

**PART- 66
TRAINER MEDIAS**

MODULE 09

HUMAN FACTORS
B1 category

Lesson 01

GENERAL

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THE NEED TO TAKE HUMAN FACTORS INTO ACCOUNT

➤ **Human factors needs :**

The aircraft is a relatively safe means of transport, but exposed to accidents.

- ✓ In France, over the past 10 years, the number of deaths per year is also comparable to air and railway transport. It is about a hundred, which is far behind the 8 000 deaths in road accidents.
- ✓ The accidents are rare, but they often have tragic consequences.
- ✓ The vigilance is even more necessary since the increase in the traffic should increase the risk of accidents.



THE NEED TO TAKE HUMAN FACTORS INTO ACCOUNT

➤ **Human factors definition :**

Generally, “human factors” as a scientific discipline and others regard it as a more general part of the human contribution to system safety. A good definition in the context of aviation maintenance would be: “Human factors is the study of the relationship between people and their activities”.

➤ **The SHEL model :**

The “SHEL” model was advocated by Professor Elwyn Edwards in 1972.



S: software
(procedures, etc.)
H: hardware
(machine, etc.)
E: environment
L: liveware (human)

In this model the mismatch of the blocks (interface) is just as important as the characteristics of the blocks themselves. A mismatch can be a source of human error.

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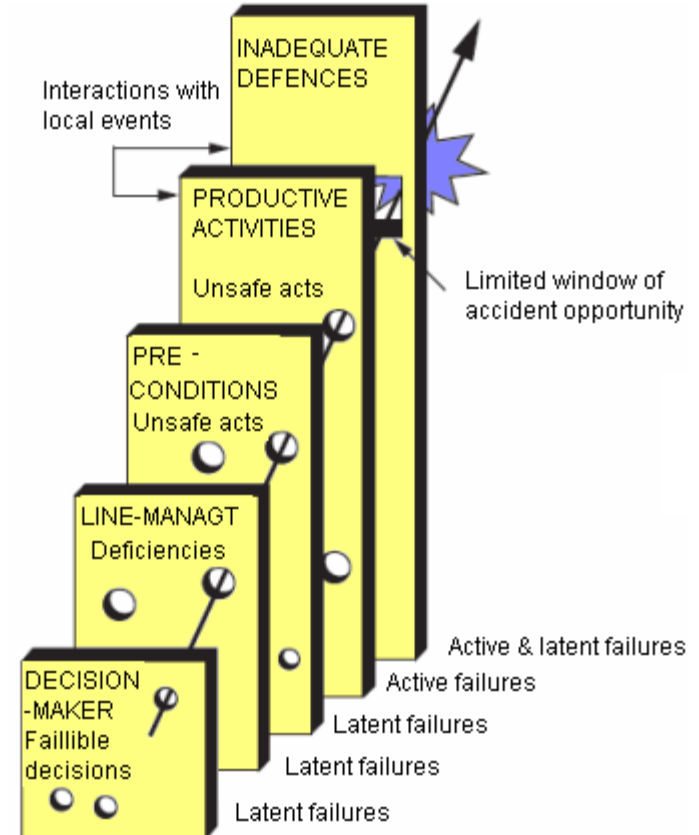
THE NEED TO TAKE HUMAN FACTORS INTO ACCOUNT

- **The SHEL model interfaces:**
 - ✓ **Liveware-hardware interface:**
Ex: Seat ergonomomy.
 - ✓ **Liveware-software interface,**
Ex: Check list layout.
 - ✓ **Liveware-environment interface,**
Ex: Pressurization, temperature, etc.
 - ✓ **Liveware-liveware interface.**
Ex: Teamwork interactions.

THE NEED TO TAKE HUMAN FACTORS INTO ACCOUNT

➤ **The REASON model:**

Since its introduction in 1990, several variations have circulated among the human factors and accident prevention specialists, including a revised model by Professor Reason himself in 1993.



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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

The six air crashes having caused the greatest number of victims due to human errors.

➤ **Tenerife (Canary Islands) :**

March 27, 1977: 583 dead.

The 747 from KLM airlines started to accelerate without permission, while the Pan Am was still on the runway. The aircraft from KLM hit the 747 from Pan Am at the take-off point. The two aircrafts caught fire.



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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

➤ Maui (Hawaii USA):

Aloha flight 243. April 28, 1988.

The accident involving Aloha flight 243 involved 18 feet of the upper cabin structure suddenly being ripped away in flight due to structural failure. The Boeing 737 involved in this accident had been examined, as required by US regulations, by two of the engineering inspectors. Neither found any cracks in their inspection.

Post-accident analysis determined there were over 240 cracks in the skin of this aircraft at the time of the inspection.



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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

➤ **New Delhi (India) :**

November 12, 1996: 349 dead.

A Boeing 747 from Saudi Arabian Airways just took off from New Delhi airport to flight level 140 when the Il-76 of Kazakhstan Airlines, which was in the landing phase, hit it head on.



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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

➤ **Ermenonville (France) :**

March 3, 1974: 346 dead.

A DC-10 from Turkish Airlines was climbing to flight level 110 just after takeoff from Orly in Paris when the aircraft lost its rear cargo door due to decompression, damaging the cabin floors and the control cables.



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➤ **Chicago (USA):**

May 25, 1979: 273 dead.

A little while after takeoff, a DC-10 of American Airlines from Chicago airport had its left engine and its engine mount separated from the aircraft damaging the wing and the hydraulic system and causing its crash.

Bad maintenance procedures were used by American Airlines during the disassembling of the engines for inspection, subjecting the engine mount to a lot of stress.

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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

➤ Gonesse (France):

July 25, 2000: 109 dead.

The Concorde aircraft of Air France fought to gain altitude right after its takeoff from the Roissy/Charles de Gaulle airport. The pilot noted engine failure #2 and tried to reach the aerodrome of Le Bourget because smoke and fire were coming out from the left wing of the aircraft. The aircraft was unable to rise, lost speed and crashed on a hotel. The first indications showed that a metal part had been left on the runway by another aircraft, notching one of the tires of the Concorde which bursted, damaging the fuel tank and causing a leak.



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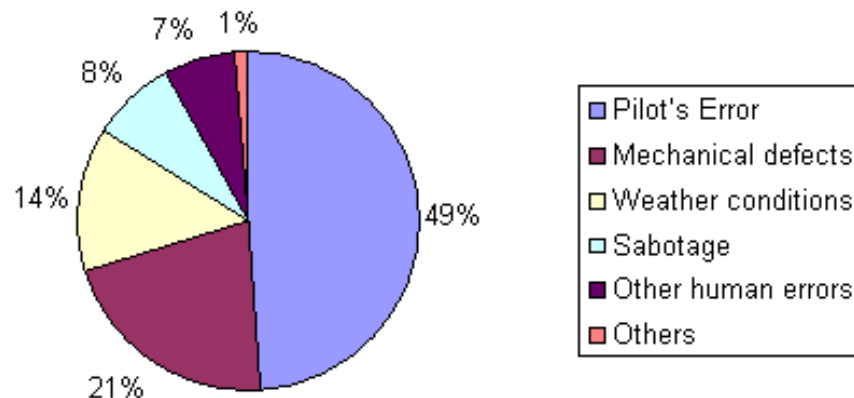
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ACCIDENT ATTRIBUTABLES TO HUMAN ERROR

➤ **Statistics:**

The table below represents the various reasons of air crashes based on a total of 1286 accidents whose causes are known.



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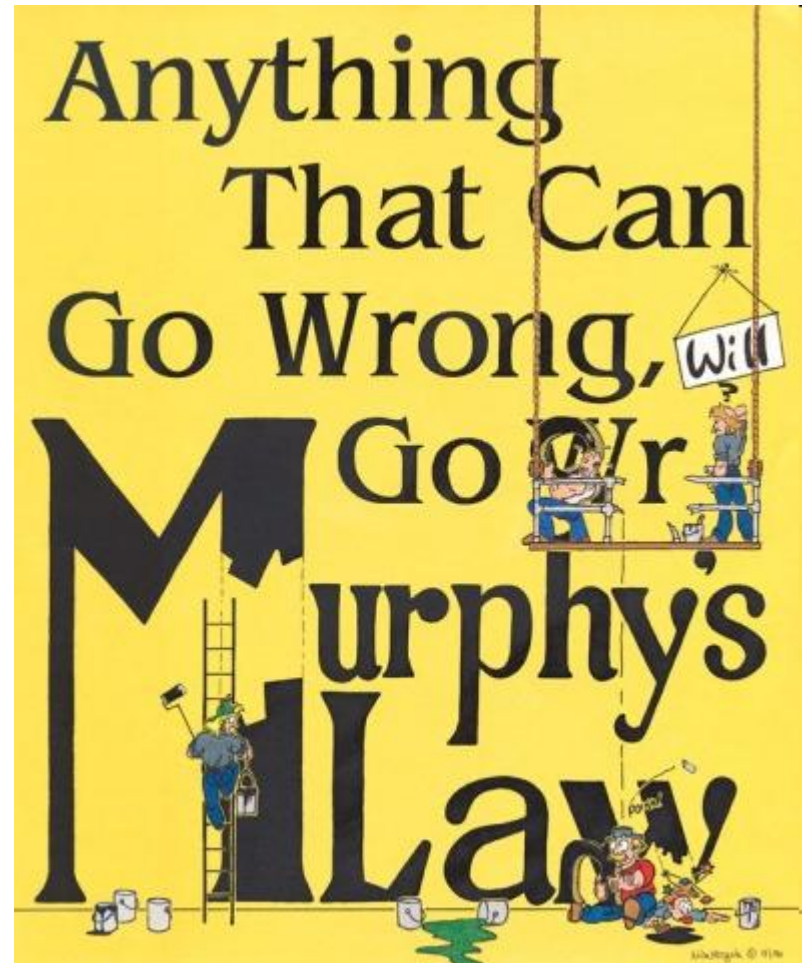
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MURPHY'S LAWS



MURPHY'S LAWS

➤ **Murphy's law examples:**

Here are a few examples of Murphy's Laws relative to hardware.

- ✓ Logic is a systematic method of coming to the wrong conclusion with confidence.
- ✓ Whenever a system becomes completely defined, some damn fool discovers something which either abolishes the system or expands it beyond recognition.
- ✓ Technology is dominated by those who manage what they do not understand.
- ✓ If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization.
- ✓ The opulence of the front office decor varies inversely with the fundamental solvency of the firm.

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MURPHY'S LAWS

➤ **Murphy's law examples:**

- ✓ The attention span of a computer is only as long as it electrical cord.
- ✓ An expert is one who knows more and more about less and less until he knows absolutely everything about nothing.
- ✓ Tell a man there are 300 billion stars in the universe and he'll believe you. Tell him a bench has wet paint on it and he'll have to touch to be sure. great discoveries are made by mistake.

MURPHY'S LAWS

- **Murphy's law examples:**

