

**Le ravitaillement  
en vol**

**La saga des  
MRTT**



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**M R T T**  
**MULTI ROLE ANKER TRANSPORT ANKER**



# Pourquoi le ravitaillement en vol ?

- Une recherche permanente d'allonge et de persistance
  - Les compromis techniques nécessaires (taille, armements, carburant...)
  - La diminution du nombre des avions de combat, l'augmentation des performances et des coûts unitaires
- ➔ Une importance croissante de la capacité de ravitaillement en vol

# Un emploi devenu courant



## Ravitaillement “stratégique”

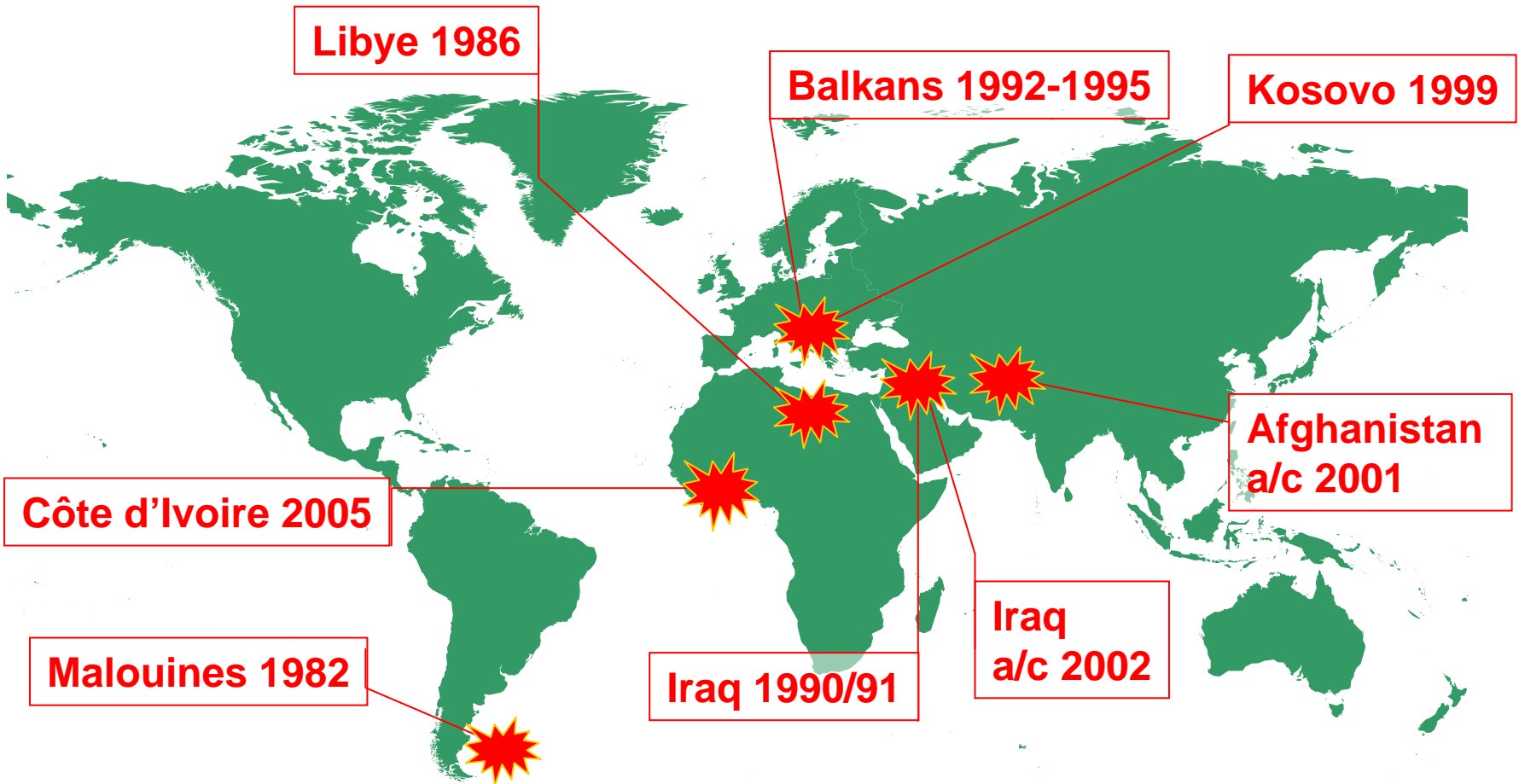
Déploiements sans contraintes d’escales intermédiaires, d’autorisations de survol...

## Ravitaillement « tactique »

Augmentation du rayon d’action ou du temps sur zone sans sacrifier la charge militaire



# Des exemples récents



**Les conflits modernes nécessitent de plus en plus souvent le déploiement rapide de coalitions internationales**

# Un peu d'histoire

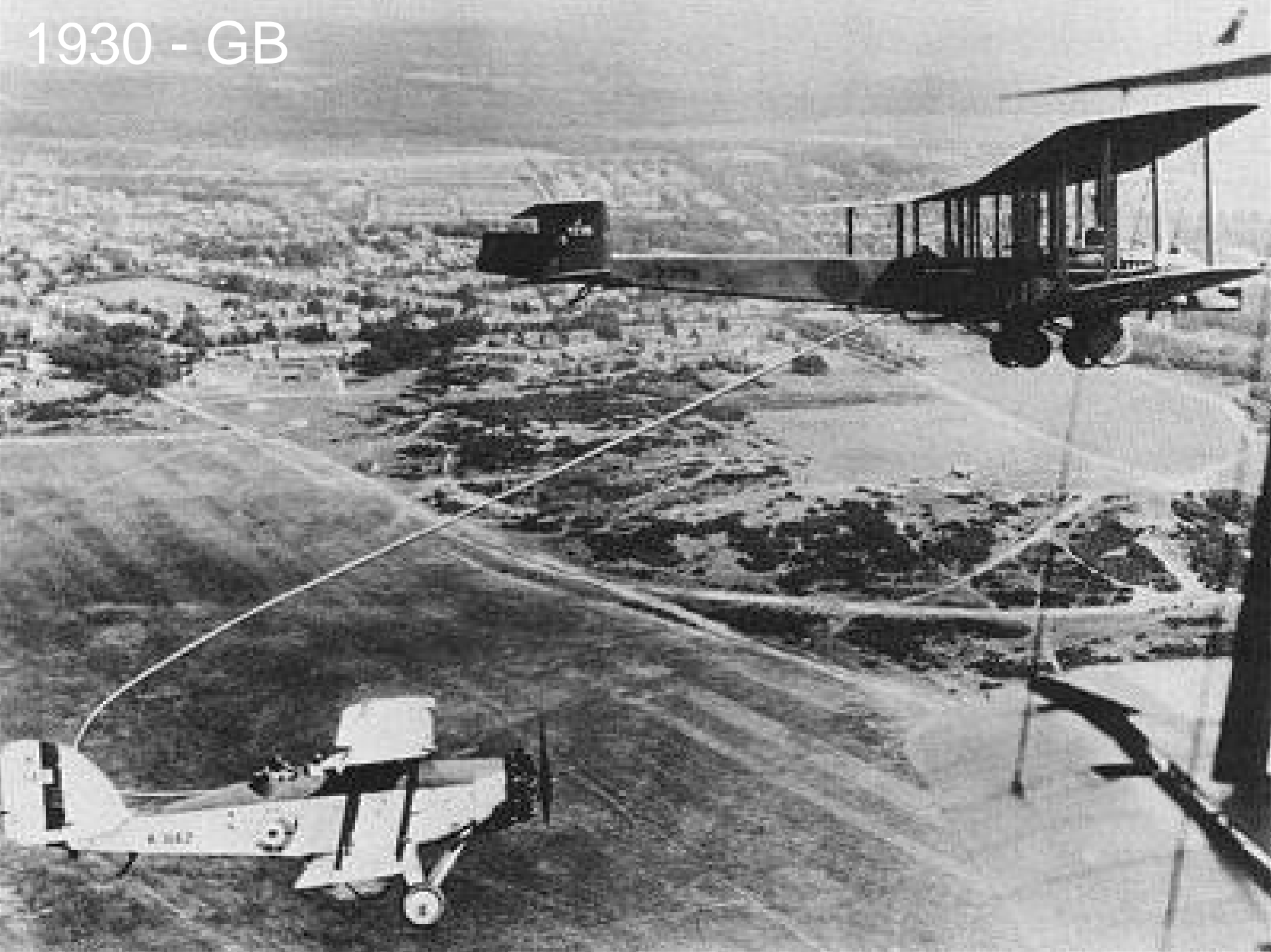
- Les expérimentations : des origines à la 2<sup>ème</sup> GM
- Après-guerre : deux méthodes se standardisent
  - Le « boom » (perche rigide)
  - Le « hose and drogue » (tuyau souple et panier)

1923 - USA



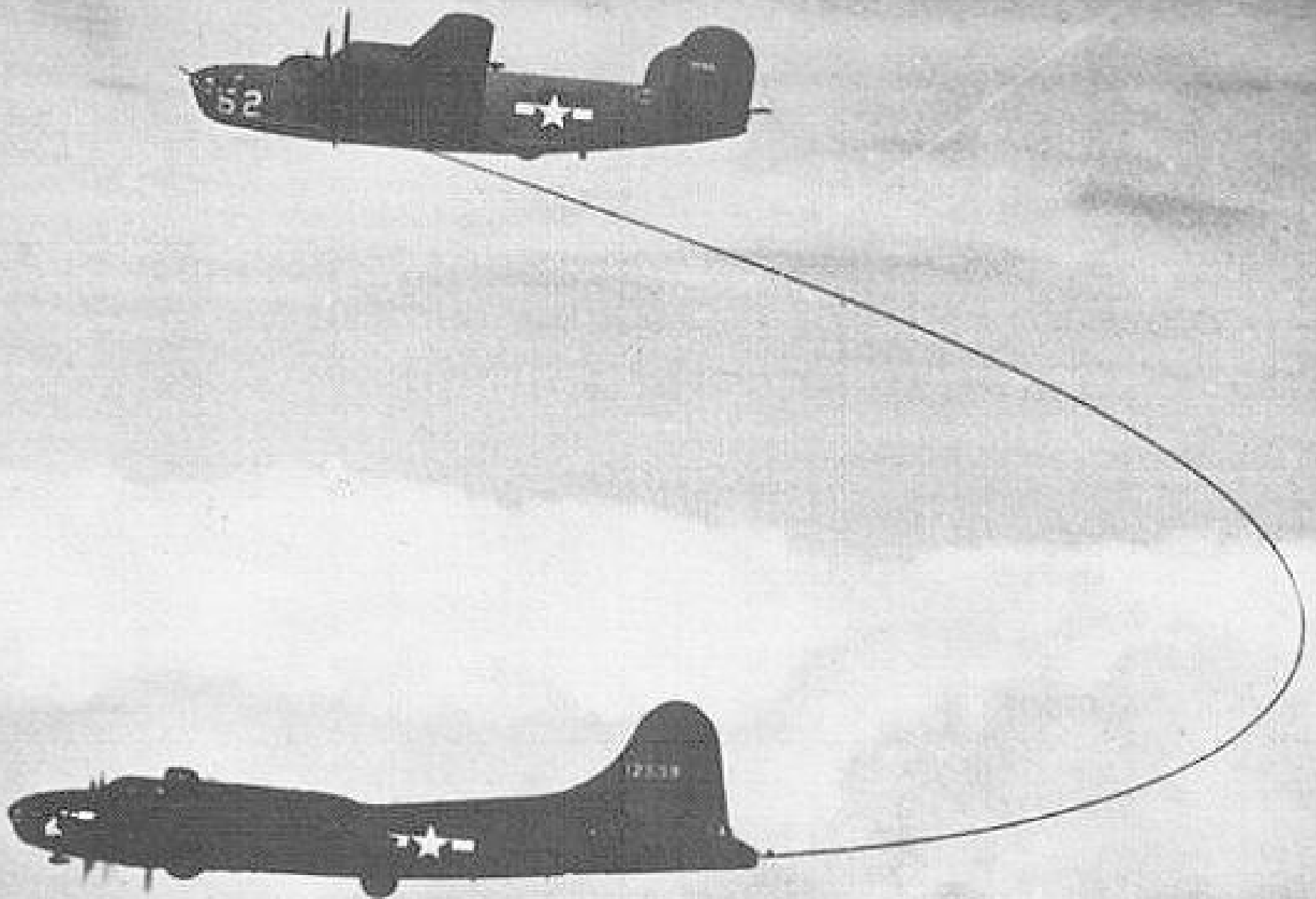
37 h 15' de vol...

1930 - GB





1943 - USA



# Années 50 - USA : les hésitations



*Le panier en pod*

# Années 50 - USA : les hésitations



*Le panier central*

# Années 50 - USA : les hésitations



*Le boom*



# Cohabitation...



F-105B  
"UNDERCHIEFS"

AIR FORCE  
FLIGHT TEST CENTER

# B-52 et KC-135



*Le boom s'impose dans l'USAF*

# Le “standard” de l’US Air Force



# L'autre système : panier + perche





# Avions non USAF (y compris US Navy)



*Interopérabilité autour du panier*

# Hélicoptères : le panier aussi



Et même les Russes...



Le BDA

*Boom Drogue Adapter*



# L'état de l'art actuel

- Les deux systèmes (boom et panier) sont établis
- Chacun a ses avantages et inconvénients
  - Compromis différent
- Aucun n'exclura l'autre
  - Besoins spécifiques
  - Poids de l'histoire (durée de vie des plateformes)

**→ un ravitailleur doit offrir les deux systèmes**



# Le KC-10



# A310 Boom Demonstration Aircraft



- The Aerial Refuelling Boom System (ARBS) has been developed on an A310 owned by EADS MTA
- First wet contact with an F-16A was made in February 2008
- First dry contact with an E-3F AWACS made in July 2008
- 80 contacts made during 350 hours of flight
- Test and development programme now completed

# Les ravitailleurs d'aujourd'hui



## Tactical Tankers: (< 50 t fuel)

- KC-130 Hercules: 82
- KC-130J Super Hercules: 33
- C-160 Transall: 9

## Mid-Size Tankers: (> 50 t fuel)

- KC-135 Stratotanker: 527
- K/B707: 24
- VC-10: 16
- Chinese H-6 (TU-16 Badger): 14
- A310 MRTT: 6



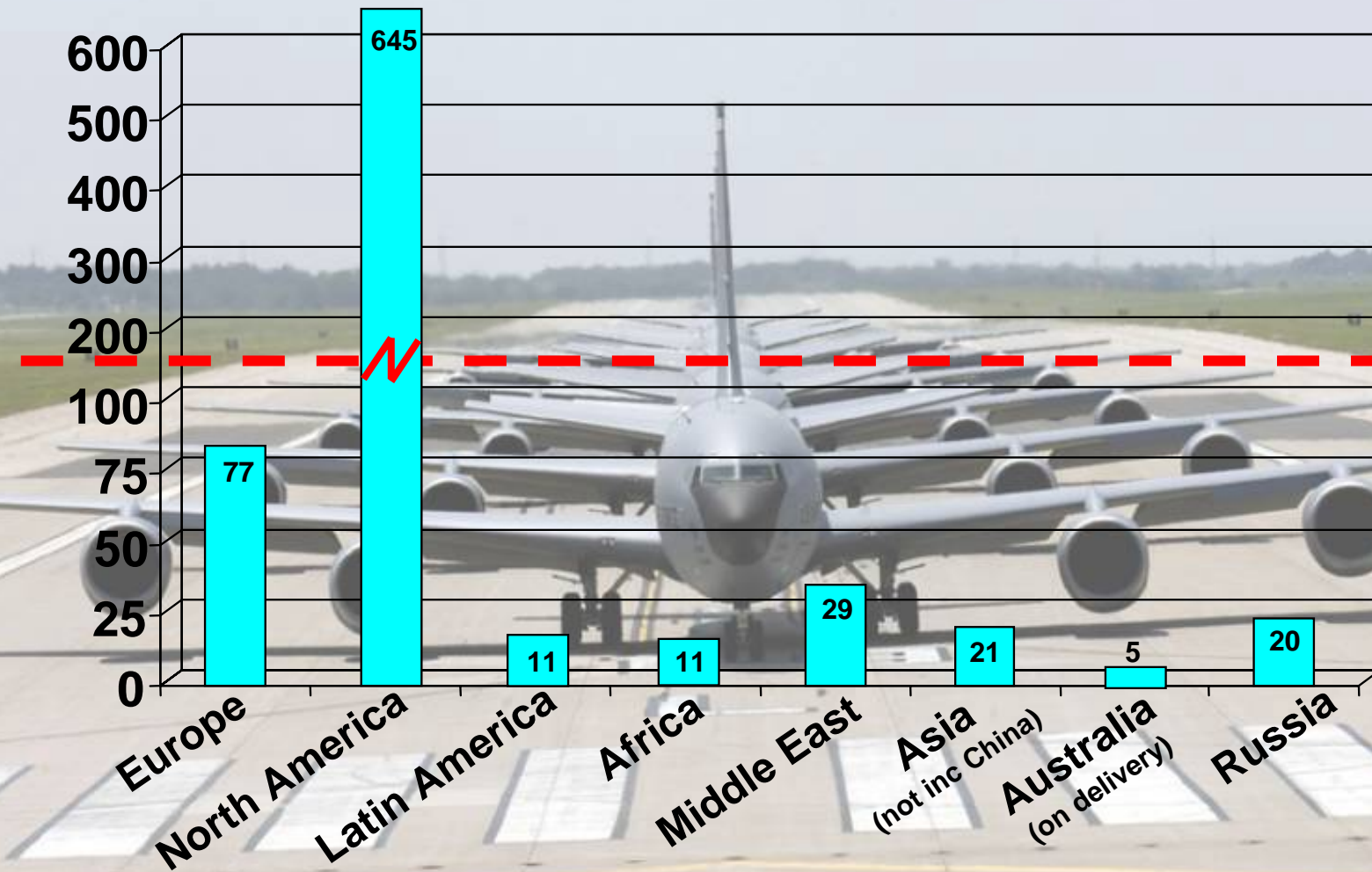
## Strategic Tankers: (> 100 t fuel)

- KC-10 & K/DC-10: 62
- IL-78: 38
- Tristar: 6
- KB-747: 1



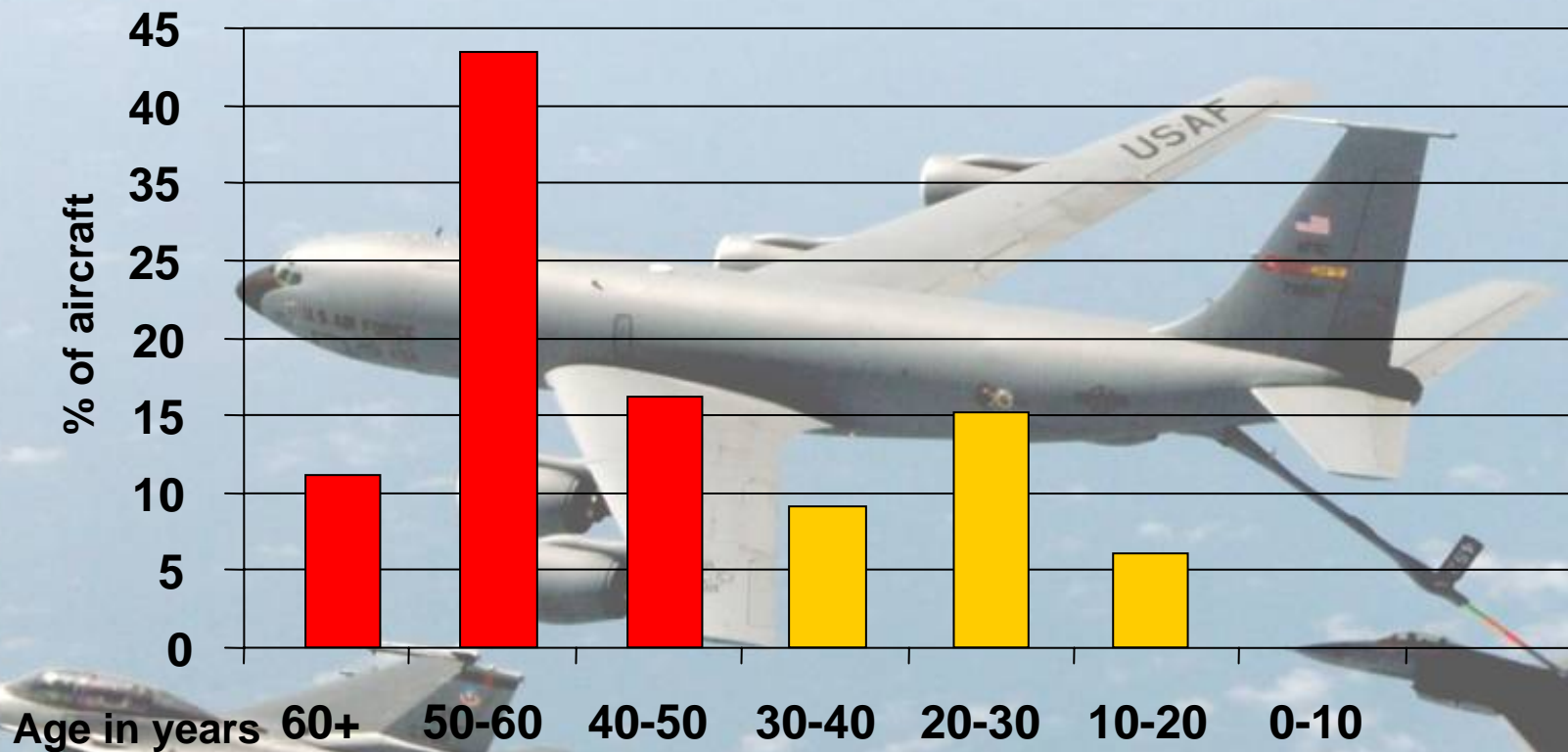


# Les flottes actuelles (par région)



**77% des ravitailleurs actuels en Amérique du Nord**

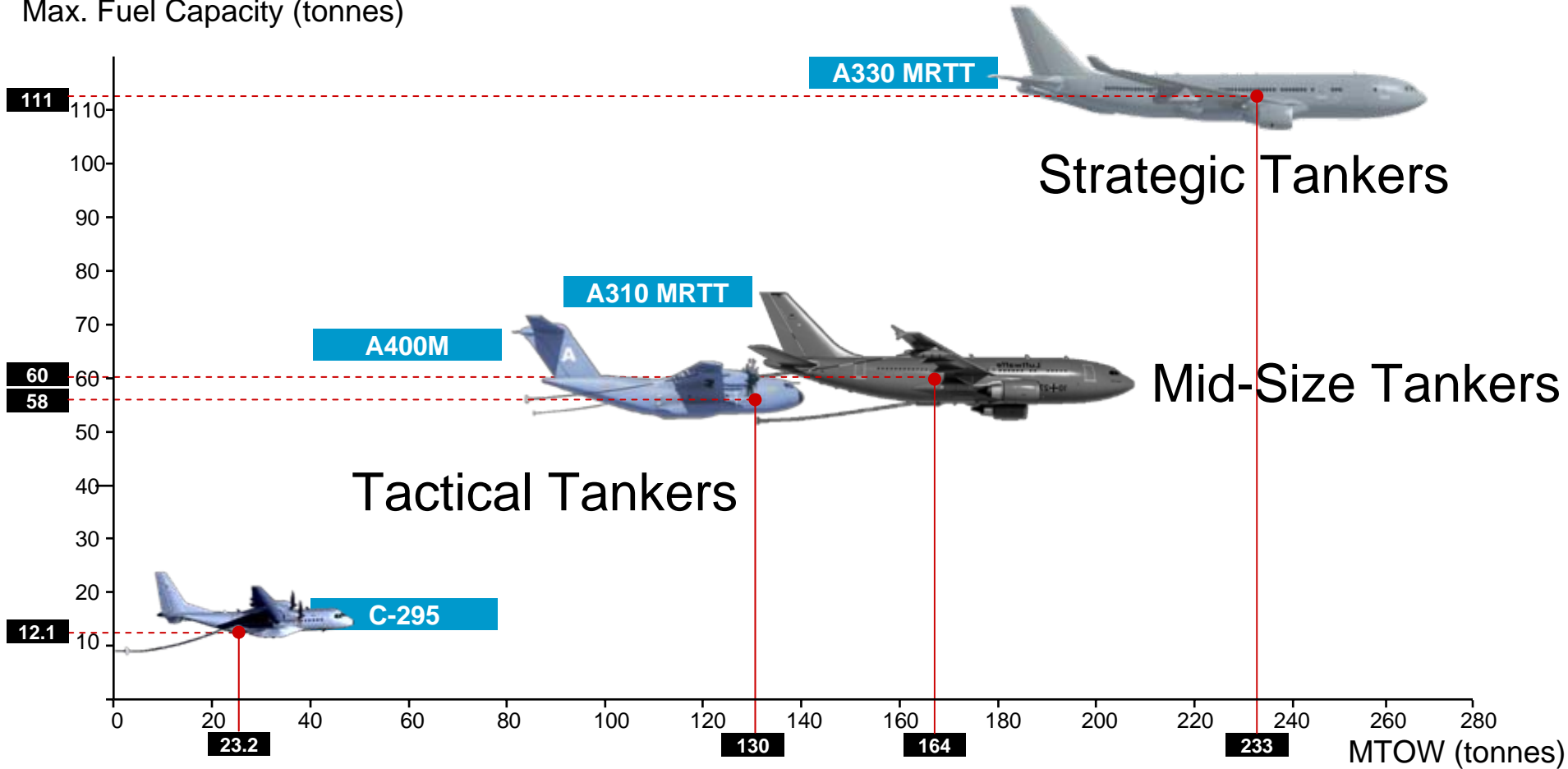
# Les flottes actuelles (par âge)



**70% des ravitailleurs ont plus de 40 ans et devront être remplacés prochainement**

# EADS MTA Tanker Family

Max. Fuel Capacity (tonnes)



**A wide product range to answer all the Air-to-Air Refuelling (AAR) needs**

**M R T T**  
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# A310 MRTT



# A330 – A Popular and Proven Platform



**Since its entry into service, more than 1 000 A330s have been sold to 93 customers, and more than 560 have been delivered\***

\* As of 30 September 2008



# The Ideal Multi Role Tanker Transport

- Efficient Airbus Fuselage

- Optimized cross-section for comfort
- No special freight containers needed
- Large mixed freight capacity

- Large Cockpit

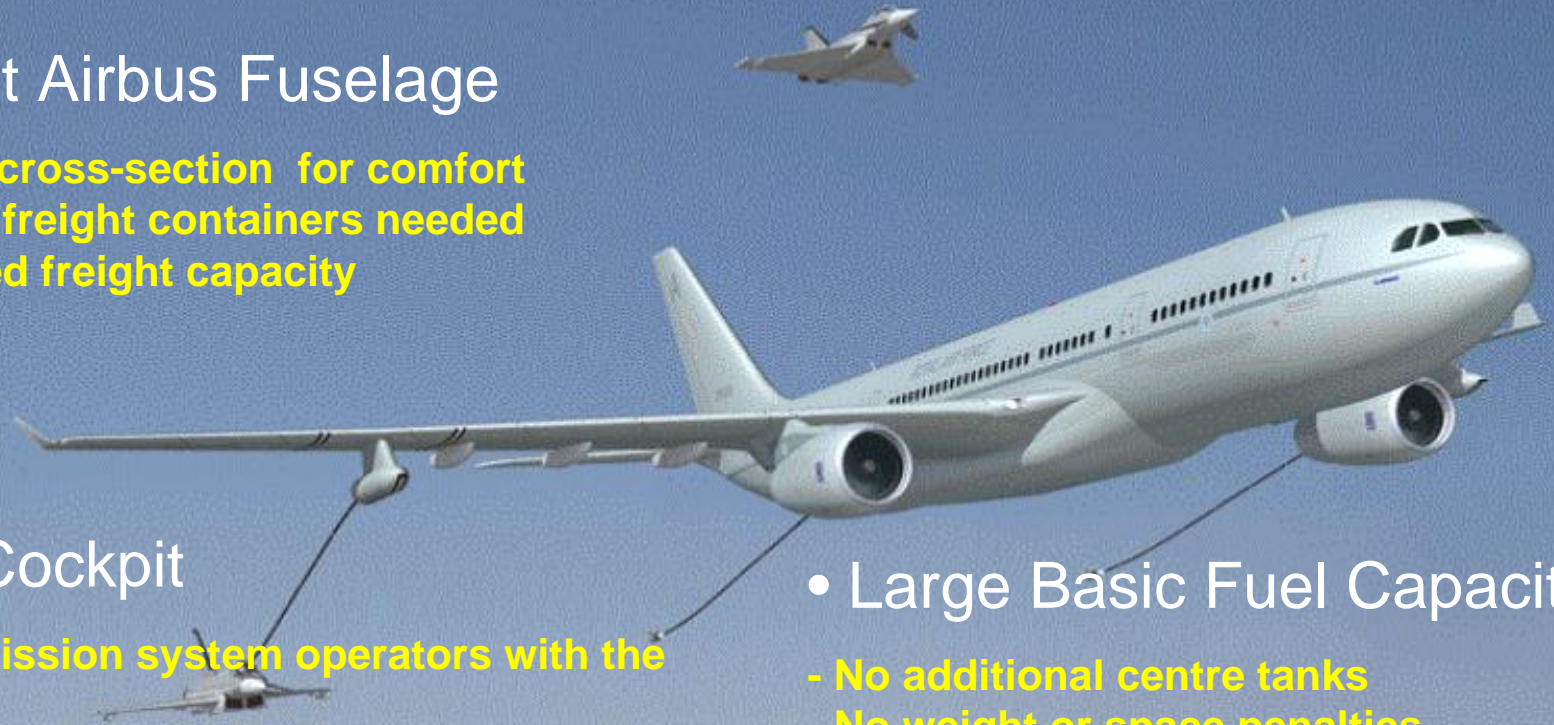
- Fuel and mission system operators with the flight crew

- Benefits from Common A340 Wing

- Pods installed at outer engine positions
- A340 fuel systems and existing fuel management computers can be adapted

- Large Basic Fuel Capacity

- No additional centre tanks
- No weight or space penalties



# Air to Air Refuelling Systems



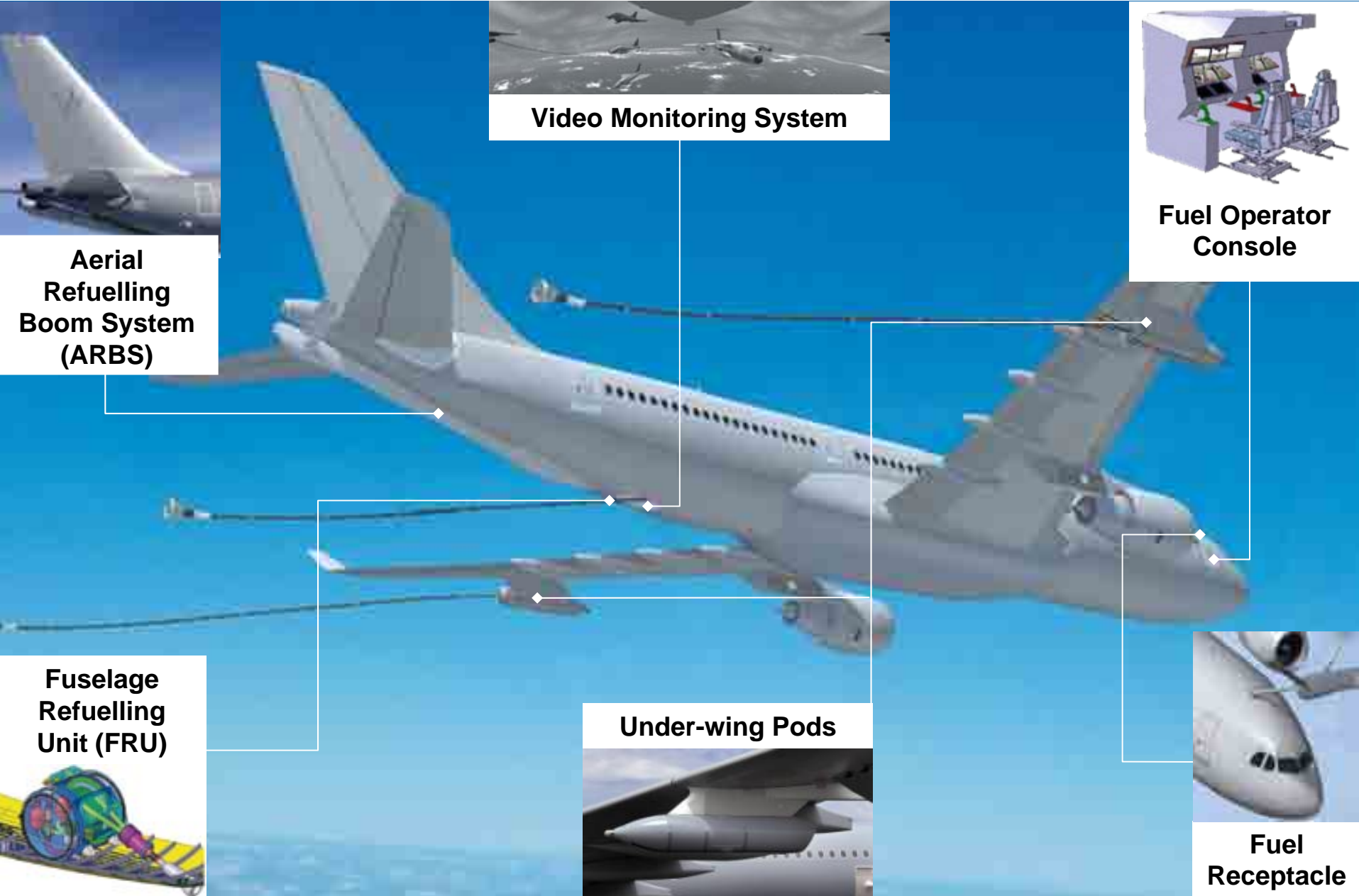
**Aerial Refuelling Boom System (ARBS)**



**Video Monitoring System**



**Fuel Operator Console**



**Fuselage Refuelling Unit (FRU)**



**Under-wing Pods**



**Fuel Receptacle**



# A330 MRTT – Air-to-Air Refuelling Capability

- Fuel Capacity  
(No auxiliary tanks needed)

- 139 000 litres  
(111 t, 242 000 lb)



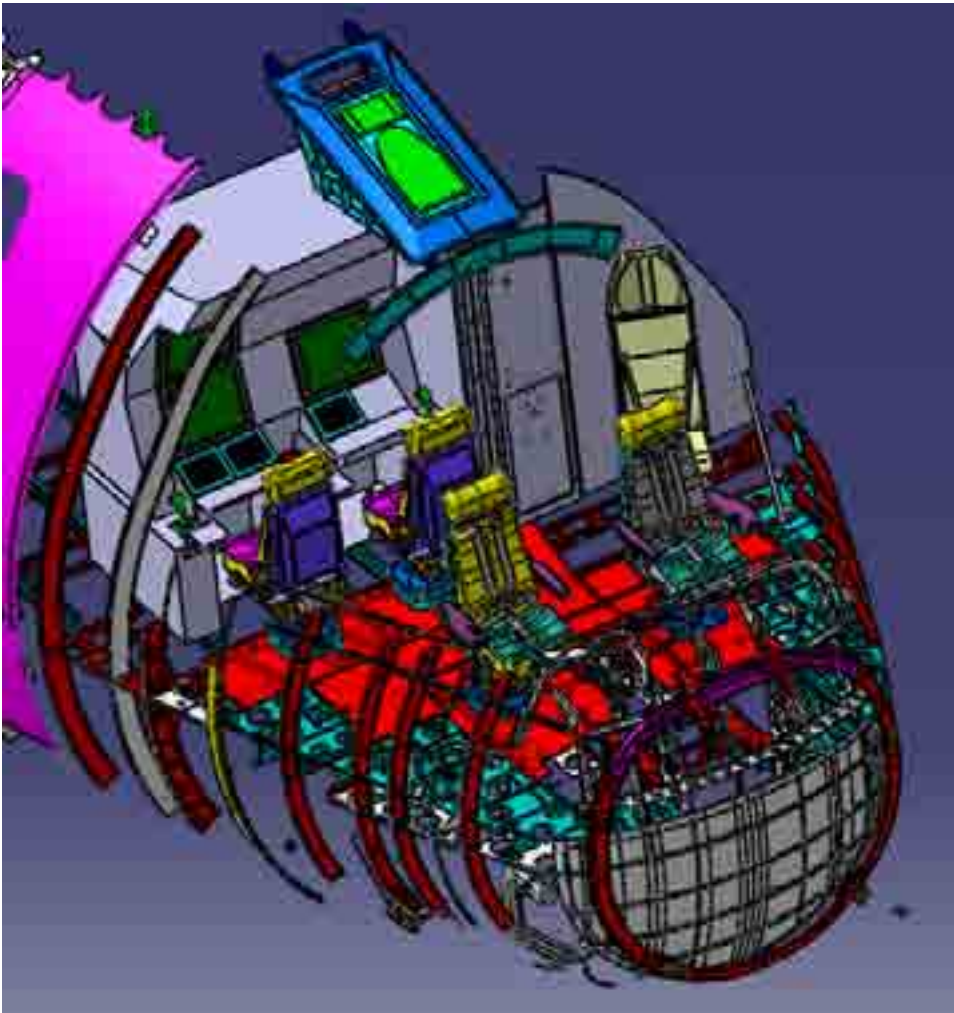
- Able to Refuel any Receiver Receptacle (ARBS) Probe (FRU, Wing Pods)



- Time on Station  
6.40 hours over 500 nm with  
47 tonnes of fuel



# A330 MRTT Cockpit

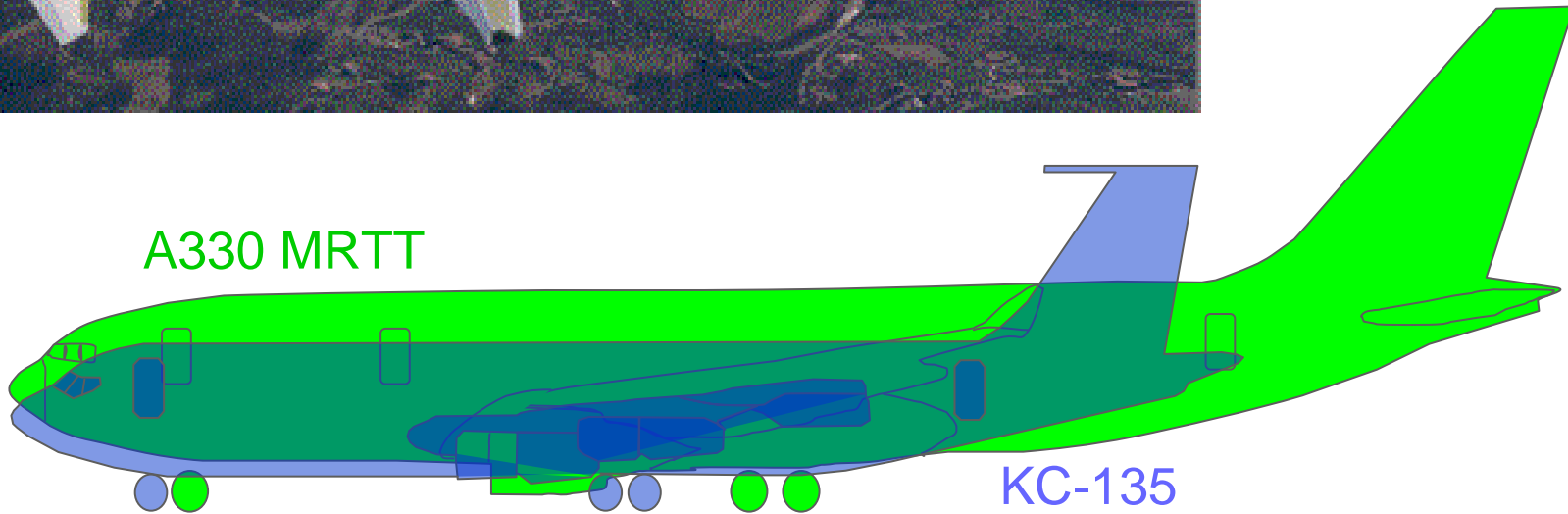


- Entire crew in cockpit
- 4 crew positions
  - Pilot
  - Co-pilot
  - ARO (Air Refueling Operator)
  - MC (Mission Coordinator)
  
- 5<sup>th</sup> seat for extra occupant

# Significantly larger than the KC-135

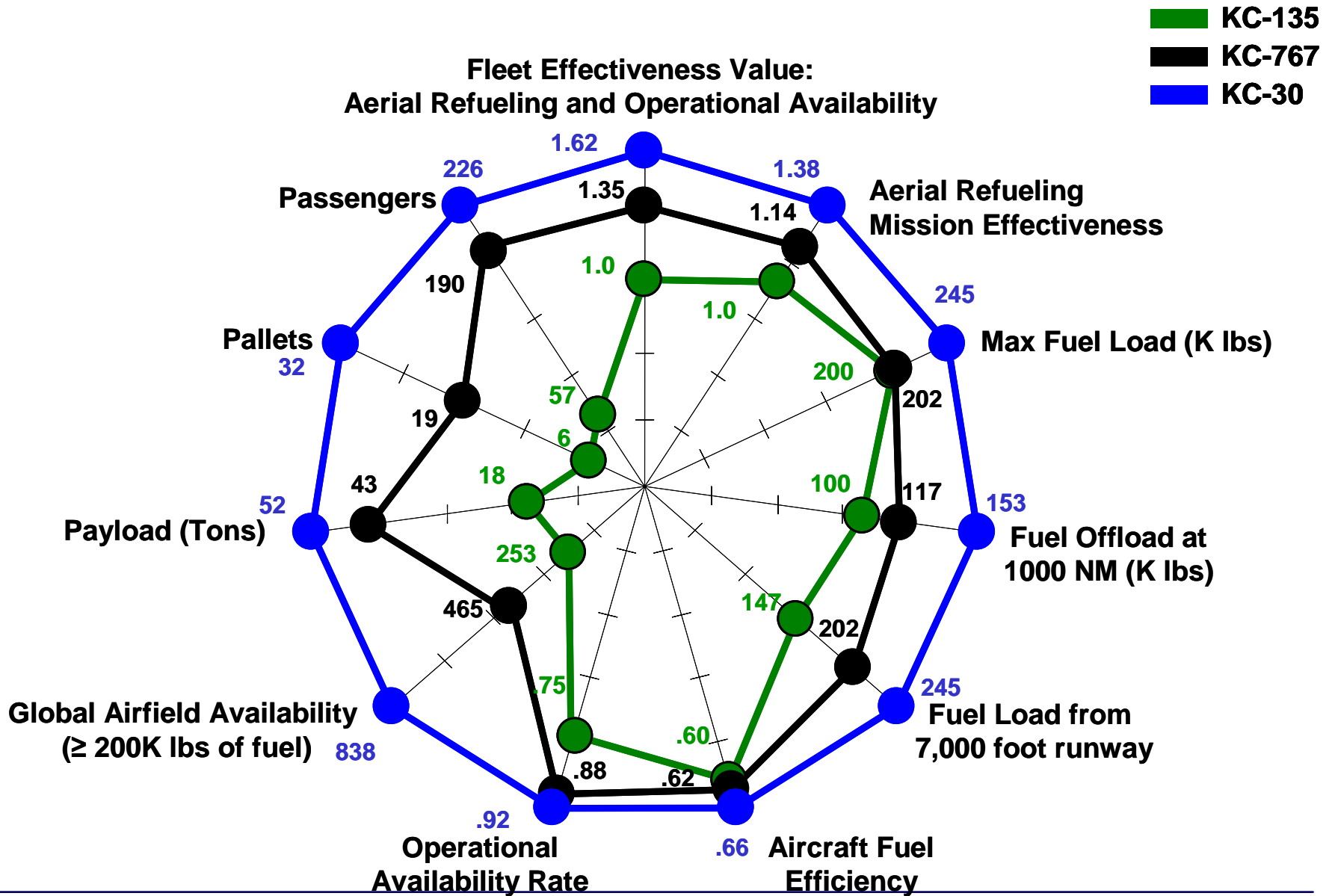


A330 MRTT

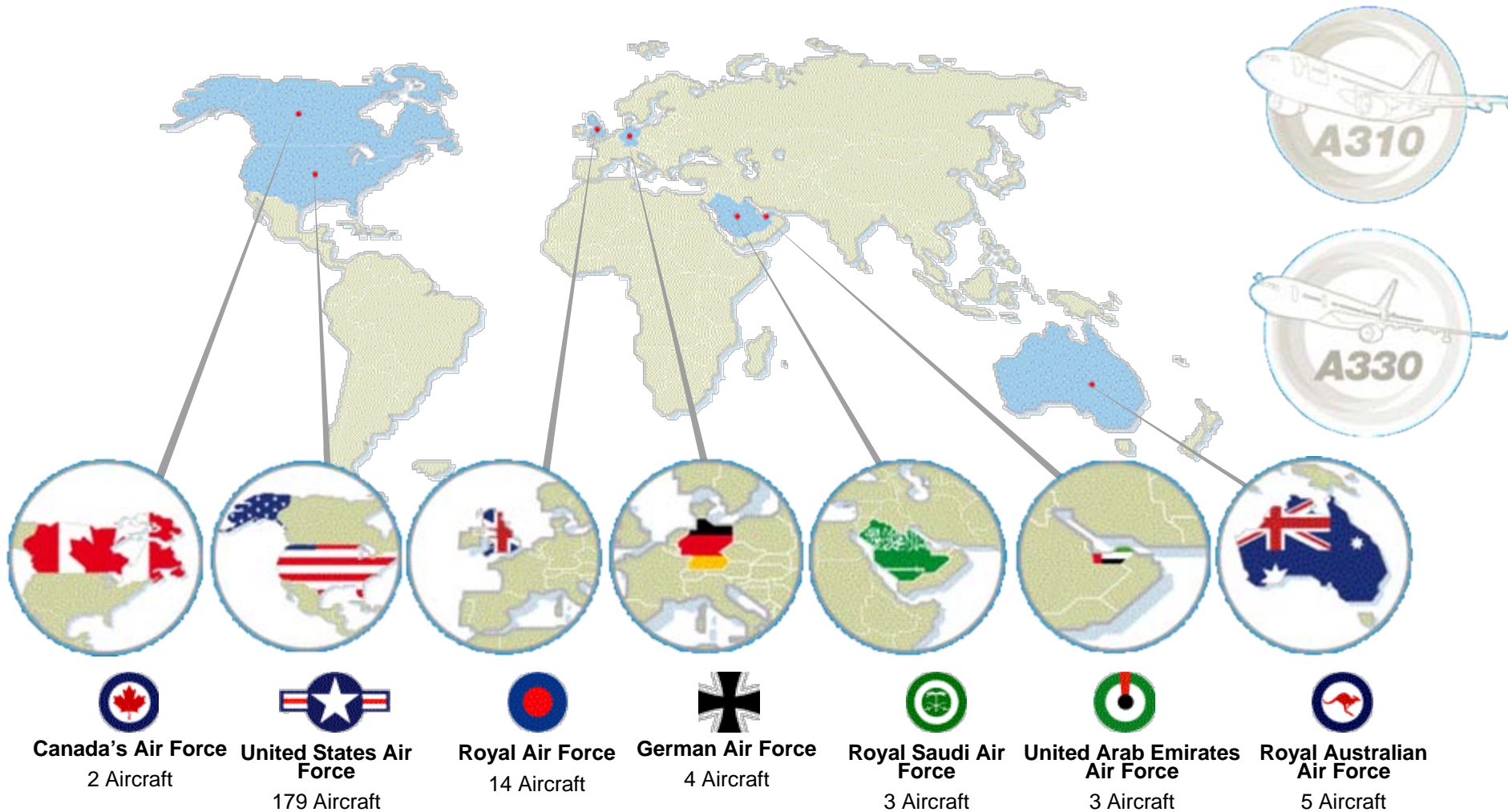


KC-135

# Tanker Comparison



# The MRTT Solution: an Accepted Standard



**Now chosen by 7 major air forces over 4 continents**



# A330 MRTT/ KC-30A - Australia



- Flight testing started in June 2007 and continues this year
- Trials with an F/A-18B Hornet started in January 2008
- In the meantime the second aircraft is being converted into an MRTT in QANTAS (Brisbane) from June 2008

# A330 MRTT – Saudi Arabia



- Contract signed in December 2007
- Three A330 MRTTs
- First delivery in 2011
- Configuration: 2 under-wing pods and a boom, UARRSI, 3D Vision System, military avionics, 272 passengers in 2-class configuration

# A330 MRTT – United Arab Emirates



- Contract signed in February 2008
- First delivery in 2011
- Configuration: 2 under-wing pods and a boom, UARRSI, 3D Vision System, military avionics, 256 passengers in 2-class configuration



# A330 FSTA – United Kingdom



- PFI solution managed by AirTanker consortium (EADS, Cobham, Rolls-Royce, Thales, VT)
- Contract signed 27 March 2008 for 14 aircraft
- First delivery in 2011
- Configuration: 2 under-wing pods and FRU, 3D Vision System, DAS and military avionics, 290 passengers, MEDEVAC capability

# KC-45A Advanced Multi Role Tanker Transport – United States



- Our local partner, Northrop Grumman acts as prime contractor in the U.S. program
- Northrop Grumman and EADS were selected by the USAF on 29 February 2008 for the first 179 aircraft
- On September 10, Secretary of Defense R. Gates unexpectedly announced the DoD had terminated the tanker RFP along with the Northrop/EADS contract
- The next US Administration will confirm the requirements, evaluation criteria, and appropriate allocation of defence budget before starting a new competition

- Les programmes
  - Un produit disponible, clairement supérieur : l'A330 MRTT
  - Les prochains enjeux majeurs : USA et France
- Les technologies
  - Ravitaillement des UAV
  - Assistance / Automatisation du ravitaillement
  - « Smart Tanker »



***Merci de votre attention***



**Groupe Professionnel Aéronautique et Espace Paris**

**SITE WEB**

**<http://gp01.gadzarts.org>**

