AIRCRAFT TYRES

SHORT WORKOUTS BY

THE BEST GUIDELINES FOR TECHNICIANS

NO MORE MISSING TOOLS

PREVENTIVE MAINTENANCE

PROPER INFLATION PROCEDURES

One of the most important factor in any preventive maintenance program is keeping aircraft tires at their correct inflation pressure, because the caused damaged can be severe.

Overinflation can cause:

-uneven treadwear
-reduce traction
- make the tread more susceptible to cutting an increase stress on aircraft wheels.

Underinflation produces:

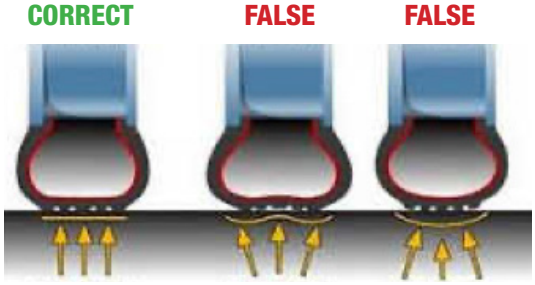
-uneven tire wear
-Greatly increase stress
-Flex heating in the tire which shortens tire life and cause Tire incidents

INFLATION PRACTICES

1. CHECK DAILY OR BEFORE FIRST FLIGHT WHEN TIRES ARE COOL
2. AMBIENT TEMPERATURE EFFECTS ON INFLATION
3. USE DRY NITROGEN GAS (SAFELY)
4. INCREASE PRESSURE 4% FOR TIRES UNDER LOAD
5. ALLOW 12 HOUR STRETCH AFTER MOUNTING
6. NEVER REDUCE THE PRESSURE OF A HOT TIRE
   REMEMBER - 1% PRESSURE CHANGE FOR 5°F (3°C)
7. EQUAL PRESSURE FOR DUALS
8. CALIBRATEINFLATIONGAUGE REGULARLY

DAILY CHECK

- Checked always by ambient temperatures of the tire (can rise 200F° (93°C) during an Operation)
- A temperature change of 5 F° (3°C) can change the prerssure of 1%
- It can take 3h or more to return of ambiente temperature of the tires after a flight
- the tire can lose 5% of the inflation pressure in 24hrs



AMBIENT TEMPERATURE EFFECTS ON INFLATION

When tires are going to be subjected to ambient temperature differences between two locations in excess of 50°F (27°C), inflation pressures should be adjusted to the colder temperature prior to take off. An ambient temperature change of 5°F (3°C) produces approximately one percent (1%) pressure change. For example, tire pressure should be adjusted for a plane flying from Phoenix at 95°F (35°C) to Chicago at 45°F (7°C). The difference is 50°F (28°C), pressure should be^1 hangar in the winter.

USE DRY NITROGEN GAS

Nitrogen will not sustain combustion and will reduce degradation of the liner material, casing plies and wheel due to oxidation. FAR 25 requires nitrogen inflation for an airplane with a maximum certified take-off weight of more than 75,000 lbs.

INCREASE PRESSURE 4% FOR TIRES UNDER LOAD

- determined if loaded or unloaded pressure (specified by the manufacturer)
- when the tire is under loud, the gas chamber volume is reduce due to tire deflection
- if loaded pressure has been specified, that number should be reduced by four percent (4%) if the tire is being inflated while unloaded.

MOUNTING

After initial mounting the tires will stretch, particularly tires. This results a pressure drop. So the tires should be not placed in service until they have inflated a minimum of 12 hours. Before mounting the tires rechecked pressure and re-inflated.

TUBE-TYPE TIRES

- Mounitored during the first week of operation
- Because air trapped between the tire and tube, it will seep out but the result is an underinflated assembly

TUBELESS TIRES

- Slight amount of gas diffusion is normal (5% in 24hrs)
- The sidewalls are purposely vented in the lower sidewall area to bleed of trapped gases, preventing separation or blisters

NEVER REDUCE PRESSURE ON A HOT TIRE

When you checked the pressure, it will be to high. So you have to wait that the tire is cooled on ambient temperature to checked it. Because hot air has a higher volume, that means that the pressure inside of the tire will be higher than usually.

EQUAL PRESSURE FOR DUALS

All single gear should be inflated equally, to prevent extra load on a gear. The mate tire(s) will share the load, allowing individual tires to run underinflated or overloaded if pressures are unequal, because all tires on the gear will deflect identically.

CALIBRATE INFLATION GAUGE REGULARLY

- Use an accurate, calibrated gauge
- checked periodically and recalibrated as necessary

COLD PRESSURE SETTING

The following recommendations apply to cold inflation pressure setting:

1. Minimum service pressure for safe aircraft operation is the cold unloaded inflation pressure specified by the airframe manufacturer.
2. The loaded service inflation must be specified four percent (4%) higher than the unloaded inflation.
3. A tolerance of minus zero (-0) to plus five percent (+5%) of the minimum pressure is the recommended operating range.
4. If “in-service” pressure is checked and found to be less than the minimum pressure, the following table should be consulted. An “in-service” tire is defined as a tire installed on an operating aircraft.

PROCEDURES FOR HOT TIRE INFLATION PRESSURE CHECKS

Goodyear recommends servicing tires cold every 24 hours, minimum. This procedure is not to be used as a replacement for cold tire pressure checks. Do not reduce the pressure of a hot tire that is to continue in service. Hot tires with pressures greater than 200% of the cold rated inflation pressure should be removed.

CASING FLAT SPOTTING

AN UNDERRATED DANGER

Aircrafts which are parked for maintenance or other reasons for a longer time (30 days or more) can develop a phenomenon called „flat spot“. The Tyres become a non round profile and a flat area on the downside.
For sure, these problems are less severe the warmer the surrounding oft the tyre is, because the rubber doesn't get that hard in warm conditions.

Aircraft Maintenance Manuals always have a special chapter for these types of “parking and taxing“. In relation oft the duration it can be enough to move the aircraft, jack it up, or replace the „good“ tyres with special maintanance Tyres, which are not in regular use.

The Problem: FlatSpots can cause heavy breaking issues and lead to skidding meanwhile the landing an breaking process

SPECIAL PROCEDURES

Tires that have experienced abnormal high conditions or have been used under critical circumstances beyond the manufacturers limits should be removed and scrapped or at least be specially inspected.

We are talking about abnormal conditions like **rejected Takeoffs** under high speeds or overspeed landings beyond the normal envelope of parameters of the tire.

Even if damages are not visible or obvious, the tires may have failures in the internal structure and should be clearly marked, documented by its serial number, taken off and sent back to a certified full service supplier.

Visit Sample AMM-PDF Chapter 12-10 (Page 179)

If Tires have been deflected due to a fuse plug release in dynamic conditions like rolling/taxing, the tires should be taken off an be scrapped. Under static conditions has the tire not to be taken off unless it fails the Aircraft Maintenance Manual or manufacturers safety parameters. Especially after hard landings the AMM should be followed strictly, because the tire is just one of the possibly critical parts.

Rejected Takeoff and heavy breaking

PROTECTING TIRES FROM CHEMICALS AND EXPOSURE

TIRES SHOULD BE STORED CORRECTLY, SO YOU ALWAYS HAVE NEW TIRES IN THE BEST CONDITION THEY COULD BE IN.

STORING TIRES THE RIGHT WAY MEANS:

- **NO SUNLIGHT**
- **NO HEAT**
- **NO ELECTRIC MOTORS (BECAUSE THEY CREATE OZONE)**

SHOULD BE IN THE STORINGROOM.

All the things named above shorten the tires life or even crack it up and make it unusable bevore it even was mounted on a Plane.

If the Tire is already mounted to the Plane u can´t always protect it from these things. But there are other things you have too look out for in that case.

Most important is it too look out that no chemicals like fuel, oil, hydraulic fluid or degreasing agents get on the tire. Otherways it will get soft and "blow up" on that spot. (graphic 01)

To prevent that from happening you should always put on waterproof covers over the tires. Those can also protect you´re tires from heat, and sunlight.

If you´re tires do come in contact with some chemical fluids you should wipe it off with some alcohol instantly.

Also when the airplane has a long standing time you should move it every other day. Otherwise you´re tires will have a standing flat. That means on the side that's always on the ground it will be flat, due to the long standing and all the weight pushing it onto the ground.

So you see tires always have to be checked, before every flight, so you safely can take off and land with them. And also you have to look after them even before they are mounted.

blown up tire (graphic 01)

CONDITION OF AIRPORT AND HANGAR FLOOR SURFACES

THE FLOOR ON AIRPORTS ALWAYS HAS TO BE CLEAN.

Many tires break on the way to and from the runway or even on the way in or out the hangar.
Reasons for this are:

- **FOD (FOREIGN OBJECT DAMAGE)**
- **POTHOLES**
- **CRACKS AND DEBRIS OF THE ASPHALT**

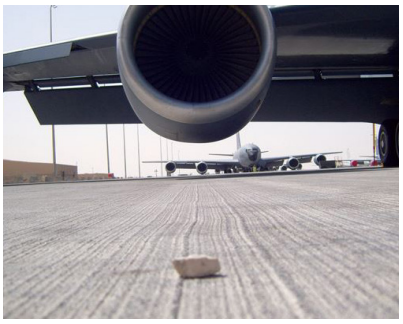
FOD´s are objects like tools, rivets, screws and other things that don´t belong on the ground where the airplanes are rolling. So you see most import is it to look out to never loose something out of you´re pockets.

Potholes and debris of tzhe asphalt can also always cut in you´re tire. So when you see it you always have to report it so the spot can be fixed.

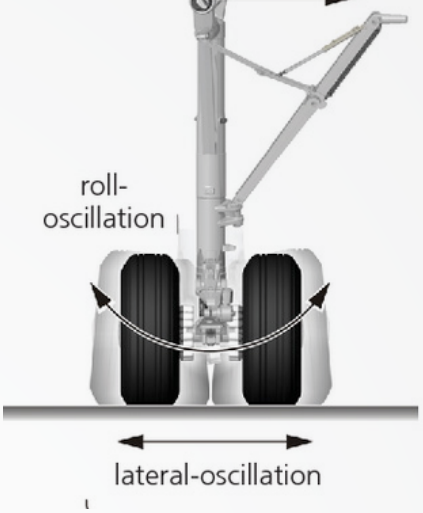
Most airports have Teams that always check the condition of the airfield.

Like in this picture where people walk over the airfield looking for FOD or damaged spots in the ground.

Because even the best preventive Maintenance routine can´t stop a piece of metal or a rock on the ground to destroy you´re tire.



AIRCRAFT TIRE CONDUCTIVITY



In service tires dissipate some static electricity but the conductivity isn't stable, it depends on the cleanliness of the tire surface, the surface of the runway and the atmospheric conditions. It will change in different conditions. The tire can't be counted on to dissipate static electricity because the discharge rate isn't very controllable and variable. So the aircraft has to be grounded by mechanical means in case there's a static charge build up or a discharge the static electricity will be controlled discharged in the ground.

CAUTION:

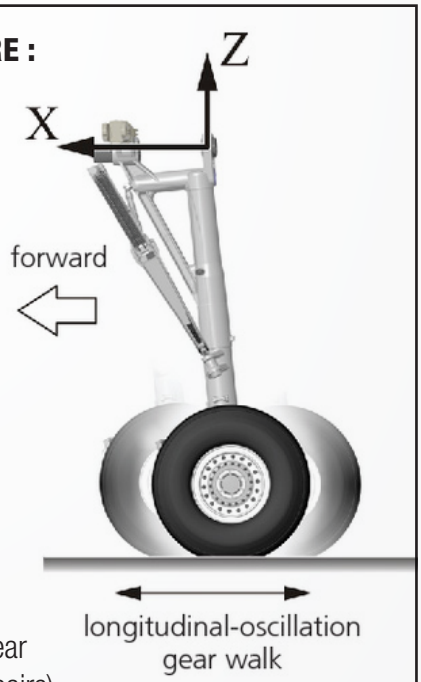
Static electricity can spark, initiating a fire.
Do not rely on tires to dissipate static electricity.

TIRE BALANCING AND LANDING GEAR VIBRATION

That the tires and wheels of an aircraft are as well balanced as possible is very important. In most cases the tire balance is not the cause but vibration, shimmy or out of balance is a major complaint.

SOME OTHER FACTORS AFFECTING BALANCE AND VIBRATION ARE :

- Flat-spotted tire due to wear and braking
- Out of balance wheel halves
- Installation of wheel assembly before full tire stretch
- Improperly torqued axle nut
- Improperly installed tube
- Use of non aircraft tubes
- Improperly assembled tubeless tire
- Poor gear alignment
- Bent wheel
- Worn or loose gear components
- Incorrect balancing of wheel assembly
- Pressure differences in dual mounted tires on the same axle
- Diameter differences in dual nose gear tires due to different levels of wear (check with aircraft manuals to see if nose tires need to be replaced in pairs)



With some split wheels there's a "L" stamped on the flange to indicate the light spot of the wheel halve. It important to position the "L"s 180 degrees apart in assembling. Some wheels have provisions for attaching accessory balance weights around the circumference of the flange in case there's additional static balancing required.