

Commercial Market for
Cargo Operations
Aviation Systems Architecture

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TOTAL CARGO MARKET

GIANT MARKET CONSISTING OF:

- **TRUCKING**
- **RAIL**
- **SEABORNE**
- **AIR CARGO**

AS THE “WORLD GETS SMALLER”, THE GROSS VOLUME OF FREIGHT HAS INCREASED DRAMATICALLY!

COMMERCIAL CARGO OPERATIONS

- . SEA
- . LAND
- . AIR
- . RIVER, LAKES, OCEAN

TYPES OF FREIGHT

- SMALL PACKAGE DELIVERY
- “LESS-THAN TRUCKLOAD” FREIGHT
- AIRLINE “BELLY FREIGHT” , e.g. AA, DL, JAL
- PALLETIZED FREIGHT
- CONTAINERIZED FREIGHT
- BULK CARGO

INTERMODAL TRANSPORTATION

ALTHOUGH THERE ARE NUMEROUS
TYPES OF EQUIPMENT FOR FREIGHT,
SOME STANDARDIZATION HAS
BEEN ACHIEVED IN:

CONTAINERS

PALLETS

AIR FREIGHT CONTAINERS

8' X 8' X 20' CONTAINERS



8' X 8' X 40' CONTAINERS



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CONTAINERSHIPS

CAPACITY:

UP TO 9000

CONTAINERS

SIZE: 950' LENGTH

UP TO 100,000

TONS G.W.



EVERGREEN CONTAINERSHIP-TAIWAN



MODERN CONTAINER SHIPS

- BEAM GREATER THAN 110 ft.
- CAN'T TRANSIT PANAMA CANAL (TOO WIDE !!)
- CREW OF ONLY 13 (U.S. Destroyer is 360', 3200 tons, crew of 360 !!!)
- DIESEL POWERED , 22-23 KNOTS
- AUTOMATED SYSTEMS –low labor costs
- OPTIMIZED FOR EFFICIENCY (reduced ton-mile costs!!)

PORT FACILITIES

- HUGE LOGISTICAL INVESTMENT !!

AUTOMATION IS KEY; SPEED IN UNLOADING / MINIMIZATION OF LABOR TO REDUCE COSTS



ONE-MAN CONTAINER HANDLING



HONG KONG-PEARL RIVER DELTA- CONTAINERPORT

MILLIONS OF 20 ft. CONTAINERS
PASSING THROUGH IN 2002*

- HONG KONG 25.2*
- LONG BEACH 10.6
- NEW YORK 3.3
- OAKLAND 1.6

(PRC'S EXPORTS GREW
22% IN 2002 !!)



EXPLOSIVE GROWTH IN CONTAINER THROUGHPUT

LONG BEACH, CA

Port Container Growth In millions of twenty-foot container units

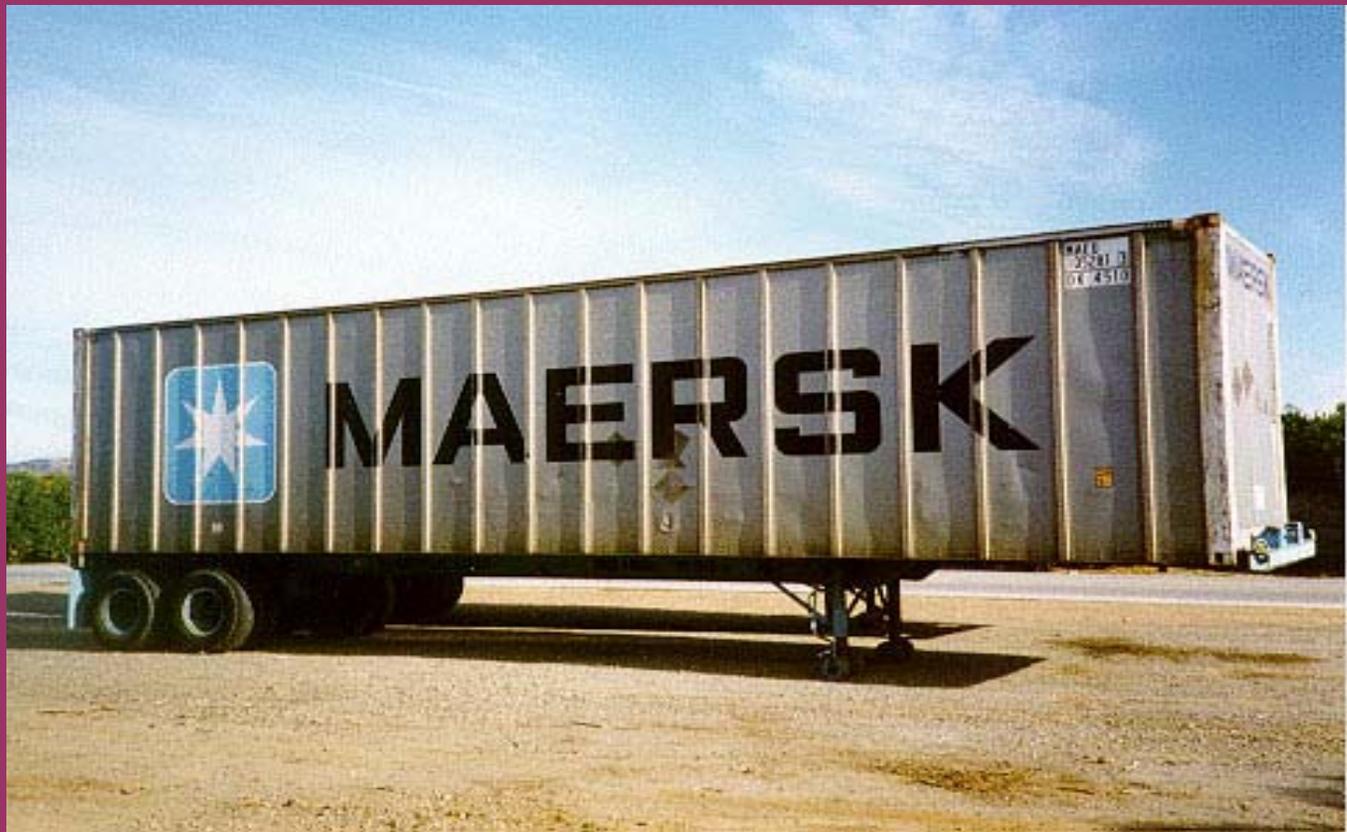


NUMBER & SIZE OF THE U.S. FLAG MERCHANT FLEET

WORLD FLEET	28,318 SHIPS
U.S. FLEET	454 (2%)
CONTAINERSHIPS	90
ROLL-ON / ROLL-OFF SHIPS	60
GENERAL CARGO SHIPS	136

SOURCE: 1960-1997 U.S. DEPT. OF TRANSPORTATION, MARITIME ADMINISTRATION, "MERCHANT FLEETS OF THE WORLD", 2001

MAERSK SHIPPING LINE INTERMODAL CONTAINER



Gross Weight :67,200 lbs. Tare : 8220 lbs. Payload : 58,980 lbs.

INTERMODAL CONTAINERS ON TRANS-CONTINENTAL RAIL SYSTEM



CARGO COMPETITION IS INTENSE!



K -LINE



EVERGREEN



TPL LINE



MAERSK SHIPPING

DOUBLE-STACKED
CONTAINERS ON RAIL
(TRAINS MOVE DAY AND NIGHT !!)



8' X 8' X 20' CONTAINERS AT FURNITURE FACTORY



DEMURRAGE

- AFTER A CONTAINER HAS BEEN DELIVERED TO ITS DESTINATION, THE RECEIPIENT HAS 24 HOURS TO UNLOAD
- “DEMURRAGE” CHARGES START TO ACCUMULATE AFTER 1 DAY
- CONTAINER SHIPPING COMPANIES TRACK THOUSANDS OF CONTAINERS ALL OVER THE WORLD!

BARGES-OCEAN, LAKES & RIVER

BULK CARGO: COAL, SAND, GRAVEL, ORE, OIL, ETC.



AIR FREIGHT

TYPES OF CARGO AIRCRAFT

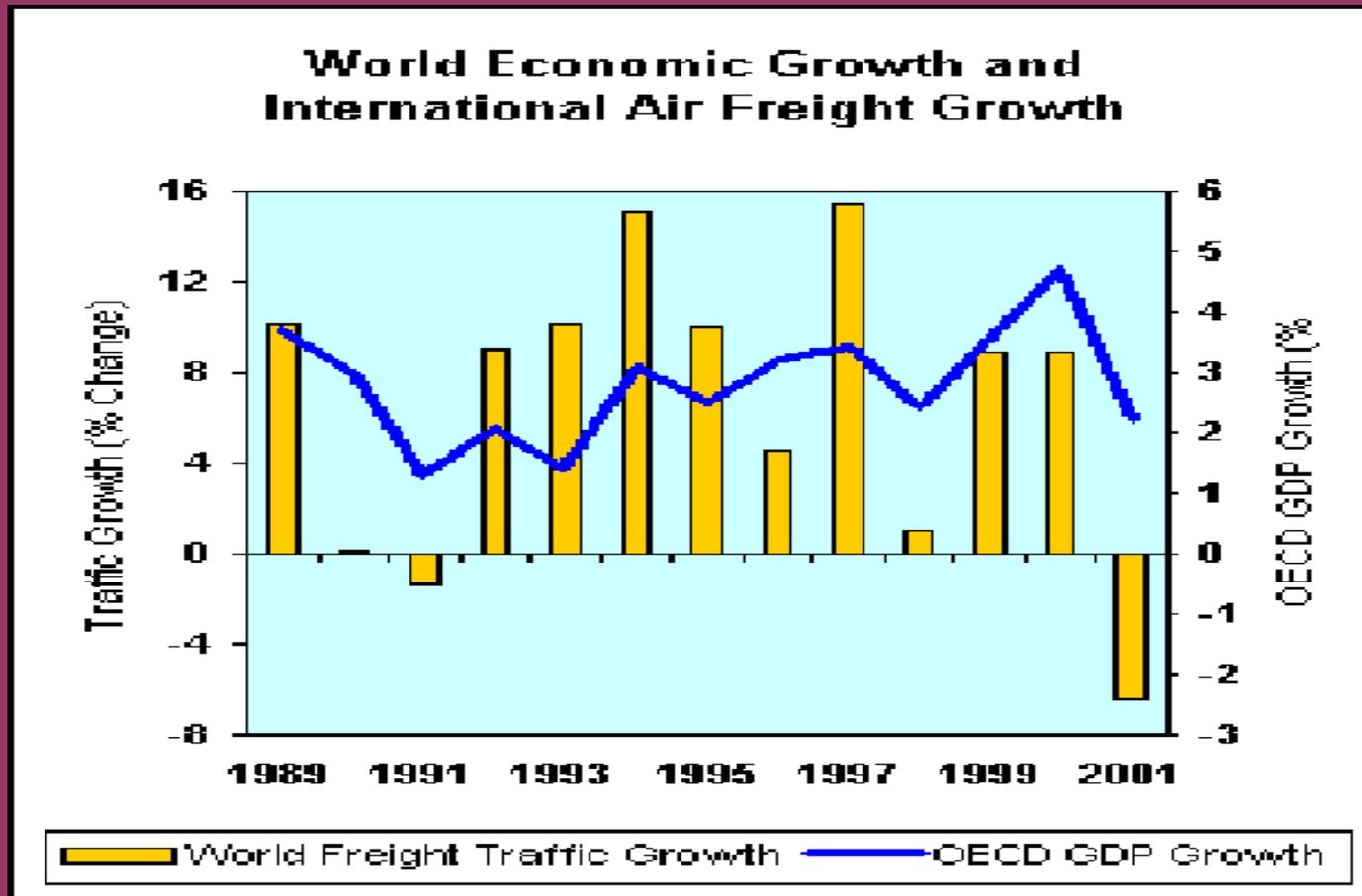
- FREIGHTERS (e.g. 747 F, MD-11F, new A-380)
- COMBI AIRCRAFT (e.g. ALITALIA

MD-11 COMBI CARRIES 200+ PAX
AND MAIN DECK CARGO AFT)

• CONVERTIBLE FREIGHTERS (e.g. MD-11CF)

**FREIGHTERS ARE MANUFACTURED NEW (747-400 ERF) OR
ARE MODS OF OLDER PAX AIRCRAFT (MD-10)**

WORLD ECONOMIC GROWTH AND INTERNATIONAL AIR FREIGHT GROWTH



GENERALLY GOOD CORRELATION BETWEEN AIR CARGO AND GDP

757 CARGO HANDLING SYSTEM (SIDE-LOADING PALLETS)



EVA 747 FREIGHTER



747 FREIGHTER-NOSE LOADING



747-400 FREIGHTER

NEW 747-400ER FREIGHTER: 910,000 lbs.

MTOGW ; APPROX. 8000 n.m. RANGE



CHINA AIR 747 LOADING CONTAINERS



757 & 767 FREIGHTERS

UPS : 767F

DHL: 757F



A-300 CARGO HANDLING SYSTEM

- . TIE-DOWN ATTACHMENTS
- . POWER-DRIVE UNITS
- . REINFORCED STRUCTURE
- . LARGE SIDE ACCESS DOOR
(LOADING / UNLOADING)
- . CARGO RESTRAINT
SYSTEM



EVA MD-11 CARGO FREIGHTER

630,000 lbs.MTOGW, 192,000 lbs.CARGO, 7200nm.Range



MD-11 CONVERTIBLE FREIGHTER & COMBI

CONVERTIBLE FREIGHTER

24hrs. PAX to Freighter

48 hrs. Freighter to Pax

MartinAir-HOLLAND

COMBI

Alitalia Combi

Main Deck Cargo +

219 Passengers



MD-11 COCKPIT

6 ACROSS MULTIFUNCTION FLAT PANEL DISPLAYS



**THIS COCKPIT WAS INSTALLED IN THE DC-10 MOD TO
MD-10 FREIGHTER FOR FEDEX**

DC-8F CARGOLINER

PAX AIRCRAFT CONVERTED TO CARGO ;RE-
ENGINEED WITH TURBO-FANS
(UPS FLEET)



THE BUSINESS OF AIR CARGO!

- ECONOMICS JUSTIFY **HIGH PRIORITY**
TIME CRITICAL PAYLOADS
(ELECTRONICS, FLOWERS, BERRIES)
- URGENT PACKAGES, DATA, PARTS
- AIR CARGO MARKET AIDED BY
PRESSURE TO REDUCE INVENTORIES
& CYCLE TIME
- SHORTER TIME TO MARKET

AIR CARGO CARRIERS

- POLAR AIR CARGO
- ATLAS AIR
- EVERGREEN INTERNATIONAL
- MARTINAIR
- GEMINI AIR CARGO
- AMERIJET INTERNATIONAL
- EMORY AIR FREIGHT
- DHL
- AIRBORNE EXPRESS
- LUFTHANSA CARGO
- UPS
- FEDEX

NUMEROUS FREIGHT FORWARDERS!

