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C-390

Delivering a Mission Relevant 21st Century Airlifter

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EXPLOITING MODULARITY TO ENHANCE SUSTAINABILITY

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How to achieve more operational effect with fewer platforms

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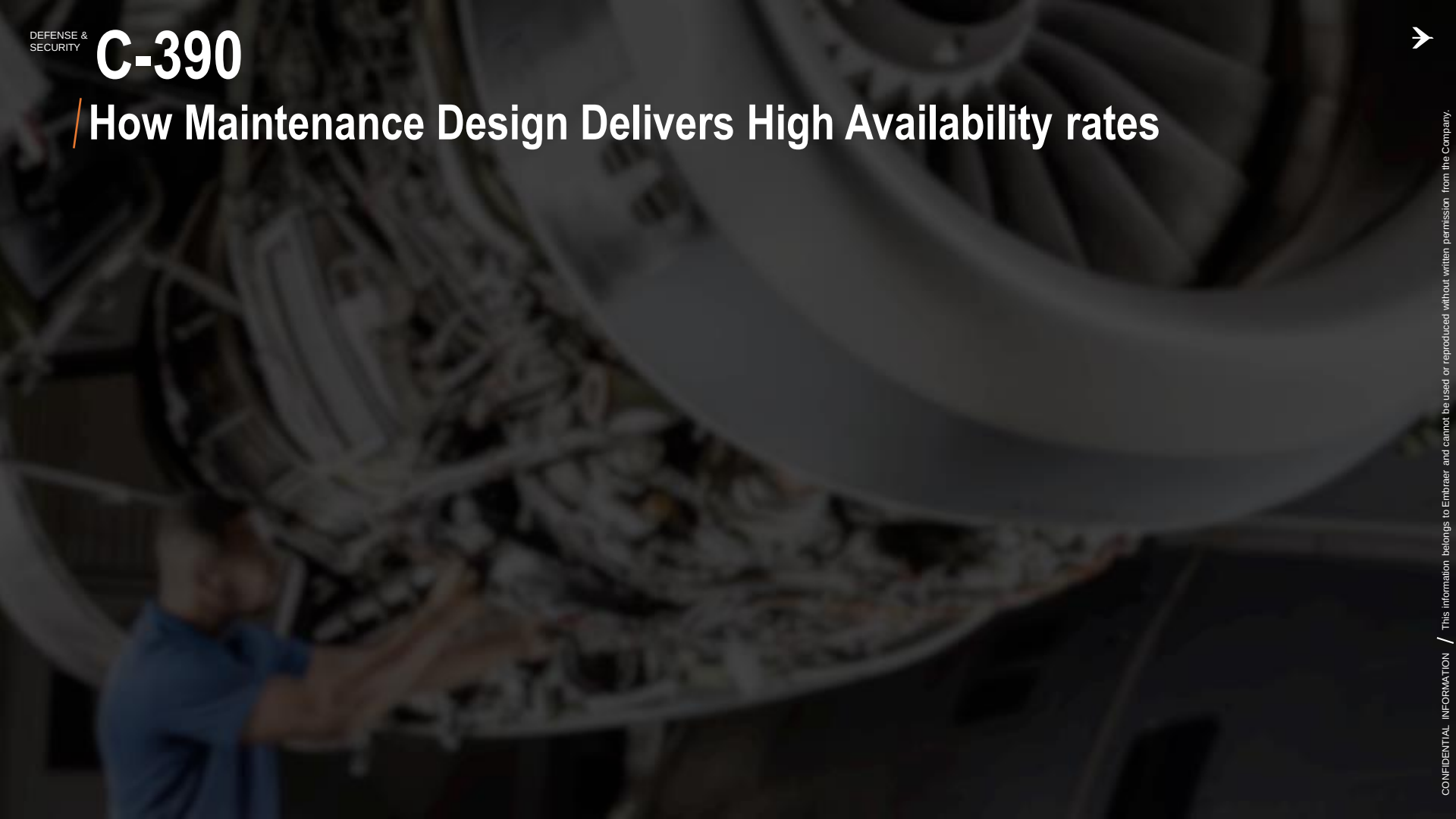
How Maintenance Design Delivers High Availability rates



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Delivering a Mission Relevant 21st Century Airlifter

- Performance:
  - Operating environment
  - Aircraft capability
- Cost Effectiveness:
  - Capital investment protection
  - Modularity

So – What is a Mission Relevant 21st Century Airlifter?

Operating Environment – Able to:

- Operate from the Antarctic to the Jungle & Desert
- Operate from rudimentary and unpaved airfields
- Use technology to operate safely in challenging terrain
- Function alongside and with allied air forces and other military components
- Shift seamlessly from high intensity to low intensity operations

The Aircraft – Able to:

- Fly quickly from point to point
- Carry significant cargo
- Offload and Onload quickly
- Deliver commercial levels of Maintainability, Reliability & Availability
- Perform multiple missions in the military and civil environment
- Significantly reduce crew workload, and allow the crew to achieve more
- Deliver exceptional HMI – Manage systems
- Exploit technology and protect against obsolescence

Assessing & Measuring Cost Effectiveness

- **"It's expensive being poor"**
  - Measure the capability and financial cost of not investing in modern platforms
  - Identify and separate financial and capability risks and…..
  - Identify how to manage those risks with Industry

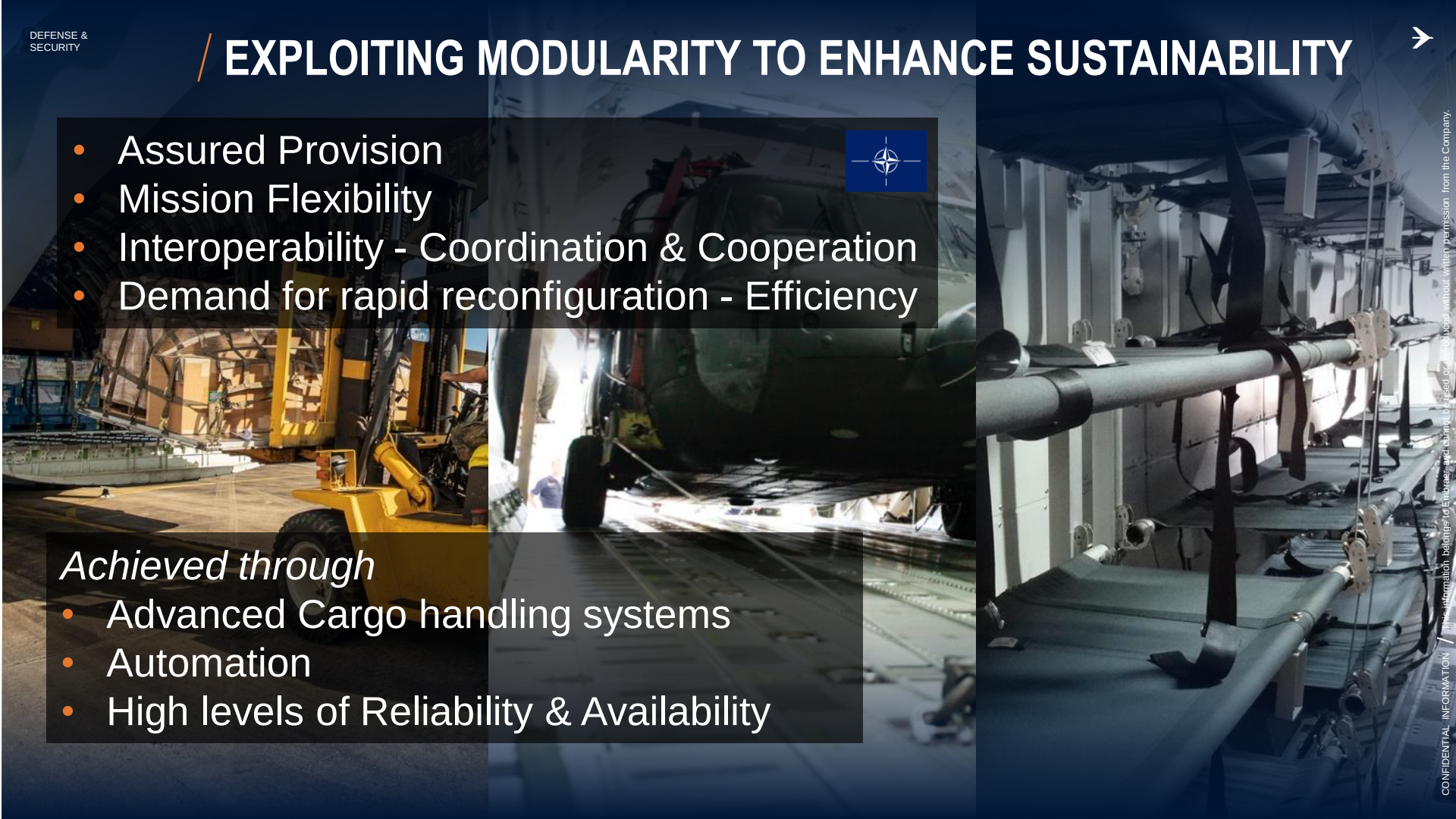
- **If it were a business operation…**
  - Insist on low cost of ownership
  - Insist on low maintenance & high availability
  - Insist on high standards of customer support
  - Demand maximum effect from the platform

  - Complexity is not an adequate excuse
  - Operational extremes is not an adequate excuse

- **Value for Money** = Return on, and protection of Capital Investment
  - Mission Completion rates
  - Operational Availability & Dispatch Reliability -
  - Sweating the Asset – multi-mission capabilities
  - Mitigating 'Capability Fade' - Preparing for the Future

EXPLOITING MODULARITY TO ENHANCE SUSTAINABILITY

- Assured Provision
- Mission Flexibility
- Interoperability - Coordination & Cooperation
- Demand for rapid reconfiguration - Efficiency



Achieved through

- Advanced Cargo handling systems
- Automation
- High levels of Reliability & Availability

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How Maintenance Design Delivers High Availability rates

The Embraer Reliability & Availability Ethos

Modern air forces are required to achieve more operational effect with less, but more capable platforms. Therefore - air forces require stringent reliability and availability performance

Embraer has applied its experience in commercial aviation to the concept, design and development of its defence portfolio

Embraer has achieved airliner reliability and availability levels through the application of commercial aviation design and manufacturing techniques

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C-390 / How Maintenance Design Delivers High Availability rates

- The application of MSG-3 (the decision-logic process for determining by reliability principles the scheduled maintenance requirements)
- Customer Collaboration to design maintenance regime aligned with operational profile
- Selection wherever appropriate of proven COTS systems
- Virtual Aircraft & Rigs to validate architecture and system integration
- Airframe inspection cycles are optimized to combine inspections, checks and services and increase availability *
- Aircraft diagnostic tools allow the crew to assess the aircraft condition quickly and efficiently; reducing the time for pre-flight checks and maintenance

*

- No scheduled airframe depot level maintenance
- Routine check every 14 days of operation (about 10 man-hours work)
- Intermediate Checks (A Check) at 600 FH or 12 months (from 5 to 10 days of maintenance work)
- Basic checks (C Check) at 6,000 FH / 3,000 FC or 60 months (from 13 to 20 days of maintenance work)

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/ How to achieve more operational effect with fewer platforms

Powerful combination of:

- Speed
- Capacity
- Mission Flexibility
- High Availability

- Enhanced Mission Effectiveness
- Reduced number of missions
- Less aircraft
- Less crew
- Fewer supplies
- Simplified training
- Simplified support

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How to achieve more operational effect with fewer platforms

Optimising the platform to deliver multiple capabilities

- Support to Regular & Special Operations
- Sophisticated Self-Protection System
- Tactical flying capabilities
- Electronic Warfare
- Broadband connectivity

- Cargo (Precision Drop)
- Troop transport and delivery
- Air to Air Refueling
- Medevac
- ICU Transportation
- Search & Rescue
- Tactical Air-Land operations
- Paratroop operations
- HALO operations
- Aerial Firefighting

THANK YOU

World-Class Mobility

Operational Data – Productivity and Efficiency

Maximum Mach Operational	**0.80 Mach**
Maximum Cruise speed	**470 knots**
Operational Ceiling	**36,000 ft**
Time to climb (20,000 ft, MTOW, ISA)	**11.5 min**
Takeoff Dist (CFL, SL, ISA, 500 nm, payload 23 metric ton)	**1,524 m / 5,000 ft**
Takeoff Dist (CFL, SL, ISA, 500 nm, payload 16 metric ton)	**1,165 m 3,820 ft**
Landing distance (over 50ft obstacle, 23 metric ton payload)	**950 m**
Vref with 25 klb of useful load 116 KCA	**116 KCAS**
Range with 23 metric ton payload	**1,520 nm**
Ferry Range with internal fuel tanks	**4,600 nm**

Unmatched mobility, delivering much more logistics, much faster, anywhere in the world.

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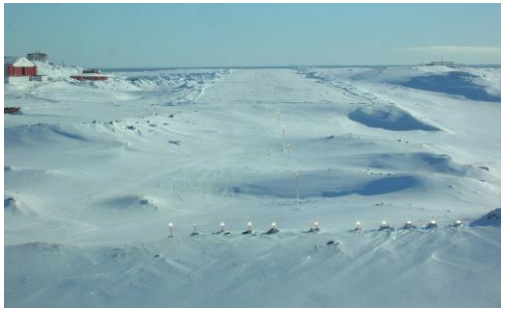
Rugged Design

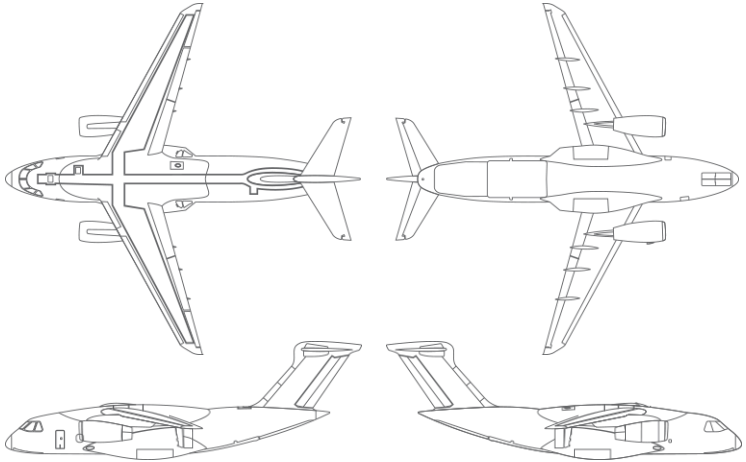
Modern Structure Design and Proven Systems

- Modern Structure Design: Strong Durable Airframe
- Operational from Semi Prepared or Damaged Runways
- Diverse Environmental Conditions: Hot, Humid, Desert and Icy Conditions



Rugged Design

Clean-Sheet Structural Design



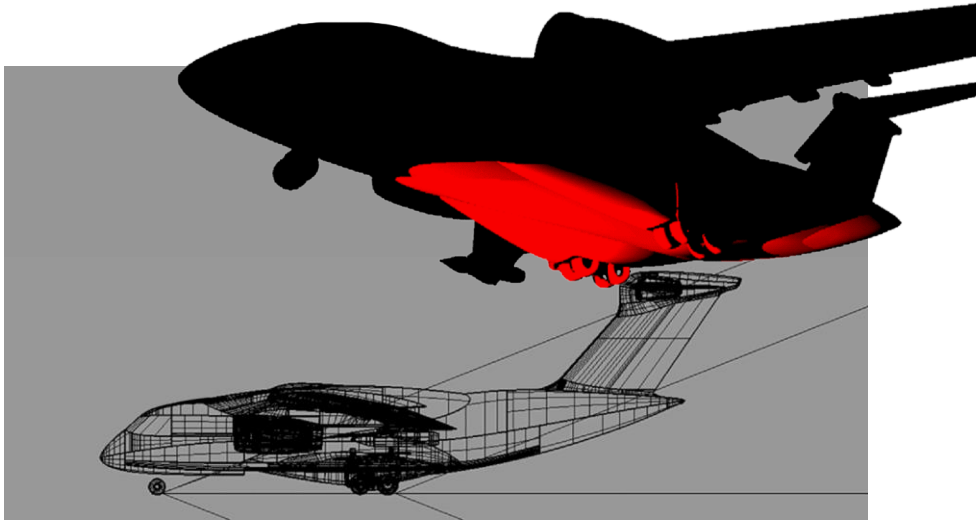
Damage Tolerance Structure:
Low Maintenance with Minimum Inspections

SHM:
Structural Health Monitoring

Advanced **Corrosion Protection Techniques**

Rugged Design

Operation in Unprepared Airfields



- Designed to operate in the worst semi-prepared airfield according MIL-B-8866B
- Engines high and forward, clear from the debris projection area

State-of-the-Art Technology

Improved Crew Interface for Better Mission Efficiency

Latest Generation Integrated Avionics and Mission Systems – **Rockwell Collins Pro Line Fusion®**

Compliant with the Latest **CNS/ATM Requirements**

Full Fly-By-Wire with Closed Loop and Active Side Sticks

Integrated Mission System

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Avionics

Configurable Multifunction Windows

State of the Art Technology

Full Fly-By-Wire with Closed Loop Improving Mission Efficiency

Reduced Pilot Workload on Demanding Conditions

Automatic Protection for Real Usage of the Aircraft Limits

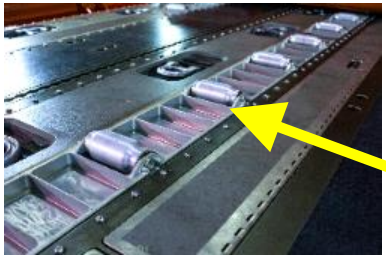
Active Side Sticks: Improved Crew Coordination and Optimized Control

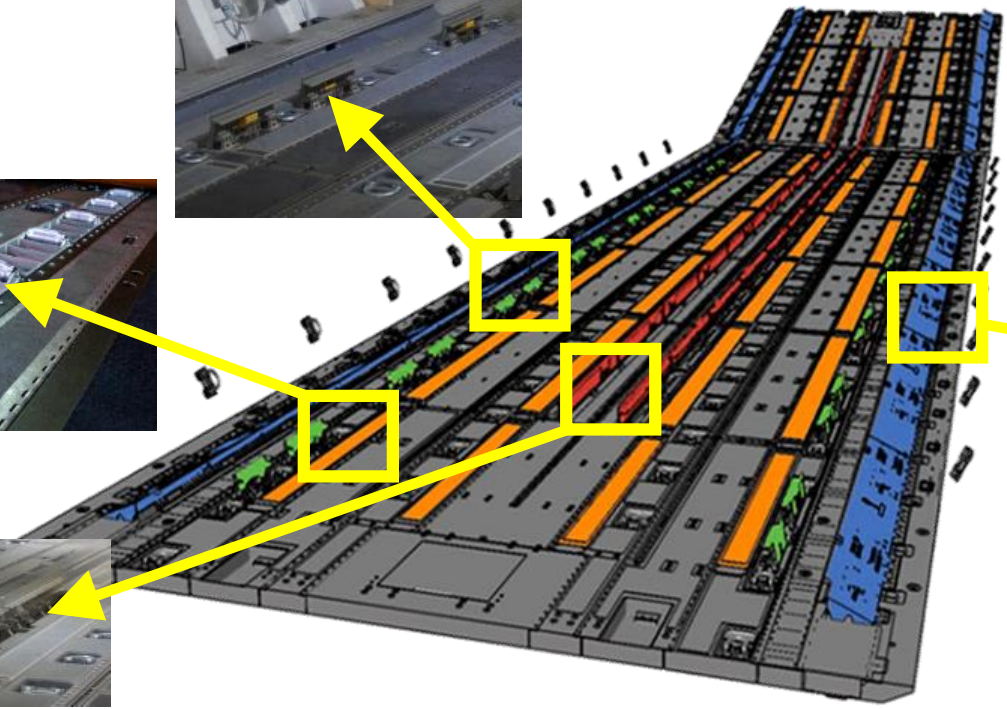
State of the Art Technology

Cargo Handling System

LOADMASTER STATION

Centralized CHS Operation





- 108” Outboard Guide Rail (OBGR)
- Roller Tray Assembly
- 88” Folding Pallet Lock (FPL)
- 48” Container Delivery System (CDS) Rail

Cargo Compartment

Safe & Comfortable

Comfort for Crew & Troopers on Long Duration Flights (Wide Cabin)

Automatic Temperature Control

Cabin altitude of 8,000 ft at FL 360

Reduced Vibration and Noise

Toilet with External Service

Appropriate Signaling and Emergency Exits

Passengers Emergency Oxygen System

Cargo Compartment

Safe & Comfortable

Designed for Maintainability

Quick and Easy Maintenance

Combination of Mature Solutions and Innovations:

IAE V2500 Engine + Rockwell Collins Pro Line Fusion Avionics

Airliner Reliability and Availability Levels:

Use of Commercial Aircraft Techniques and Experience

(MSG-3,On-board Maintenance System)

No scheduled airframe depot level maintenance:

Routine Check: Every 14 days of operation → 10 man-hours

Intermediate Checks (A Check): 600 FH or 12 months → ~ 1 to 3 days

Basic checks (C Check):6,000 FH / 3,000 FC or 60 months → ~ 8 to 10 days

CUSTOMERS AND OPERATORS

Our Defence Solutions are present in over 60 countries around the world

C-390 Clients	Quantity	1st Delivery
Brazil	21-28	2019
Portugal	5	2023
Hungary	2	2024

4 x C-390 DELIVERED TO BRAZILIAN AIR FORCE

- Operational and supporting the fight against Covid-19, since Aug 2020
- Engaged in the humanitarian aid mission in Lebanon & Haiti

Mission Modules

Easily Reconfigurable

- **AERIAL ASSAULT** (high altitude)
- **AERIAL REFUELING** (fighters and helicopters)
- **AERIAL RESUPPLY**
- **SPECIAL OPERATIONS**
- **AERIAL FIREFIGHTING**
- **AEROMEDICAL EVACUATION**
- **HUMANITARIAN AID**
- **SEARCH AND RESCUE**

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High Flexibility

CARGO

No Tools Required

VEHICLES

Less than 30min

Roll-on/Roll-off Internal Tanks and Wing PODs

AIR-TO-AIR REFU

01h30min(1)

Roll-on/Roll-off MAFFS

FIRE FIGHTING

01h30min(2)

THE C-390 Millennium CAN BE RECONFIGURED FOR ALL MISSIONS IN 3 HOURS OR LESS

(1) **Time to configure internal tanks and refuel system setup, without system checks. Estimated times.**
(2) **Time to configure MAFFS. Estimated times.**

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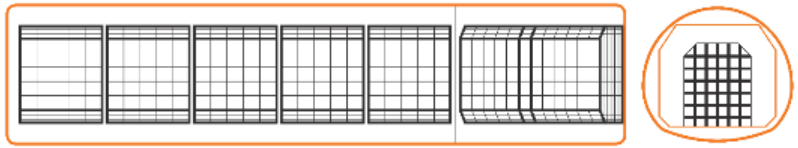
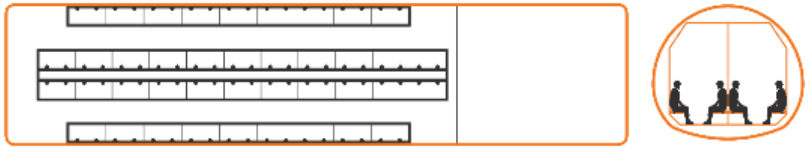
High Flexibility

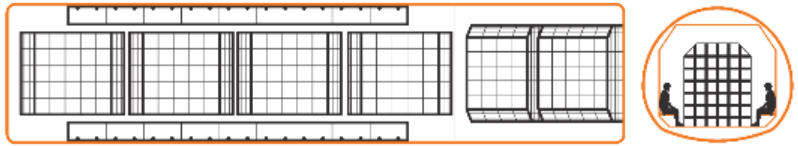
SEVEN 463 L PALLETS



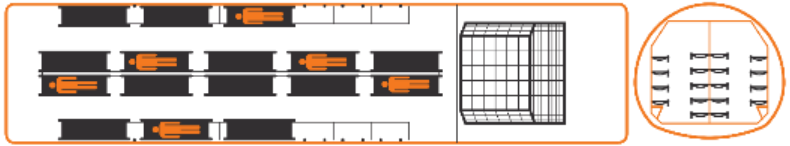
80 TROOPS OR **66** PARATROOPERS



6 PALLETS AND **36** TROOPS



74 STRETCHERS AND **8** ATTENDANTS



High Flexibility

Heavy Vehicles

8x8 Vehicle Boxer

ATF Dingo

6x6 Transportpanzer (TPZ) Fuchs

Airlift Capability

Highlights

- Maximum Payload = 26000 kg
- 7 full pallets 463L
- Taller, Wider and Unobstructed Cargo Compartment
- Advanced Cargo Handling System
- Quick reconfiguration (from flat to roller floor in minutes)
- Hydraulic Struts Stabilizers (no external ramp support)
- Cargo Cameras to increase LM situational awareness
- 36 foldable troop seats (no geometrical loading envelope impact)
- +44 central troop seats easily configurable
- Cargo Winch = 6500lb; 200ft long; 40ft/min

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Airlift Capability

Highlights

- Continuous Computed Delivery Point
- Continuous 3G envelope protection = real usage of aircraft capability
- Automatic or manual release
- Gravity or extraction system
- 24 CDSs (8 in the ramp + 16 in the cargo floor)
- Gate Release Devices = No straps/ropes cutting
- Dual Parachute Deployment Mechanism
- Dual Retrieval Winches

Aerial Resupply

Photo Credit: David Branco Filho

Aerial Resupply

Air Drop Operations:

- Automatic and manual releases
- From Low and High altitudes
- Parachute extraction or gravity cargo dropping
- Continuous Computational Drop Point Calculation Software integrated to the avionic system

Maximum Cargo Drop Capability:

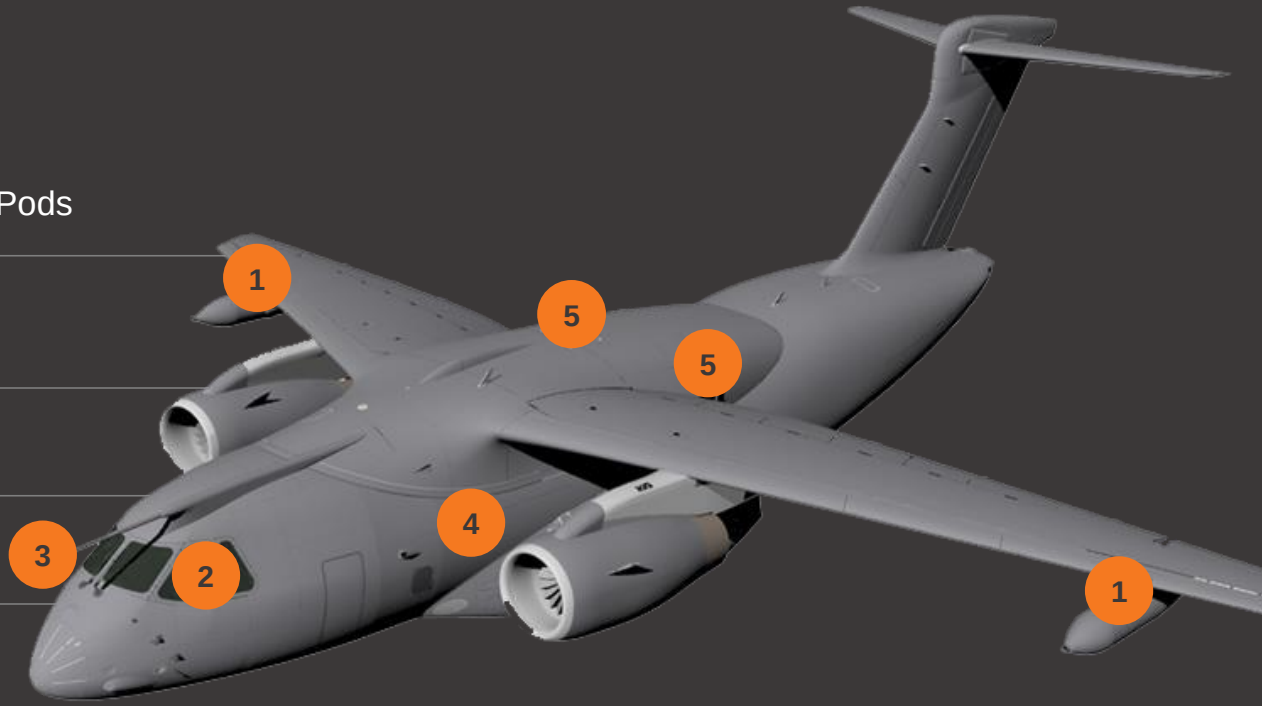
- Heavy Single Drop: up to 19,000 kg
- ~~LAPES: up to 10,000 kg~~
- CDS: 24 CDS with up to 19,000 kg distributed

High-Altitude Air Drop for Special Forces Operations

Air-to-Air Refueling System

Features

1. (WARP) Wing Aerial Refueling Pods
2. Adittional Crew Member Station (ACM)
3. Receiver Refueling Probe
4. Palletized Fuel Tanks
5. Aerial Refueling Cameras



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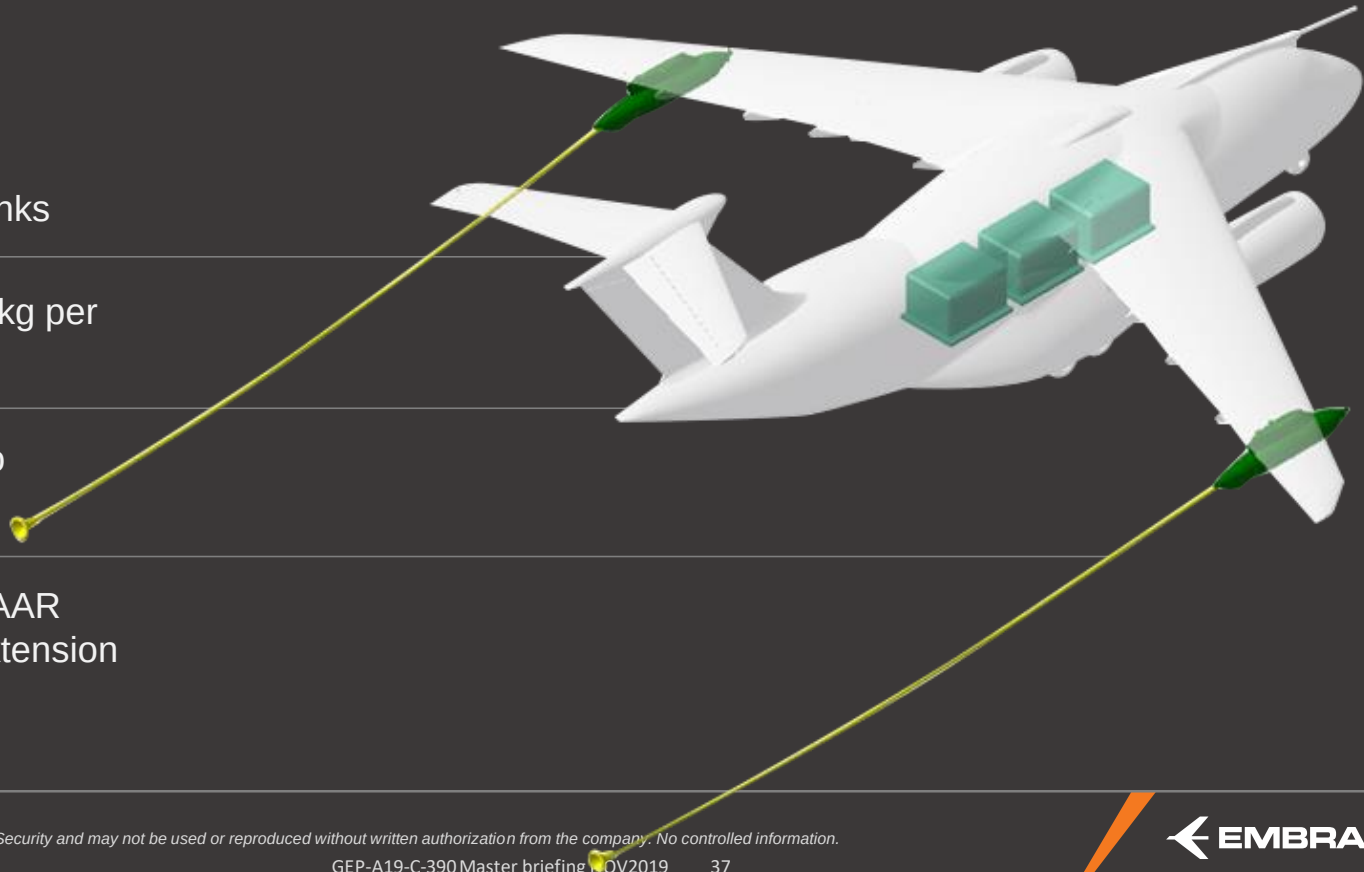
Air-to-Air Refueling System

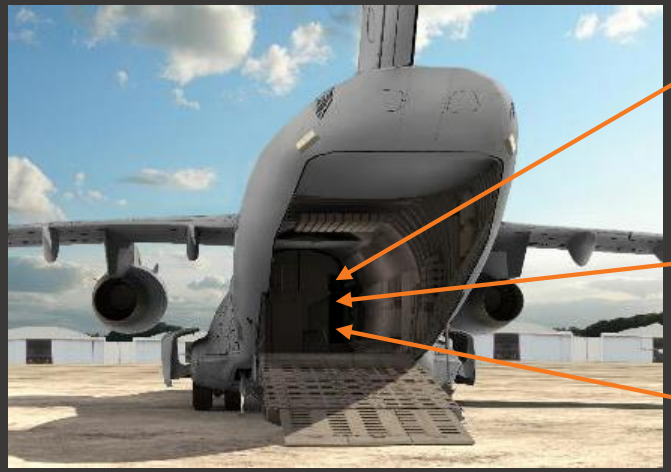
Auxiliary Fuselage Fuel Tanks

- Up to 3 Optional Fuselage Fuel Tanks
- Capacity of 4000 kg per Tank
- Fully Integrated to Avionics
- Can be Used for AAR SAR or Range Extension



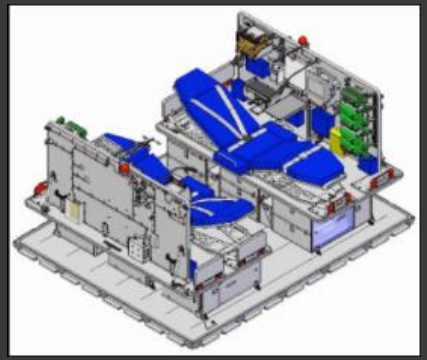
C-390 Millennium MEDEVAC

Roll-on / Roll-off Systems



For Illustrative Purpose Only

Medevac Container



4 double Intesive Care Units

74 Stretchers + Oxygen

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Medical Evacuation

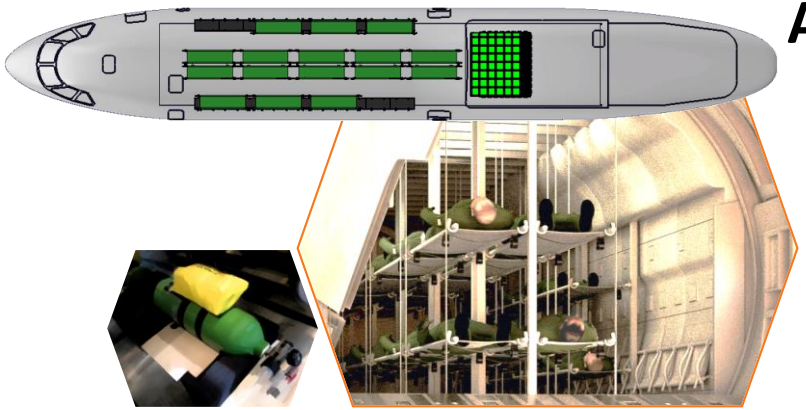
Roll-on / Roll-off solutions

A 74 Litters + 8 medical attendants+ Medevac oxygen

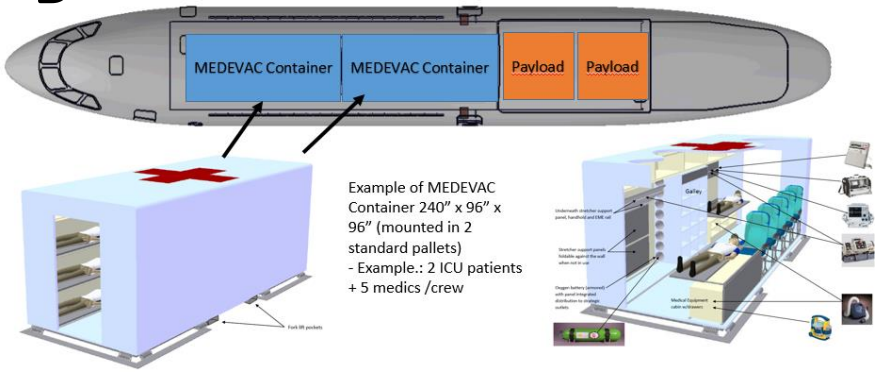
B 2 Medevac Containers (4 ICU's + 10 medical attendants)

C 4 Palletized ICU's (8 ICU's + 8 medical attendants)

A



B



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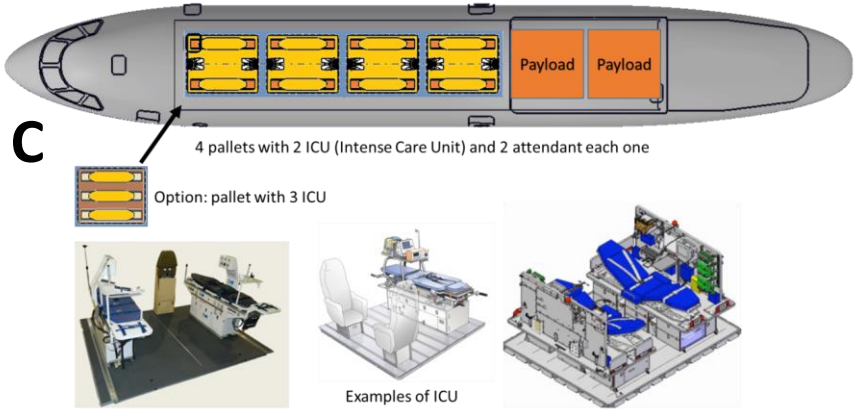


Higher Flexibility

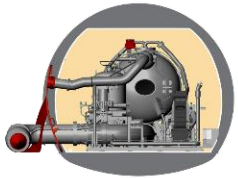
Fire Fighting

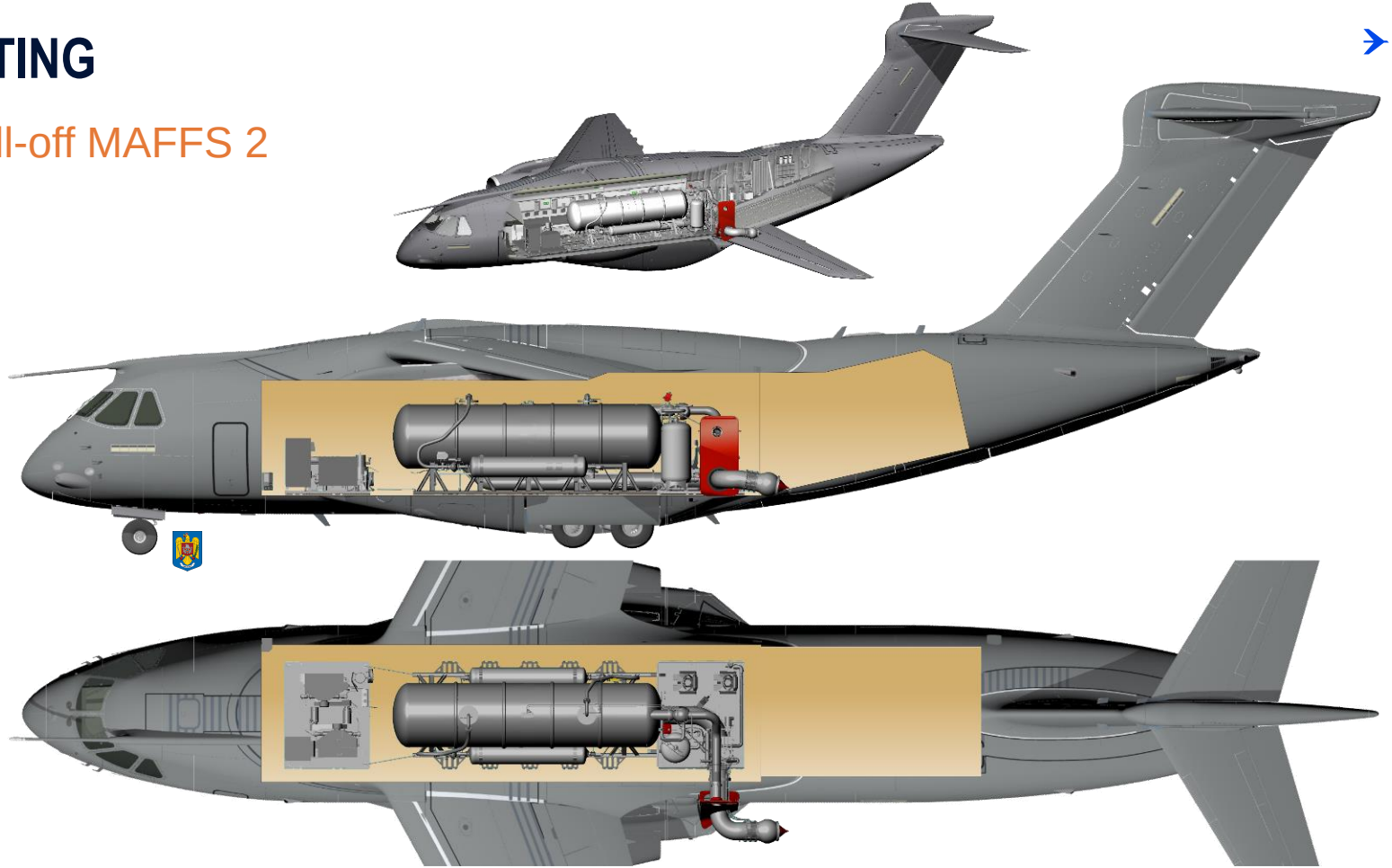
Quick and Easy Reconfiguration

- Commercial Off-the-Shelf Solution
- Full fly-by-wire flight control system, reduces pilot workload, maximizes fire fighting efficiency
- Continuously computed release point: high precision on the launching of the fire suppressor

FIRE FIGHTING

Roll-on / Roll-off MAFFS 2





Higher Flexibility

Search and Rescue

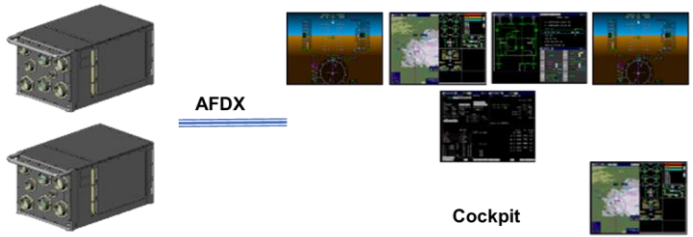
Quick and Easy Reconfiguration

- Mission Systems: Pod EO / IR and Mission Radar
- Auxiliary Fuel Tanks + Pallet SAR Gear + 4 Observers

State-of-the-Art Technology

EO/IR Pod

RAFAEL Model Litening 3U



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State of the Art Technology

Self Protection Systems

- **Ballistic Protection**
  - 0.50” armor
  - 7.62mm armor
  - Fixed and removable
- **Critical systems redundancy**
- **Fully Integrated Self Protection System**
  - Radar Warning
  - Laser Warning
  - Missile Approach Warning
  - Integrated Chaff & Flare
  - DIRCM
  - Self Protection Jamming Pod
- **OBIGGS**