ofc Aviation Fuel Services S.A

Operations of a Hydrant System

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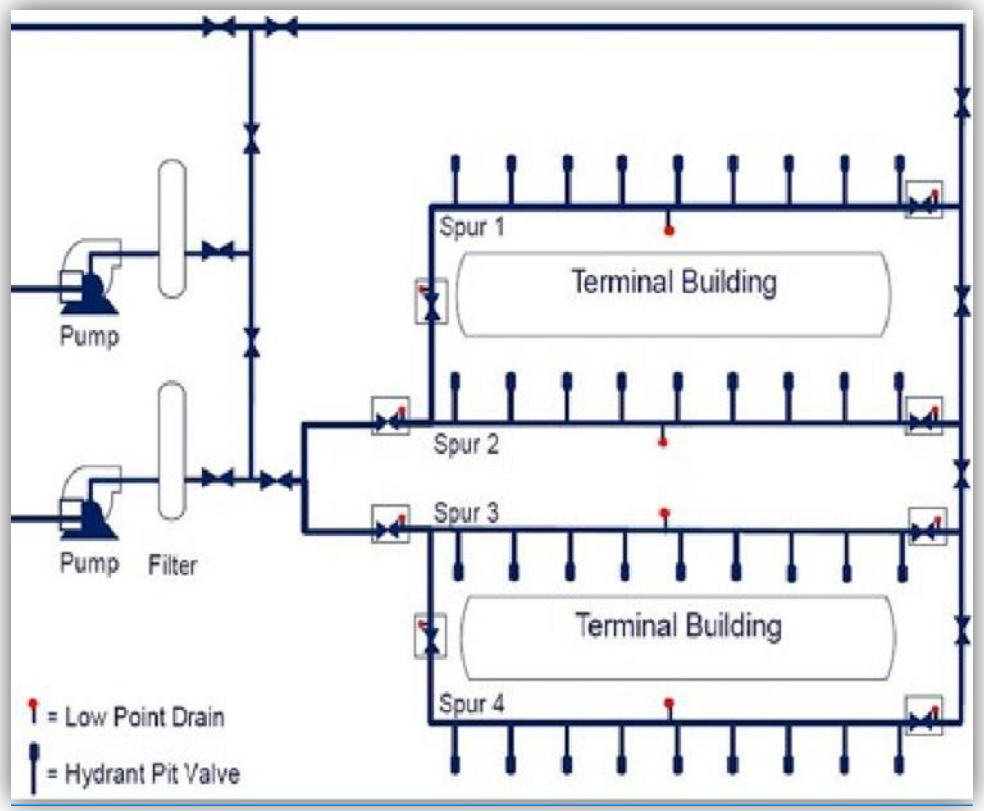
What is a Hydrant System???

Technically thinking:

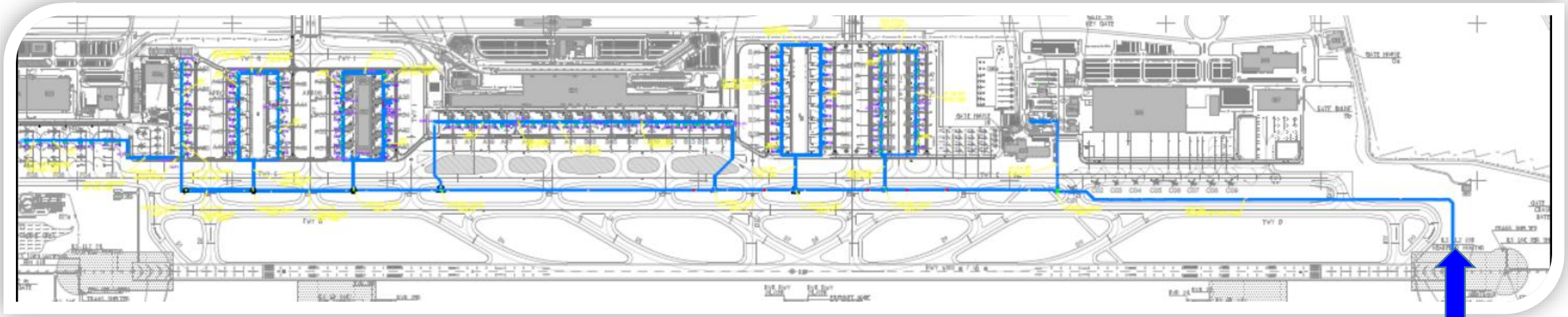
- **JIG Glossary:** an in-ground fixed fuelling system for transfer of fuel
- **EI 1540 (and 1560) Definition:** a buried fuel pipe system with associated pumps, filters, drain and venting points, valves and valve chambers, etc.

Hydrant: From pump inlet to hydrant fuel pits valves.



What ELSE the Hydrant System is???

Operationally thinking:



From Tank Farm

- Fuel is delivered into-plane **not** straight from the storage tank, **but** straight from the Hydrant pipes and pit valve
- So, Hydrant is also **THE underground "tank"** which the aircraft is fueled from!
- The volume of a Hydrant might be **more than** a peak day fuel demand!

Consequences - Impact

Operationally thinking, in view of Fuel Quality and Safety Requirements:

- No fuel quality control **System** in place,

  No time left to correct fuel quality during aircraft fueling
- No HSSE **System** in place,

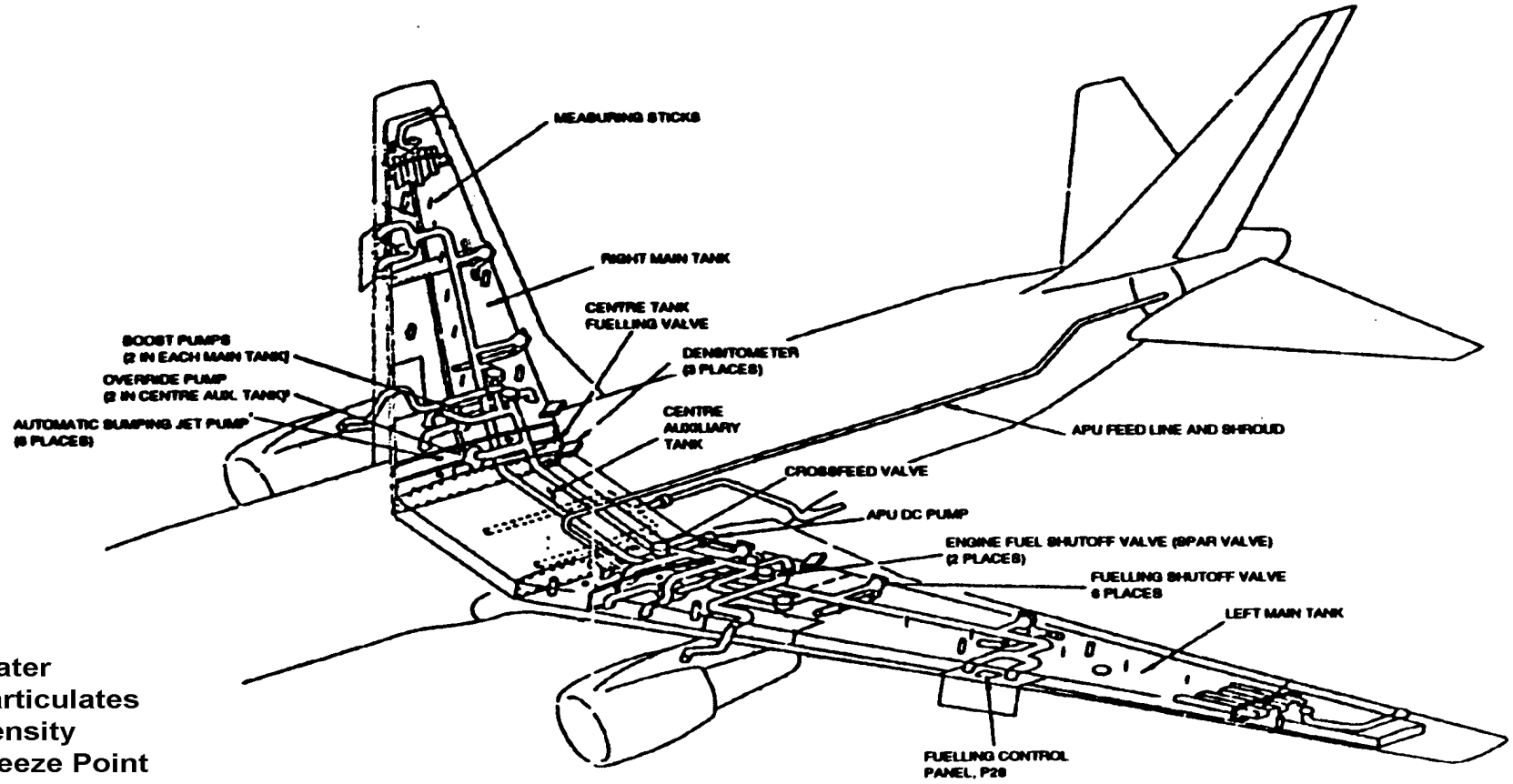
  No time left to avoid an incident or a catastrophe
- Major fueling objectives for a "Healthy" Hydrant:
  - **Deliver On spec fuel, Safely and On time!**
- We do have time to correct something wrong at airport's upstream facilities (Refineries, Transportation, Intermediate Fuel Terminals),
- Maybe also at the airport depot (Tank Farm),
- But at the Hydrant, there is **NO TIME left**!

Hydrant Operator Mission

Operationally thinking, in view of Fuel Quality and Safety Requirements:

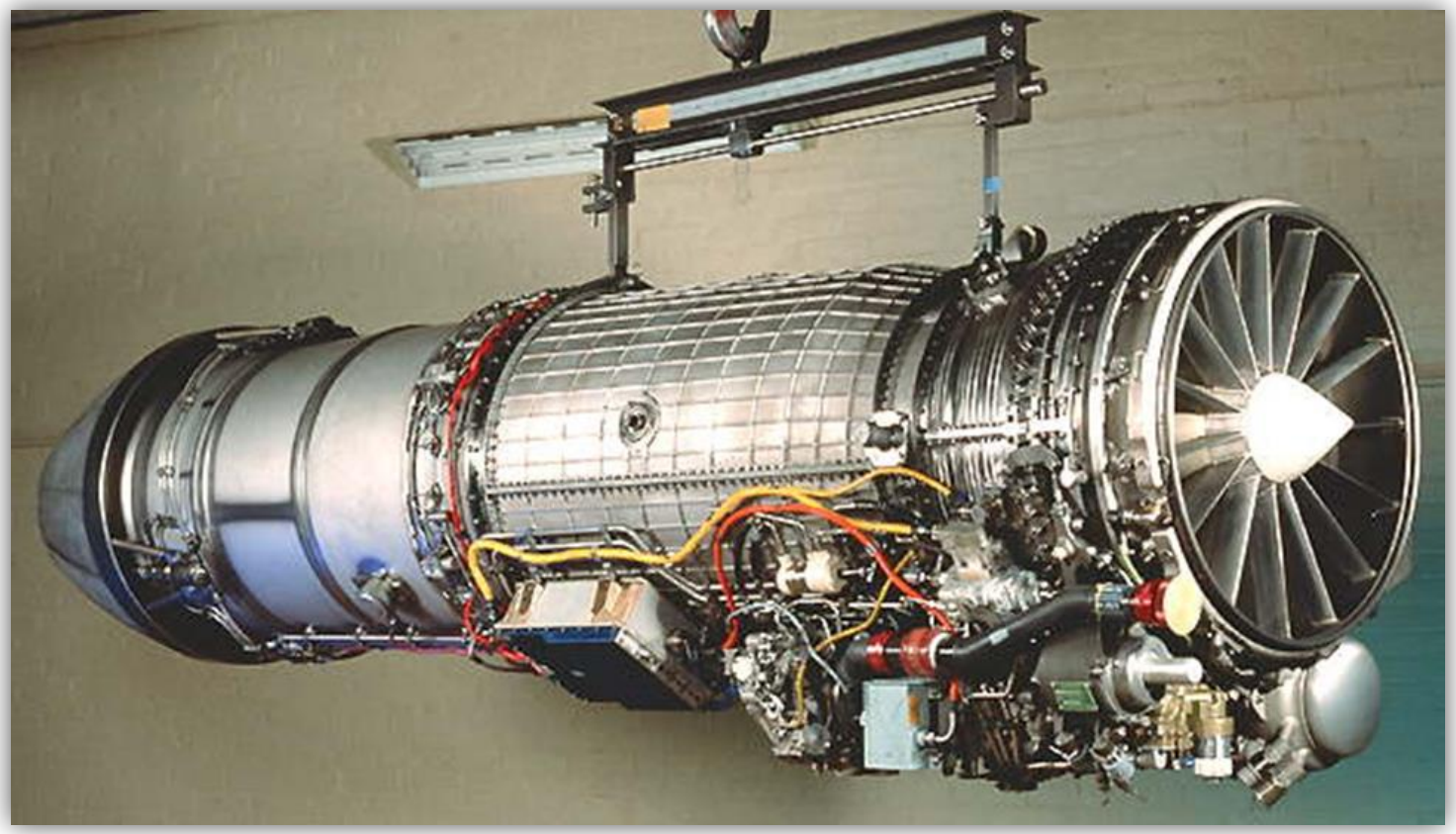
- Ensure the fuel receipt at the airport depot is **ON-SPEC**:
  - Liaise with upstream locations to follow **EI/JIG 1530**
  - Follow an **International Standard**
  - Create your own management system, with task-break-down **O&M Procedures,** incl. **BCP & ERPs**
  - **Train** your people
  - **Inspect** your people and facilities
  - Be **externally inspected**
- **Fill** the Hydrant with ON-SPEC fuel
- **Remember that Hydrant is a "Hidden" underground tank!**

Remember the Stringent Fuel Quality Requirements by the OEMs



Water
Particulates
Density
Freeze Point
Viscosity
Conductivity
(Microbiological)

Remember the Stringent Fuel Quality Requirements by the OEMs

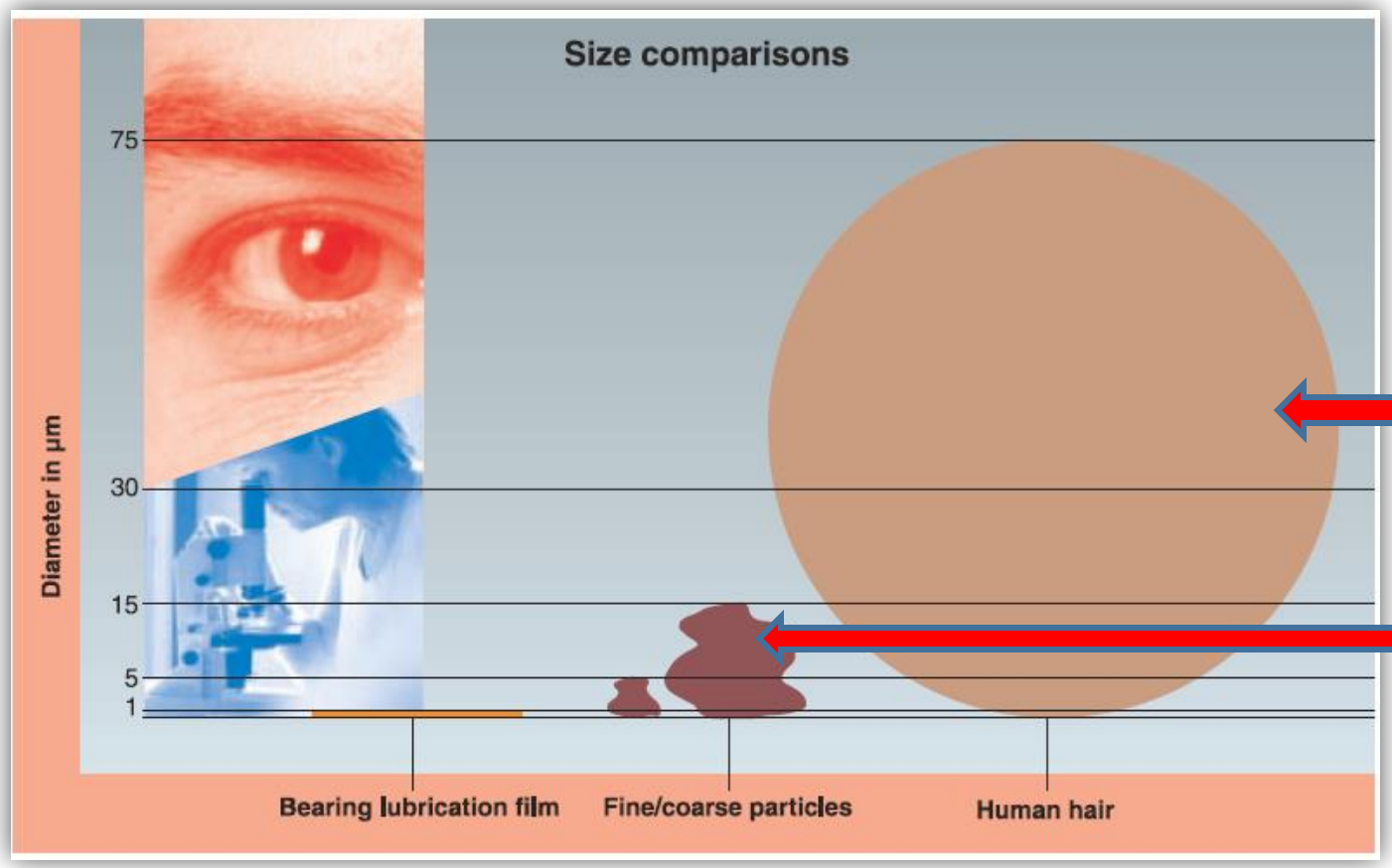


And More Importantly…
Remember that

On the air

The Invisible Enemy

- **Micron size Dirt or Water (which usually carries dirt in it) causes big problems**



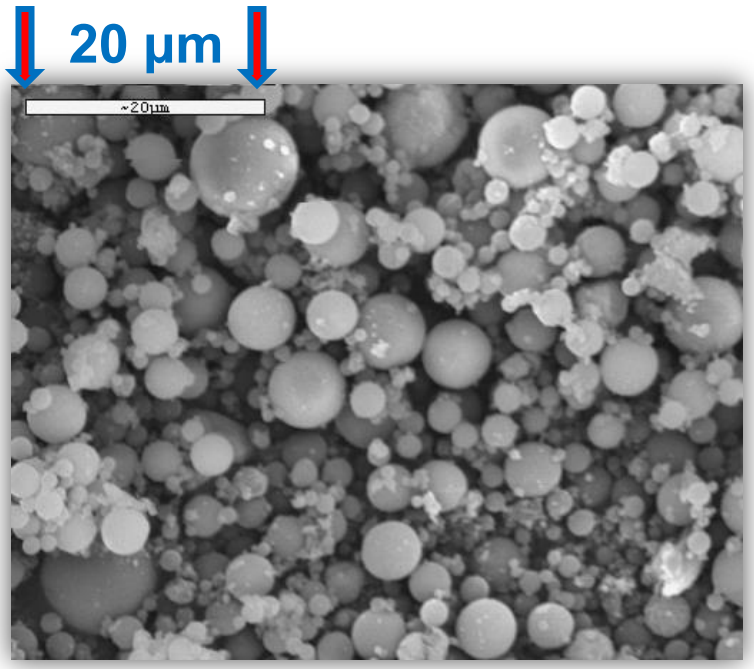
Human Hair

Fine Particles

Surabaya - Cathay Pacific Aircraft Incident

13 April 2010 at Hong Kong International Airport

- No 1 engine stuck at about 70%
- No 2 stuck at about 17%
- **Contaminated fuel from HYDRANT**
- Particles found in engine had the size in the order of:
  - **5 to 15 micron**



The above resulted in the first ICAO Doc (9977) in 2012.

This is why we need Fuel Quality Control System

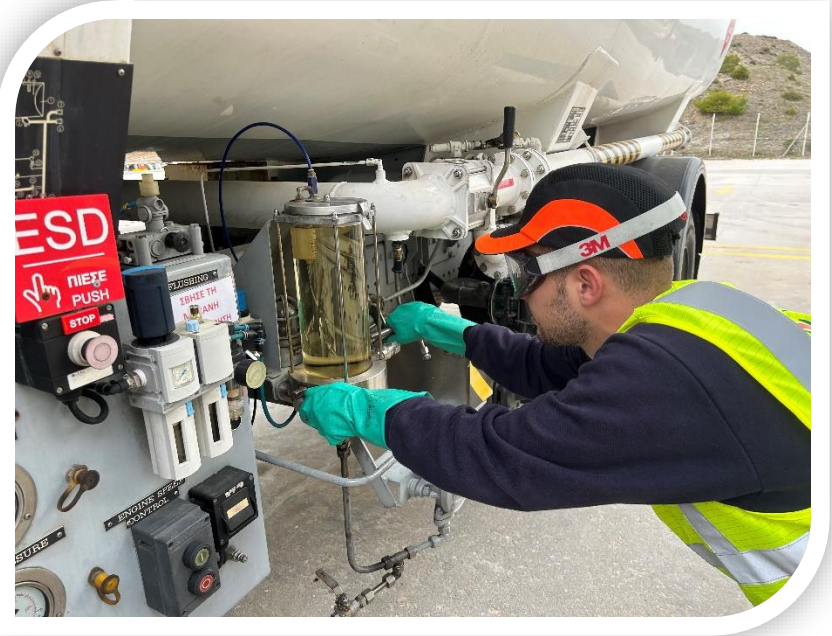
- **Monitor** Fuel Quality on the apron

  Via Hydrant Low Point Drains (**LPDs**)

  - Investigate any changes observed
  - Collaborate with Into-Plane Agents,

    e.g.:

    - Fuel samples during aircraft fueling
    - Filters' DP trending at Dispensers
    - Internal filter inspections
- Consider Hydrant flushing, if needed.



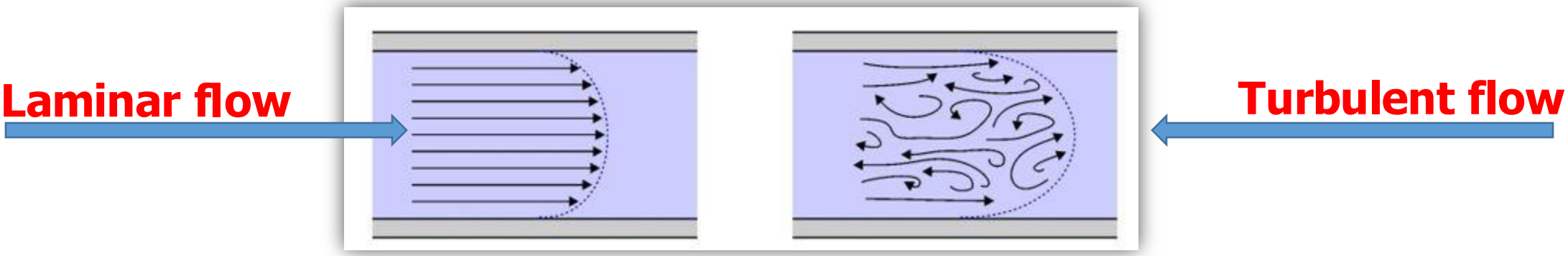
LPD

Challenges (1 of 3)

How can **a Hydrant Operator** keep the Hydrant "Healthy" with **on-spec fuel**, if:

- **Hydrant Design** is not professionally developed. **Highlights**:

a) Pipe diameter is too big, no Turbulent flow, so self-flushing => dirt/water not moving into LPD

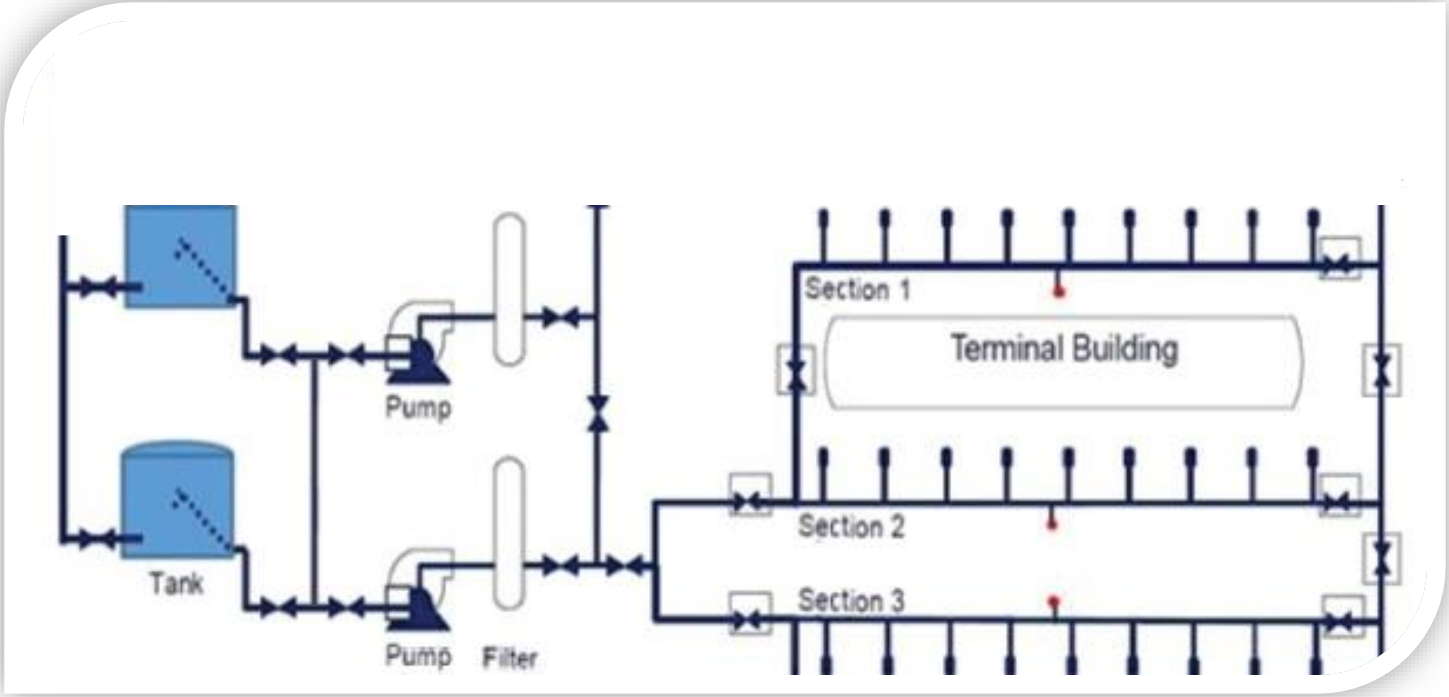


b) LPDs located at airport restricted areas => No easy access, maybe no LPD performed frequently!

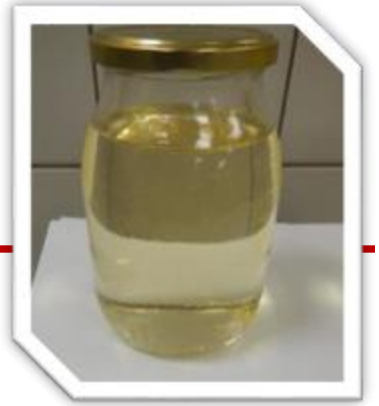
Challenges (2 of 3)

c) No possibility to flush fuel back to storage => Not possibility for **Hydrant Flushing**

d) How to operate, if a hydrant main line valve fails and the Design has not provided **redundancy in valves**?



Challenges (3 of 3)



Construction is not carried out correctly. **Highlights**:

a) No proper pipe slope => **Physical low points** => dirt/water not moving into LPD

b) Poor housekeeping, so **mud** may enter the pipes due to rain => **mud** may stuck inside the hydrant pipes and be released during peak flow rates unexpectedly!

c) etc.

Surprise

- The Hydrant System is also like an **"Octopus"**
- Why?
- Because **it expands and shrinks**
- It seems like a **living creature**
- Fuel temperature increases in summer, it cools underground and shrinks
- Fuel temperature decreases in winter, it is warmed underground and expands
- The frequent testing of Hydrant integrity (Tightness Control Test) rises and lowers its pressure, so it expands and shrinks again!
- Same during aircraft fueling
- **Systematic Preventive maintenance is vital to ensure Hydrant safety!**

Conclusions

Operationally thinking, in view of Fuel Quality and Safety Requirements:

- Verify that you fill the Hydrant with **ON-SPEC clean and dry fuel**
- As hydrant is like a living creature and usually operates in 24/7 mode, **expect the unexpected**, since its operational profile is continuously changing:
  - Due to aircraft fuel demand (no flow, low flow, high flow),
  - Due to temperature and pressure changes, etc.
- So, operate based on **recognized International Standard**,
- Using a **Management System** to ensure **complete**, **correct** and **on-time** tasks performed,
- Assuring **flight safety** and **safe operations on the ground.**

Have a safe Flight out of Hydrant Fuelling

Thank You
For your Attention!

Any Question?

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