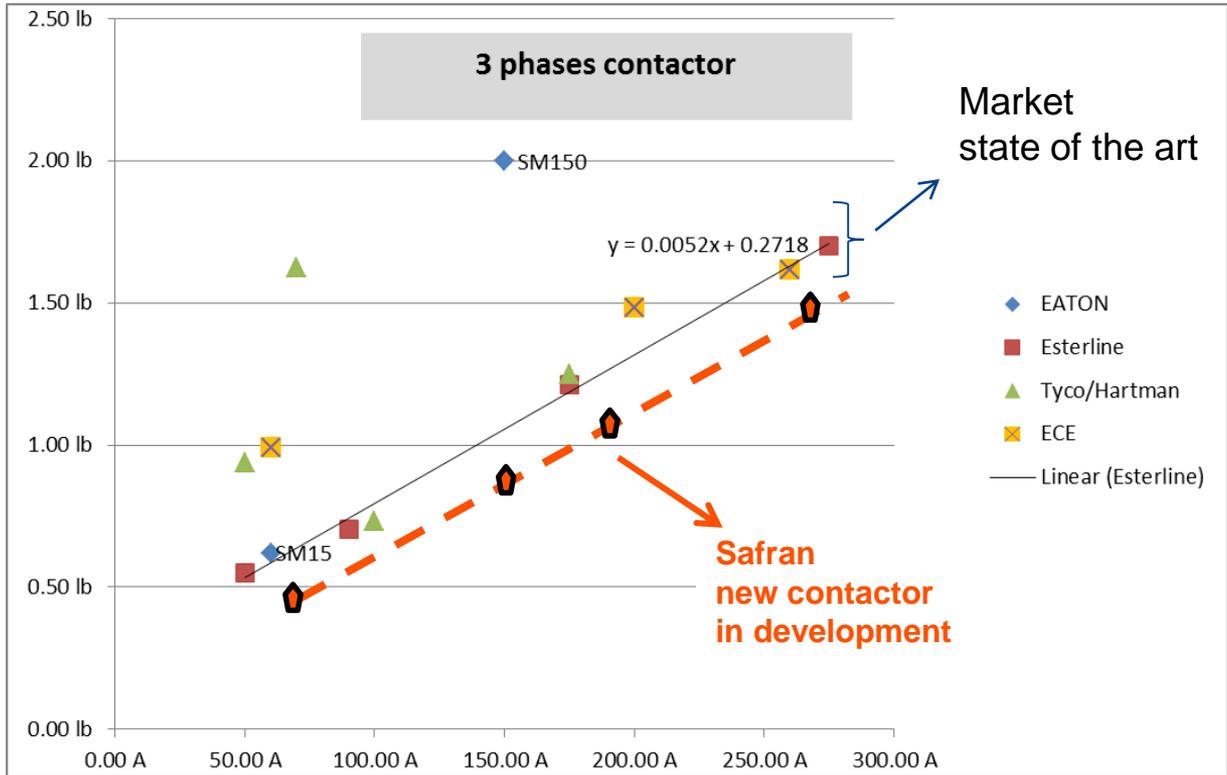
### Key differentiators

- **Optimized Weight**
- **Increased Reliability /Robustness**
- **Improved thermal efficiency**
- **Optimized Volume**
- **Modular auxiliaries (quantity and current rating)**
- **Minimized in rush current on actuation coil**

**10% lighter than competition**  
**First new generation contactor will be available end of 2018**  
**(qualification all P/N by June 2019)**



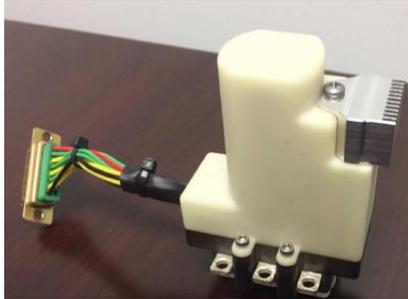
# WEIGHT COMPARISON



# Contactors Development In Progress

## Four designs in qualification test

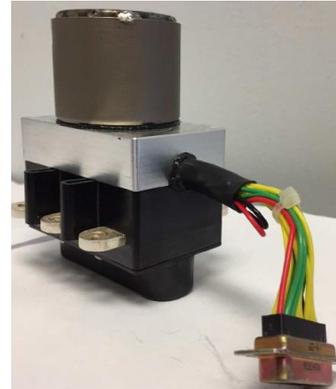
- ❑ 3 phase AC contactors
- ❑ 60 Amp, 130 Amp, 175 Amp & 260 Amp
- ❑ Significant decrease in cost and weight



SM3-60  
Qualification Q2 2019



SM130  
Qualification Q3 2018



SM3-175  
Qualification Q1 2019

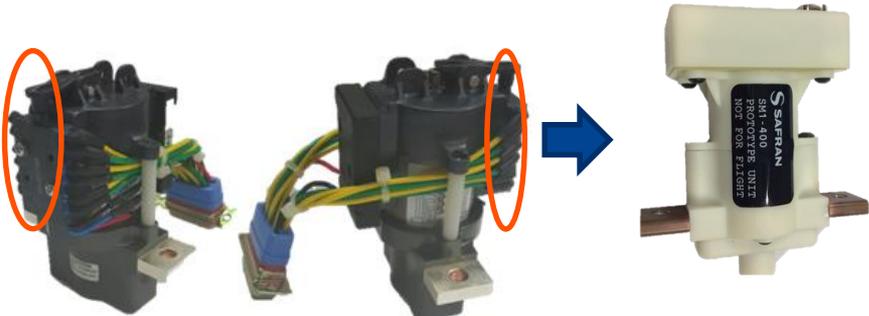


SM3-260  
SOF granted  
Qualification Q4 2018



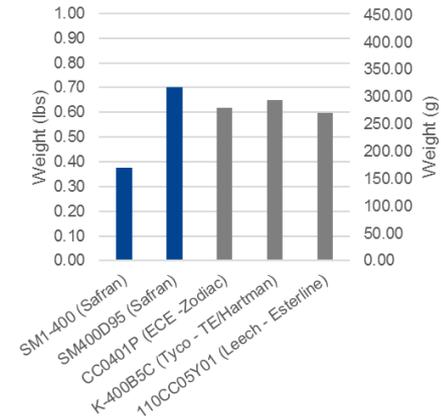
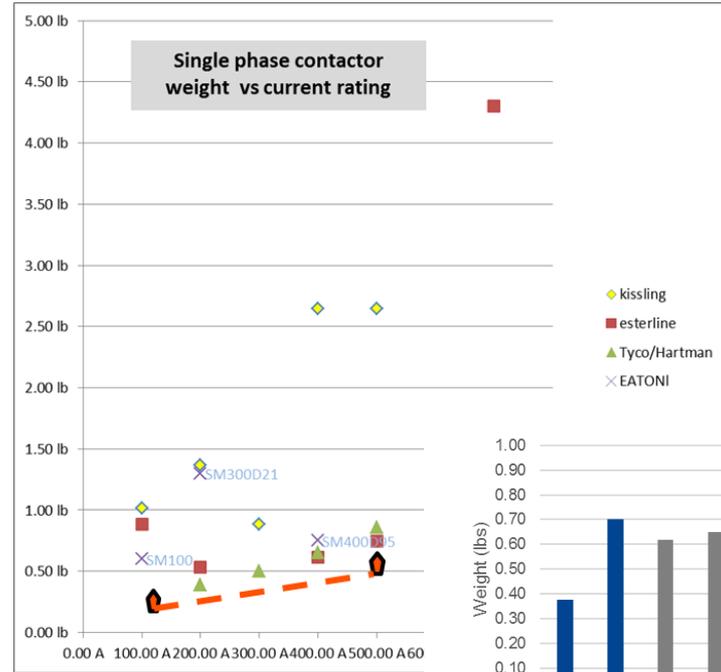
# Single phase contactor

- Go higher density
- Introduce new composite material with higher thermal efficiency and lower density



**Eliminate external Auxiliaries**

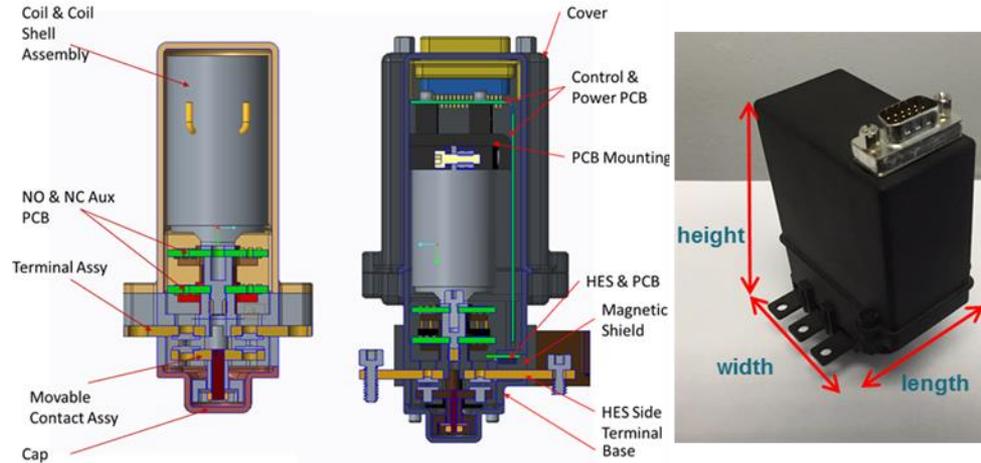
**=> thinner, cost competitive, lighter, available in Q1 2019**



# New 3 phase smart contactor in development

- **Voltage: 115 V AC and 230V AC**
- **Current rating:**
  - 20 Amp to 60 Amp: 400 g
- **Rupture: 2000 Amp**
- **Temperature range:**
  - Max operating -55C to +85C
- **The following protection are implemented:**
  - I2T thermal protection
  - Ground fault protection
  - Phase lost protection
  - RCCB overheat protection
  - ARC fault protection is an option

RMS current of each phase and RCCB temperature are provide through CAN bus



Rating (A)	Height (mm)	Width (mm)	Length (mm)
70-130	97	80	76
20-60	82	51	43

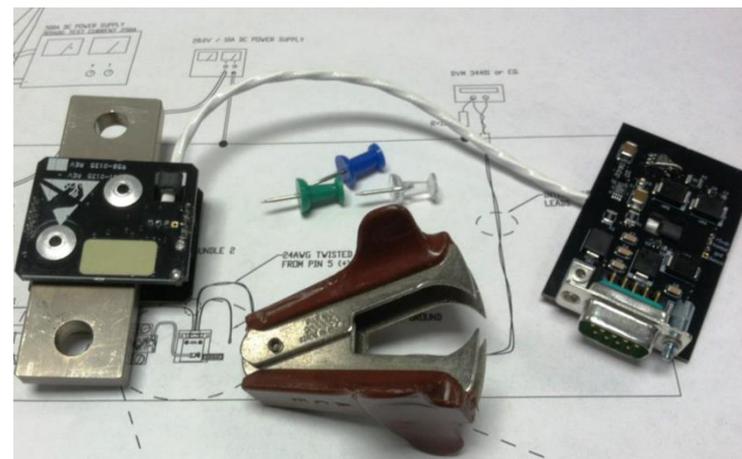
**Sample available Dec 2018 20-60Amp**

## Busbar mounted precision current sensor

bidirectional current sensor family based on the dual Hall-effect

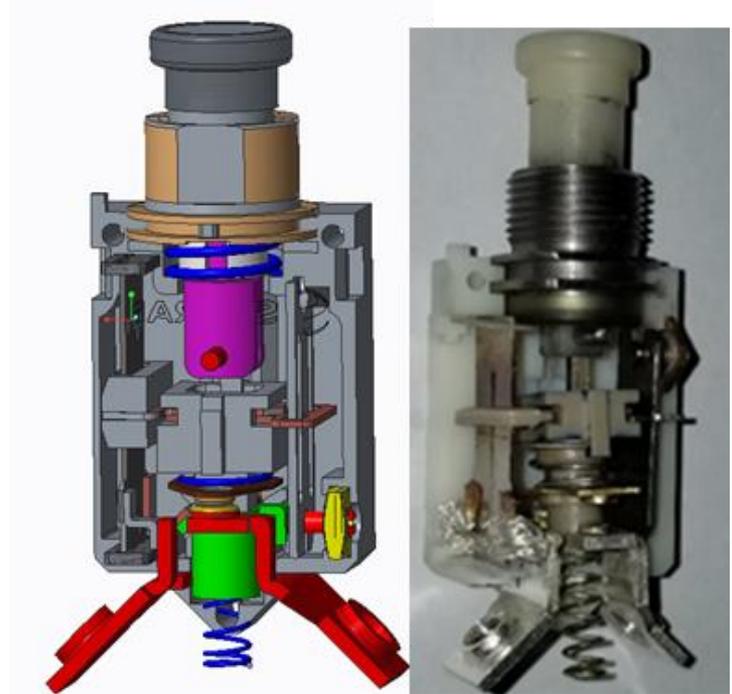
- Spans the range of +/-200A to +/-850A
- Operates using aircraft 28VDC power (DO160 Section)
- Withstands the common aircraft electromagnetic environment
- Costs well less than competitive technologies
- Typical accuracy better than 0.5% of FS (including temp drift)

**Available**



## Re-design of CB family for obsolescence management more competitive pricing

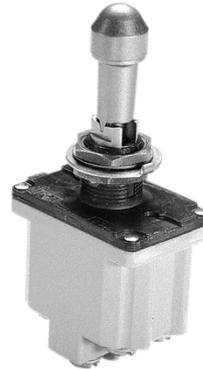
- ❑ New design aims at creating positive margin while bidding against Sensata
- ❑ Prototype available
- ❑ Design validation perform at 90% and to be completed in coming weeks.
- ❑ Qualification Q4 2018



# SAFRAN ENVIRONMENTALLY SEALED TOGGLE SWITCH IMPROVEMENTS

## MANAGE OBSOLESCENCE

## MATERIAL EVOLUTIONS



- 1, 2, and 4 pole options
- Standard and custom lever ends
- Largest switch contacts available on the market – Built to Last
- Over 100,000 confirmed electrical life cycles
- Best in Class MTBF
- IP68 and MIL8834 approved Sealing
- Multiple mounting options
- Screw, Solder and Spade Terminal Configurations
- Mil Spec Switch Guards also available
- Customers use Safran Sealed Toggles Switch because “They always work!”
- Options for adding leads, connectors, and potting



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*Nearly half a century of support*



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