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EXPERIENCE :

TITAN AVIATION has been designing and manufacturing aircraft refuellers since 1950 and therefore has wide experience and acknowledged know-how in this field.

TITAN AVIATION has references throughout the world and collaborates with all the large oil companies, airlines, aircraft and airport equipment manufacturers.

ON has developed a very large range of refuellers and dispensers, together remely simple, standard equipment to vehicles which include logic ent.

OPERATIONAL FACILITIES :

TITAN AVIATION is composed of two sites of production :

The registered office is located at VILLEFRANCHE SUR SAONE, 20 kms north of LYON conurbation, the second largest in France.

The plant at VILLEFRANCHE has 2000 m2 of covered area on 4000 m2 of land.

The buildings are modern and belong to TITAN AVIATION.



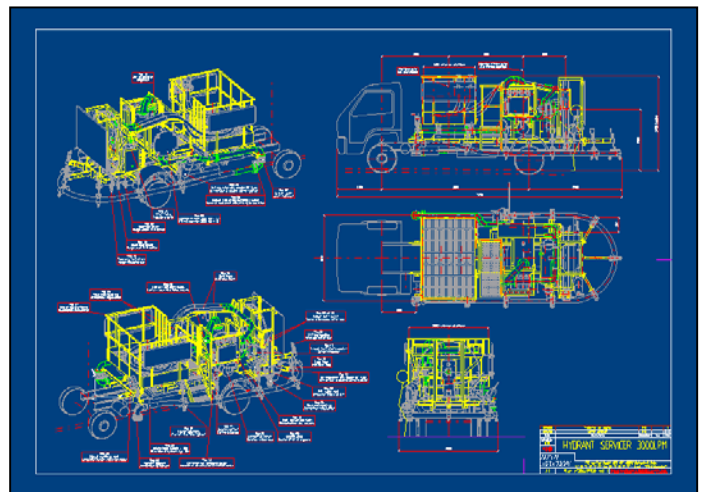
TITAN AVIATION has one subsidiary in AIX EN PROVENCE, 20 Kms north of MARSEILLE.

The plant at Aix en provence has 3000 m2 of covered area on 2000 m2 of land.

40 persons at TITAN AVIATION are specialized in the design and assembly of aircraft refuelling equipments.

There is a projects office who carry out the DESIGN of the equipment :

- overall design by definition of functions, adjustments and components.
- analysis of load distribution.
- drawing up general plans.
- drawing up detail and manufacturing drawings for sub-assemblies and assembly.



Manufacturing is organized around three main phases :

1- Building sub-assemblies such as tanks in our plant of Aix en provence & subframes, structures, platforms, hose reels in our plant of Villefranche sur saone. The equipment and installations were designed for assembly work : compressed air, overhead travelling cranes, welding posts, grinders, saws, drills, boring machines, lathes, presses and shearing machines, together with inspection and testing equipment.



2- Assembly on the units and vehicles by building pipework, assembling components and sub-assemblies and installing services: electricity, hydraulics, pneumatics, computer equipment, etc...

3- Test on sub-assemblies and finished products :hydraulic tests, product tests : flow rates, pressures, functions, services.

The number of vehicles produced each year varies, depending on the models, but the production capacity is **about 100 units each year**, this capacity can easily be extended by using the Group's facilities.



TITAN AVIATION RANGE OF PRODUCTS

The main range of products consists of **MOBILE AIRCRAFT REFUELLERS** and **DISPENSERS**, used for aircrafts and helicopters fuelling and also for military tanks fuelling.

These equipments are mainly mobile, i.e mounted on rigid chassis with trailers or towed trailers, but **TITAN AVIATION** also manufactures fixed distribution unit groups and associated equipment like hydrant pit cleaners, anti-icing vehicles and so on....



TITAN AVIATION equipments have been designed to be used for any kind of fuel (KEROSENE JET A-1, JP-4, AVGAS etc...) and for any brand or model of aircrafts or helicopters.

The design is based on two main principles :

- efficiency, simplicity in the use and maintenance and security.
- quality through the systematic use of first class materials (aluminium, stainless steel) and components from highly reputable manufacturers in compliance with International Standards.

TITAN AVIATION has developed efficient and simple systems of pressure control and regulation in cooperation with specialists as for example the ZENITH AVIATION FUEL DEPARTMENT in FRENCH GROUP INTERTECHNIQUE

The range of products is based around two main product lines :

* **REFUELLERS** : Aircraft refuellers are vehicles equipped with tanks, which are filled with fuel in depots located out of the airports runways.

Aircraft refuellers are often used with special aircraft fuelling designed trailers to extend the carried fuel volume.

* **DISPENSERS** : Dispensers are used on airports equipped with HYDRANT SYSTEM i.e underground pipes till aircraft parkings with hydrant pits for the connection of the pipe system to the dispensers.

For each kind of product, TITAN AVIATION has developed a complete basic range which is adapted each time to the users specific needs.

Usually, equipments are made on MODULE basis which can be easily taken down or put up.

The equipments are designed to be installed on any brand of chassis.

1/ AIRCRAFT REFUELLERS :

The aircraft refueller is a mobile vehicle with a **tank** and a fuelling unit group using a pump, a filter (water separator or monitor) , one or several meters, valves, hoses reels , deck hoses aircraft couplings, valves, interlock and so on ...

The basic models are the following :

- refuellers with capacity from 500 liters to 5000 liters on one or two axles trailers.
- refuellers with capacity from 2000 liters to 13000 liters on a rigid chassis 4 x 2 or 4 x 4 according the using.
- refuellers with capacity from 18000 liters to 22000 liters on a 19 tons rigid chassis 4 x 2 used only on airport fields.
- refuellers with capacity from 26000 liters to 30000 liters on a 26 tons rigid chassis 6 x 4 used only on airport fields.
- Trailers of variable capacity (for instance from 27000 to 40000 liters) can be coupled with rigid chassis.
- refuellers' capacity of 30000 liters, 45000 liters or 65000 liters made of one tractor truck with one semi-trailer.

The location of the fuelling group on a rigid chassis depends on the load repartition on axles.

Usually for a chassis with short front forward cabin, distribution group is located between the cab and the tank.

When the chassis is not equipped with a short front forward cab, the distribution group is placed at the rear of the vehicle after the tank.

For a truck with a semi-trailer, the distribution group can be put on the truck or at rear of the semi-trailer.

Kerosene pumps are moved by Power Take Off of the engine's chassis or by hydraulic engine.

The range changes according several criterions :

a- Special Airports Specifications :

They mainly concern the dimensions of vehicles especially for the total height from ground which can sometimes require low profile vehicles with a total height of 2750 mm. The usual heights are 3500 mm, 3050 mm and 2750 mm.

b- Tank Capacity :

The tank capacity depends of the type of aircrafts to fuel. The tank's capacity can go from 500 litres to 80000 litres

c- Flow Rate :

It depends of the type of aircrafts to fuel. The flow rate can go from 100 liters per minute to 5000 liters per minute

d- Distribution System :

It depends of the type of aircrafts to fuel :

- fuelling with or without defuelling, defuelling consists of fuel taken back from the aircraft to the main refueller tank.
- fuelling through underwing reel(s) with or without overwing nozzle,
- fuelling through hose reel(s) with or without deck hoses on fixed or elevated platform.



2/ AIRCRAFT DISPENSERS :

Dispensers are used on airports equipped with underground **HYDRANT SYSTEMS** which allows fuel to come through underground pipes under aircrafts parkings.

So dispensers need not tank but all the equipments used on the refueller distribution group will be used and adapted according flow rate and distribution system.

Dispensers will be placed either on towed trailers or rigid chassis from 4 to 7 tons capacity. The connection between the dispenser and the underground pipes is made through hydrant pits.



Usually, the range of dispensers is as following :

a- Flow Rate :

The flow rate depends of the hydrant pressure which is usually around 10 bar.

Flow rates of the TITAN AVIATION range go from 100 liters per minute to 5000 liters per minute.

b- Distribution System :

Distribution system depends of :

* TYPE OF AIRCRAFTS TO FUEL platform.

- using or one or several meters, electronic metering.
- location of the platform at front, middle or rear of the vehicle.



*** AIRPORT SPECIFICATIONS OR PROBLEMS**

On airports crowded with a lot of traffic, the dimensions of the dispenser mainly regarding its length could be very important,

- special design to make the shortest length have been studied for instance with special hydrant hose reel.
- special designs as turning of hose reel or installation of two hydrant couplers are available.

REMARKS :

Refuellers and dispensers are built in accordance with international standards particularly for filtration, regulation and hoses.

All components used have to be kerosene adapted or agreed according standards.

Materials will be mainly aluminium or stainless-steel, steel is only usable with internal epoxy.



EXAMPLE OF RANGE OF VEHICLES

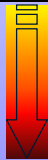
Example of Range of refuellers and dispensers :

Rigid 6k litre	Rigid 11k litre	Rigid 20k litre	Special Rigid 30k litre	Semi Trailer 35k litre	Semi Trailer 45k litre	Special Semi trailer 60k litre	Rigid 18k litre plus 35k litre trailer	Rigid 18k litre plus 45k litre trailer	Hydrant Servicer
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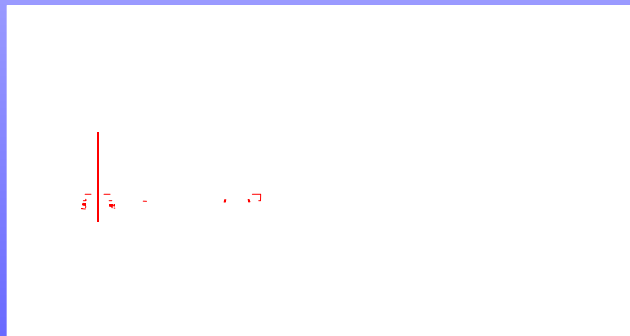
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EXAMPLE OF RANGE OF VEHICLES

Range of refuellers and dispensers required by EXXON MOBIL:

Rigid 6k litre	Rigid 11k litre	Rigid 20k litre	Special Rigid 30k litre	Semi Trailer 35k litre	Semi Trailer 45k litre	Special Semi trailer 60k litre	Rigid 18k litre plus 35k litre trailer	Rigid 18k litre plus 45k litre trailer	Hydrant Servicer
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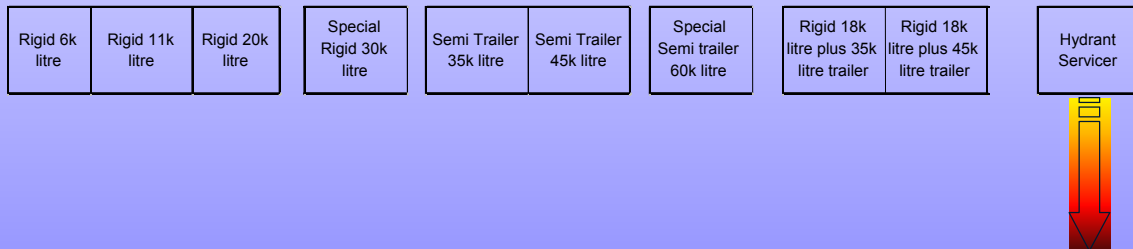
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EXAMPLE OF RANGE OF VEHICLES



This know-how is not limited to France and UE countries but is spread all over the world thanks to the many industrial-trading partners and joint-ventures they have on each continent.

Recently TA opened its north American subsidiary: Titan Aviation North America. Thus TA is able to offer a global solution to its customers, the petroleum companies, which all have set up a global approach of their markets.