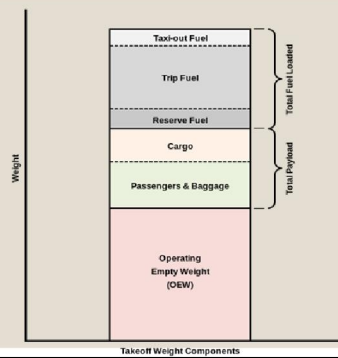


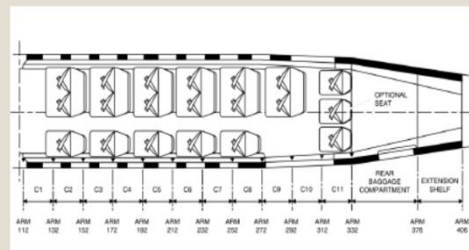
# WEIGHT AND BALANCE FUNDAMENTALS

## WEIGHT DURING LOADING

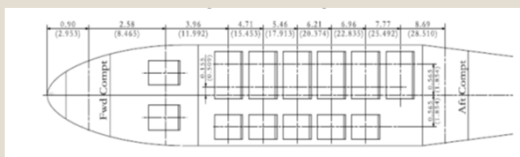


Takeoff Weight Components

## TWIN-OTTER SEATING ARRANGEMENT



## Y12E Seating Arrangement

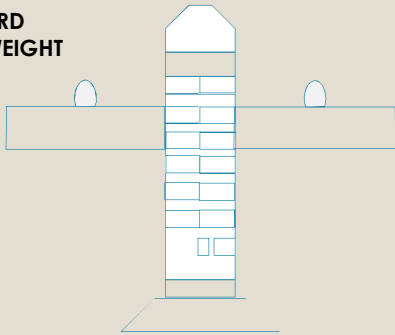


## Standard Empty Weight

ALSO CALLED BASIC EMPTY WEIGHT (BEW) OR MANUFACTURER EMPTY WEIGHT (MEW)

- It is the weight of the aircraft "as built" and includes the weight of
  - Structure
  - power plant,
  - furnishings,
  - installations,
  - systems and other equipment
- excludes any crew, operating fluids, baggage, passengers, or usable fuel

### STANDARD EMPTY WEIGHT



### BASIC EMPTY WEIGHT

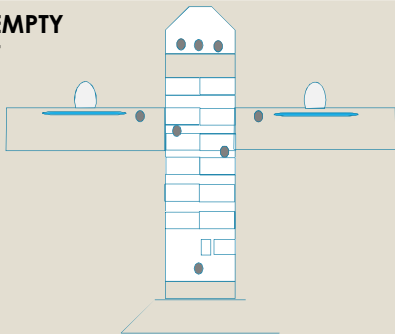
Also called Dry Operating Weight (DOW)

(Roughly equivalent to *basic empty weight* on light aircraft)

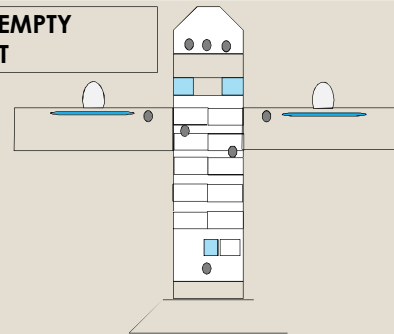
It is the Standard Empty Weight of an aircraft **Plus**

- all fluids necessary for operation such as engine oil, engine coolant, water, unusable fuel
- all operator items and equipment required for flight
- crew
- excluding usable fuel and the payload

### BASIC EMPTY WEIGHT



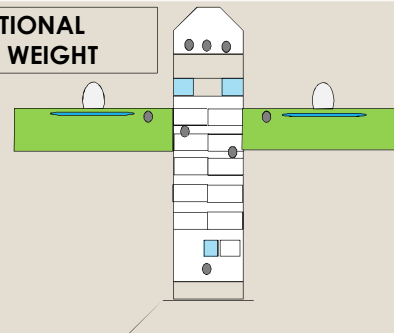
### BASIC EMPTY WEIGHT



### OPERATIONAL EMPTY WEIGHT (OEW)

- It is the BASIC Empty Weight of an aircraft **Plus** the fuel
- Does not include payload

### OPERATIONAL EMPTY WEIGHT



## PAYLOAD

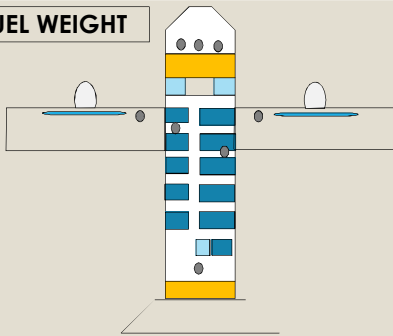
It is the carrying capacity of an aircraft. It includes cargo, people, extra fuel. In the case of a commercial airliner, it may refer only to revenue-generating cargo or paying passengers.

## ZERO FUEL WEIGHT (ZFW)

This is the total weight of the airplane *and* all its contents (including unusable fuel), but excluding the total weight of the usable fuel on board. As a flight progresses and fuel is consumed, the total weight of the airplane reduces, but the ZFW remains constant.

Maximum zero fuel weight (MZFW) is the maximum weight allowed before usable fuel and other specified usable agents (engine injection fluid, and other consumable propulsion agents) are loaded.

## ZERO FUEL WEIGHT



## MAXIMUM ZERO FUEL WEIGHT (ZFW)

OPERATIONAL EMPTY WEIGHT PLUS MAXIMUM PAYLOAD

## FUEL

- **TAXI FUEL**  
Fuel planned to be consumed during Taxiing of Aircraft
- **TRIP FUEL**  
Fuel Planned to be consumed during flight from point A to B
- **HOLDING FUEL**  
Fuel Planned for Holding
- **RESERVE FUEL**  
Fuel planned for diversion, weather and other unforeseen circumstances

## TOTAL FUEL

- Sum of taxi, trip, holding and reserve fuel

## Maximum FUEL

- Maximum Fuel Capacity of Aircraft

TOTAL FUEL IS ALWAYS LESS THAN OR  
EQUAL TO MAXIMUM FUEL CAPACITY OF  
AIRCRAFT

## RAMP WEIGHT (MRW)

- *also called taxi weight (MTW)*

- It is the maximum weight authorized for maneuvering (taxiing or towing) an aircraft on the ground.

- ZERO FUEL WEIGHT + TOTAL FUEL

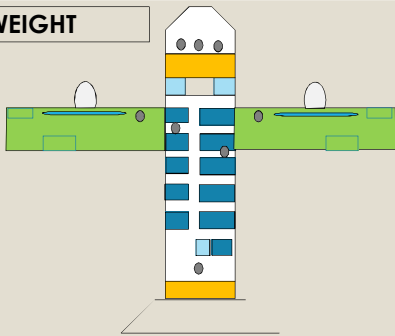
## MAXIMUM RAMP WEIGHT (MRW)

- *also called maximum taxi weight (MTW)*

- It is the maximum weight authorized for maneuvering (taxiing or towing) an aircraft on the ground.

- MAXIMUM ZERO FUEL WEIGHT + MAXIMUM FUEL

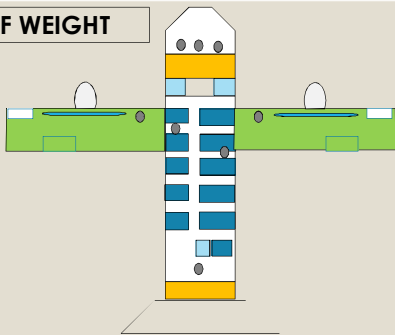
### RAMP WEIGHT



## TAKEOFF WEIGHT

◦ RAMP WEIGHT **minus** Taxi Fuel

### TAKEOFF WEIGHT



## MAXIMUM TAKEOFF WEIGHT (MTOW)

This is the maximum weight at which the pilot of the aircraft is allowed to attempt to take off.

## REGULATED TAKEOFF WEIGHT (RTOW)

- Depending on different factors (e.g. flap setting, altitude, air temperature, length of runway), RTOW or *maximum permissible takeoff weight* varies for each takeoff.
- It can never be higher than MTOW.

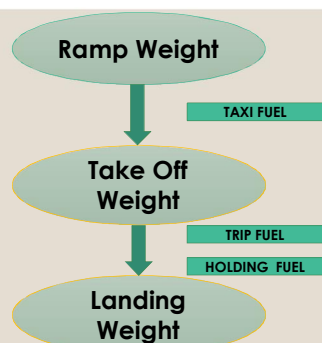
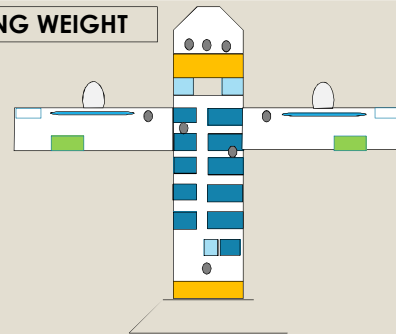
## LANDING WEIGHT (MLW)

TAKEOFF WEIGHT minus TRIP FUEL

## MAXIMUM LANDING WEIGHT (MLW)

- This maximum weight at which an aircraft is permitted to land
- Is structurally limited

## LANDING WEIGHT



## QUICK REVIEW

|                 | Basic Weight | Dry Operating Weight | Operating Weight | Zero Fuel Weight | Take-off Weight |
|-----------------|--------------|----------------------|------------------|------------------|-----------------|
| Aircraft Weight | *            |                      |                  |                  |                 |
| Fixed equipment | *            |                      |                  |                  |                 |
| Basic Weight    |              | *                    | *                | *                | *               |
| Crew            | *            | *                    | *                | *                | *               |
| Pantry          |              | *                    | *                | *                | *               |
| Take-off Fuel   |              |                      | *                |                  | *               |
| Passengers      |              |                      |                  | *                | *               |
| Baggage         |              |                      |                  | *                | *               |
| Cargo & Mail    |              |                      |                  | *                | *               |

Aircraft Weight

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