AMT Maintenance Safety

**Good housekeeping**

_Hangers, shops and flight line_
- essential for safety and efficient maintenance
- not just kept clean, but also orderly
- off going shift should always clean up and stow all tool boxes, work stands, hoses, electrical cords, hoists, crates, and other equipment

_Safety lanes_
- are painted in appropriate hazard areas
- should never be blocked
- stay within them when walking through a work area

_Power cords_
- obtain from tool room when needed
- don't drape them from bench to bench making them into tripping hazards
- inspect your power cord prior to using it
  - no breaks, exposed wires, or other hazards

_Compressed air system_
- air hoses should be inspected before using
- never use compressed air to blow off anything
- never use compressed air for "horse play"

_Spilled oil and grease_
- must be wiped up immediately- not at end of shift
  - slipping hazard, potential back injuries, etc.
- "shop dry" should be used because wiping up with just rags leaves a slick film
Safety equipment

The most valuable tool in your toolbox is the one that will prevent personal injury to the individual.

They are often among the most inexpensive items that the toolbox will contain at a bare minimum, technicians should have their own personal eye protection, hearing protection, respirator, and leather gloves.

Eye protection (safety glasses, safety goggles, or face shield) should be worn during the following operations:
- hammering, sawing, shearing
- drilling, reaming, grinding, countersinking
- driving rivets and operating rivet squeezer
- operating any power tool (machine tools, etc.)
- near flying chips or around moving machinery
- working with any liquid hazardous to the eyes
- chipping, treating, priming or painting metal
- pressure checking fluid or pneumatic systems
- disassembly of parts that might have spring loaded sub-components, or other eye hazards
- all welding and related operations require special goggles with colored lenses whenever there is a potential eye hazard.

Ear plugs (or ear-muffs)

The ear-muff style protectors will usually do a better job than the ear plugs and are felt by many to be more comfortable.

Slow hearing loss is common in aviation for those who neglect hearing protection around operating engines (you never feel it happening).

Should be worn during the following operations:
- engine run-ups
- rivet guns
- air drills
- any sufficient noise to pose a hearing hazard
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**Respirator**

A good respirator has two separate "filtration systems; the first is a paper dust filter that will remove dust particles, the second device contains activated charcoal that absorbs chemical vapors.

Should be worn during the following operations:

- Dust and other solid particles from cutting and sanding operations
- Chemical vapor hazards from solvents, cleaners, finishes, and resins
- Certain substances such as polyurethane paint can produce very serious health impairment if proper protection measures are not taken
- Paper dust filters alone offer little protection
- Any procedure producing potential lung hazards

**Leather Gloves**

Many hand injuries from burns, scrapes, and other hazards could be avoided by wearing a good pair of leather safety gloves.

Should be worn during the following operations:

- Working on a hot engine
- All welding, brazing, and cutting
- Handling large sections of sheet metal
- Any maintenance activity that the hands are likely to be injured if not protected

**Rubber Gloves**

Used to protect hands from chemicals, solvents, paints, and other hazardous liquids. Various types of rubber gloves for use with different chemicals are available in tool room.
Safety around power tools

Spinning and cutting tools are commonly found in aviation maintenance shops and are dangerous when they are misused

- you must not have any loose clothing and long hair must be in a hair net or hat
- do not use any machine tools with which you are not familiar or any tool whose safety features you are unfamiliar with
- tools equipped with guards and safety covers are there for a reason, to protect you, the operator
  - even if the guard appears to interfere with the operation of the equipment, never disable or remove a guard
- make sure all cutting and drilling tools are properly sharpened
  - a dull, improperly sharpened tool can require excessive force to cut and as a result shatter or grab and be thrown out of the machine
- be sure all projects are securely clamped on the drill press table when cutting any holes
  - it is possible for the drill, or cutter, to grab the metal and spin it around, slicing anything in its way
- never leave a chuck key in a hand drill, or especially a drill press
  - should the drill be turned on, the key will be thrown from the chuck with considerable force
- disconnect all power tools whenever adjusting, repairing, or changing a drill, blade, or a bit
- never be in a hurry around a power tool, never use the tool for a purpose for which it is not intended
- most important of all, think safety while using it
Hazard communication program

Occupational safety health administration (OSHA) communication standard 29 CFR 1910.1200 require the maintenance shop to develop a formal hazard communication program.

The program’s purpose is to make all personnel aware of the existence of, and trained in the handling of, all shop materials considered hazardous or potentially hazardous.

The shop program consists of:

1. A formal written program stating compliance and training procedures
2. A complete inventory of all hazardous materials on premises
3. A material safety data sheet (MSDS) for each item listed on the inventory
4. Labeling of all pertinent containers and equipment
Material safety data sheets

An MSDS binder must be readily available to all shop personnel at all times, for quick reference in case of a chemical spill or injury. In the event of a chemical injury, a copy of the pertinent data sheet(s) should be sent along to the emergency room to ensure immediate medical attention.

An MSDS consists of seven basic sections:

heading block:
contains product identification including trade name, and the address and emergency phone number of the manufacturer/supplier

1. Principal ingredients including percentages of mixture by weight

2. Physical data describing the substance's appearance, odor, and specific technical information such as boiling point, vapor pressure, solubility, etc.

3. Fire and explosion hazard

4. Reactivity data including stability and incompatibility with other substances

5. First aid and health hazard data

6. Ventilation and personal protection-gloves, goggles, respirator, etc.

7. Storage and handling precautions
   spill, leak and disposal procedures
   national fire protection agency rating
Container labeling

Chemical hazard labels vary in size, style, and amount of information they convey, but all have in common the same color coding and hazard indexing information.

The hazard index is a numerical rating system from zero (0) to four (4):
- Zero designates the minimum hazard
- Four designates the maximum hazard

The blue area of the label:
- Substance's health hazard
  - "Zero" is no significant risk
  - "Four" is life threatening or permanently damaging with single or repeated exposure

The red area of the label:
- Substance's flammability hazard
  - "Zero" means the materials are normally stable
  - "Four" applies to highly combustible gases and volatile liquids with flash points below 73 degrees F.

The yellow area of the label:
- The reactivity of the substance
  - "Zero" applies to materials which are normally stable, even under fire conditions
  - "Four" are materials readily capable of detonation or explosive decomposition at normal temperatures and pressures

The white area of the label:
- The personal protection index
  - An alphabetical rating system using the letters "a" through "k" indicating different combinations of protective equipment to be worn when work with the hazardous material
  - Letter "a" = eye protection
  - Letter "k" = full body suit, boots and head mask with independent air supply
National transportation safety board (NTSB)

Created by the department of transportation act of 1966
the federal government’s transportation accident investigator
the federal watchdog of transportation safety
promotes transportation safety by formulating safety improvement recommendations

The independent safety board act of 1974 established the NTSB as an entirely independent agency, divorced from the department of transportation

responsible for investigating, determining accident cause, making safety recommendations, and reporting the facts and circumstances of:
all civil aviation accidents
all railroad accidents in which there is a fatality or substantial property damage, or which involve a passenger train
all pipeline accidents in which there is a fatality or substantial property damage
highway accidents that the board selects in cooperation with the states
major marine casualties, and accidents involving a public vessel and a non public vessel
other transportation accidents which are catastrophic, involve problems of a recurring character, or otherwise should be investigated in the judgment of the board
Aviation safety facts
the odds of a passenger becoming a fatality on an airliner are 2,000 to 1

it is a statistical fact that the most dangerous part of making an airline flight is the drive by automobile to and from the airport

on the basis of fatalities per 100 million passenger miles flown, the most common standard of safety measurement, the airline fatality rate has declined steadily since the government began keeping accurate records in 1937

if a passenger was born on an airliner and flew continuously during their entire lifetime, they could not expect to be involved in a fatal crash until they reached the age of seventy six years

based on the accident rate over the past several years, a passenger could fly more than 300 million miles on a certificated u.s. air carrier without being involved in an accident

the overall odds in favor of a safe flight are 99.99998 percent- which compares most favorably with virtually any form of human activity

the majority of delayed take-offs for mechanical reasons are based on safety considerations

a jet receives five man-hours of maintenance for every hour of flight, at an annual cost of nearly $1 million per aircraft

u.s. carriers average 23 mechanics per plane in their fleets and spend approximately $2 billion a year on maintenance
Aviation safety facts (continued)

the wings of a modern jetliner are 50% stronger than required by federal regulations

in one structural test a wing was deliberately deflected some 30 feet upwards from its normal level without popping a rivet, and the flight tests for this same plane lasted a full year and cost $28 million

an airline pilot’s training never stops, whether they have 3,000 hours in their log book or 30,000 hours

flying ability and command capability are tested twice a year, and refresher courses are required annually

the industry spends more than $100 million each year for flight crew training- a sum representing the airlines’ entire gross in 1940

one government report pointed out that a passenger who boards a united states jetliner can expect to fly 16,000 revolutions of the earth before probability will involve them in a fatal accident

the same report also states that it is statistically more than seven times safer to ride a mile in a certificated united states airline than to drive one mile in an automobile
Human factors affecting aviation maintenance safety

The dirty dozen- the twelve human factor influences affecting performance

1. Lack of communication
   communication: the dynamic process by which we engage and interpret messages
   don’t debate. Don’t detour. Don’t plan, (listen instead). Don’t tune out.

2. Complacency
   self-satisfaction accompanied by a loss of awareness of the danger
   the “I’ve done this a hundred times and never found anything wrong” trap.
   Feeling that everything is okay. Boredom

3. Lack of knowledge
   lack of experience and/or training
   training not up-to-date. New equipment and procedures. Advances in technology.

4. Distraction
   anything that draws your attention away from the task at hand
   any common occurrence. Number one cause of forgetting/omissions. Can have disastrous consequences. Ex. Phone call.

5. Lack of teamwork
   a team is a group of interdependent individuals working together to achieve a common goal
   characteristics of a good team: a clear purpose, relaxed, participation, listening, disagreement (without fear of attack), openness, clear expectations, shared leadership, good relations, team maintenance

6. Fatigue
   performance impairment arising from loss of sleep and/or circadian (body clock) disruption
   promotes poor judgment. Slows reactions. Promotes forgetfulness. Promotes withdrawal
7. Lack of resources
   lack of supply or support
   manuals, materials, tools, environment, human resources (trained/qualified people)

8. Pressure
   urgent demands influencing our performance
   management, peers, self

9. Lack of assertiveness
   assertiveness: ability to express your feelings, opinions, beliefs and needs.
   Expressing yourself in a positive, productive manner. Assertiveness is not the same as being aggressive
   know what you want to say, and say it. Take the time you need to plan what you need to say. Stick to the issue at hand. Deal with the facts. Support what you say with how you say it.

10. Stress
    is a body's response to demands placed on it. Anything that worries us, prods us, thrills us, scares us, or threatens us.
    impairs our ability to concentrate. Results in tunnel vision. Creates personality change

11. Lack of awareness
    failure to recognize all the consequences of an action
    loss of situational awareness comes into play. The situation may get away from the person. Ask yourself, "do I see the complete picture?"

12. Norms
    a customary behavior or attitude. An unwritten rule dictated and followed by the majority of a group- not necessarily correct
    positive norms: the expected behavior is condoned and actually contributes to the betterment of the group
    neutral norms: neither positive or negative. These norms neither detract or enhance an accepted standard.
    negative norms: are short cuts or accepted practice that detracts from safety and that the majority of a group encourages or tolerates.

Safety nets: anything you use, or your employer uses to help prevent any of the dirty dozen from causing an accident.