

Training Topic:**Risk Management in Practical Terms- An Exercise in Utility****Introduction**

Let's get some of the esoteric stuff out of the way.

What is risk?

Risk is an expression of the impact of an undesired event in terms of severity and probability.

What is Risk Management?

Risk Management is the process of identifying risks, assessing their implications, deciding on a course of action, and evaluating the results. Risk Management introduces the idea that the likelihood of an event happening can be reduced, or its consequences minimized. In Civil Aviation, the term is frequently used in the context of decision-making about how to handle situations which affect aviation safety. The goal of Risk Management is not to eliminate risk, but to manage risk so the task can be accomplished with minimum impact. We manage risk to operate effectively and efficiently; we do not eliminate risk as a means to prevent loss.

Selling Risk Management on the Street (Hangar)

As a general statement, people have developed the perception that risk is "bad". Risk is not bad; it is essential for an organization to operate effectively and efficiently, and capitalize on its capabilities. Leaders must develop a mindset throughout their operation that the right risks should be taken, and that not taking them is wasteful. Risk Management is, in reality, a tool for making smart decisions, used by employees at all levels. Each person has a role to play in managing risk for the organization, whether they realize it or not. So it's crucial to wipe away the fog and ensure everyone understands how their contributions collude to create an effective and efficient organization.

 **Let's get to the practical stuff.**

A Scenario

Information can be transmitted via many different paths; for this example let's assume a hazard report was submitted by an employee who observed aircraft being towed into your hangar while the doors were open just wide enough to accommodate the wing-span. He surmised the reason behind this was climate control in the hangar- it gets cold when the doors are fully opened. He predicted an aircraft damage event would eventually occur when a wing impacts the hangar doors, and submitted the hazard report to raise awareness. Initially determining the hazard has validity, it's time for a risk management solution. If the revealed hazard is judged to be obviously time-critical, act immediately and do whatever it takes to eliminate risk until analysis is performed. If there is no immediate danger, use a defined risk management process accepted and endorsed by your company.

 **Let's explore this scenario.**

We can begin by assigning a severity and probability to this hazard using the risk matrix shown here, with defined parameters specific to your operation (company X).

		Severity of Consequence			
		Negligible	Marginal	Critical	Catastrophic
Probability of Occurrence	Improbable				
	Remote				
	Occasional				
	Probable				
	Frequent				

A Safety Management System (SMS) requires a defined risk management process; risk assessment is a component of that process. For our purposes, company X uses the following parameters for definition:

- **Negligible:** would not affect personnel safety or health, but is in violation of a standard, or property loss less than \$10k
- **Marginal:** may cause minor injury, minor illness, or property loss greater than \$10k
- **Critical:** may cause severe injury, severe illness, or property loss greater than \$100k
- **Catastrophic:** may cause death, or property loss greater than \$1 million

In our company X, we have predetermined if an assessment falls in the **GREEN** area, continued operation is permissible. If it falls in the **YELLOW**, continued operation requires written, time-limited waiver, endorsed by management, who may decide risk controls are necessary. Lastly, if an assessment is in the **RED**, it is imperative to suppress the risk to lower levels; a no-go situation, come to a stop. This matrix can be modified in any way appropriate to company X operations.

Who is responsible for doing the risk assessment? That depends on company policy. Let's assume that in the SMS Manual for company X, it states that all risk assessments are performed by the Safety Committee. Not a bad approach to business. Processes need stakeholder involvement; there's an abundance of expertise available when the circle gets larger.

Now back to performing a risk assessment on the hazard identified by our employee. You perform the necessary research and place the risk assessment on the agenda for the next committee meeting. In the meeting, you begin on the horizontal axis: "Severity of Consequence." The hazard was created when aircraft were towed into the hangar with the doors partially opened, increasing the potential for a wing/door impact. After researching repair costs for an aircraft wing impacting a hangar, you decide on a reasonable cost of \$115,000 in parts, labor, and lost revenue due to aircraft down time. The Ops and Maintenance reps concur with your logic; this analysis leads the committee to select "Critical" for the severity level. Probability, the vertical axis is next. Your research reveals an abundance of incidents concerning aircraft impact ground events; it turns out to be a very common occurrence. Based on investigation, it seems entirely appropriate to assign a probability level of "Occasional." Again, all stakeholders on the committee agree after seeing your data. Applying our analysis to the matrix yields the result below.

		Severity of Consequence			
		Negligible	Marginal	Critical	Catastrophic
Probability of Occurrence	Improbable				
	Remote				
	Occasional			*****	
	Probable				
	Frequent				

The predetermined parameters for company X state if a risk assessment falls in the **YELLOW** area, continued operation of this type requires a written, time-limited waiver, endorsed by management. As a temporary measure, you advise everyone involved in aircraft movement that the doors are required to be fully open when an aircraft is towed into or out of the hangar, with each employee signing a statement acknowledging awareness of this new, and possibly temporary requirement.

Now management must make a decision. The risk must be mitigated or waived because it resides in the **YELLOW** area. You prepare a brief delineating multiple options and vet these options through members of the Safety Committee:

- 1. A policy requiring the hangar doors to always be fully open before towing an aircraft into a hangar parking spot.**
- 2. A policy allowing the doors to be partially opened for aircraft entry only when OAT is below 40 degrees F.**
- 3. Paint defining lines on the hangar floor to clearly depict the minimum door opening for specific aircraft to ensure wing clearance.**

In company X, the SMS Manual vests authority to make risk management control decisions with the Director of Operations (DO). The DO decides on a combination of options 2 and 3. Company X will paint lines to define where the door openings are sufficient for clearance, and only use the procedure when the OAT is below 40 degrees F (otherwise the doors will be fully open for aircraft towing entry). You make a revision to company X SOP stating the new procedure, and post the information on the internal information e-board. The facility manager is charged with carrying out the painting; the Director of Maintenance is charged with training all applicable personnel. You have thoroughly documented the entire process, and retained it in an organized fashion. Chances are you'll refer to it in the future.

Glad that's finished!

Not so fast. Assurance: did the control (mitigation) actually work as designed?

What could go wrong?

- Employees use the markings and partially open the hangar door regardless of the OAT, increasing probability of an impact event.
- Company X has dissimilar aircraft wingspans, and incorrect door opening lines are used.
- Employees ignore the painted lines and use their own judgment to determine the correct door opening width.
- Etc....

You've got to be certain the controls put in place are actually working, and accomplishing what was designed.

- Has the employee training been completed? What's the completion %?
- Do the door paint lines fade after 6 months?

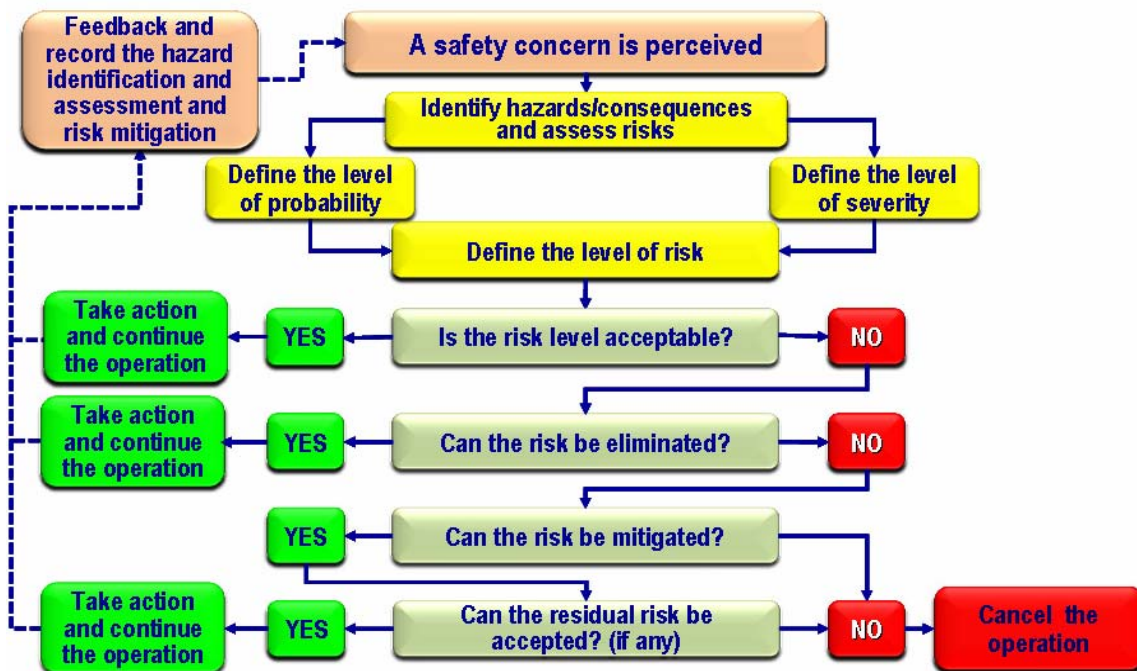
- Do all employees involved understand the new procedure? Do they comply?
- Are aircraft movements observed by management periodically?
- Etc...

Go back to the matrix for each possible control discrepancy. Run the matrix: If the paint lines fade and are unusable, you will be in the same **YELLOW** area. Better assign the facility manager to define an effective verification process that ensures the paint lines are always detectable. Each potential deficiency has to be uncovered and analyzed to determine if you can accept the residual risk. Is company X willing to accept the risk if the paint lines fade because it was overlooked on a facility inspection? If the answer is yes, it is a conscience acceptance, not a circumstance based on ignorance.

Problem Resolved?

Assurance is a genuine due diligence commitment: is it working? Keep in mind, risk management is a process, it keeps going in perpetuity. The bad news: You're never done. The good news: the chance of an accident or incident in company X is significantly diminished. You'd rather do risk management vice accident / incident investigation.

➔ **What exactly happened in the above scenario?**



We worked our way through a risk management decision process. A safety concern was perceived via an employee hazard report (aircraft damage). The consequences, severity, and probability were assessed, and the level of risk defined (yellow area). The risk was determined to not be acceptable (by your research and the safety committee's endorsement). Faced with eliminating or mitigating the risk, a mitigation strategy was

chosen (company X vests the DO with authority select appropriate controls). The residual risk was accepted through due diligence (you ran the risk matrix and vetted possible scenarios and outcomes). Action was taken (lines painted, OAT restriction defined, SOP revised, training completed) and documented. Feedback was obtained (process monitoring and observation) and recorded, ensuring the controls were effective.

Smooth Sailing

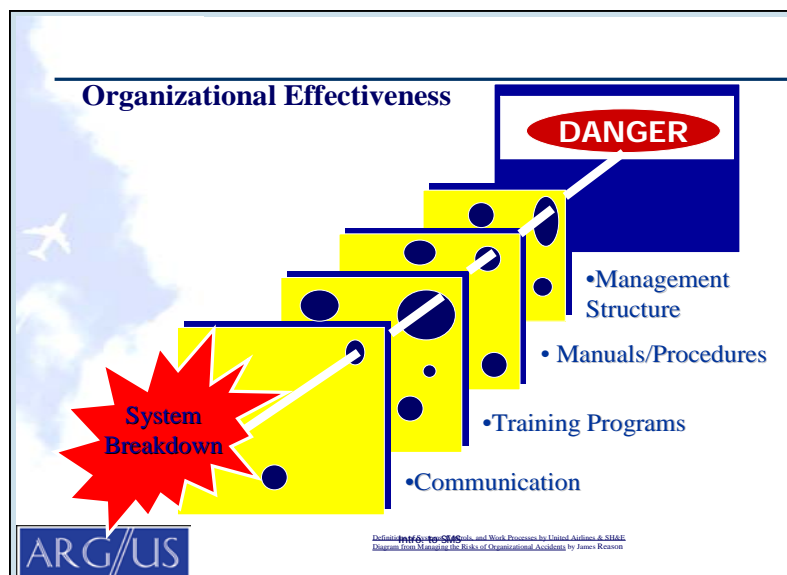
Now you're confidently monitoring the risk controls and all is well. Your confidence is validated by six months without a related incident. Not even a close call. The controls are effective. It's on autopilot.

Then the phone rings. The newest aircraft in the fleet (a G550 that was delivered 3 weeks ago) was just towed into the hangar door. The damage is significant. The investigation begins. What went wrong?

Your initial investigation reveals the following:

- The OAT was 27 degrees F
- The aircraft was attached and towed correctly
- The tug driver is properly licensed
- The hangar doors were opened to the Gulfstream paint line
- There was no wing walker (not required per SOP)
- The damage is significant
- Local time was 2215

Where were the holes in company X's processes? James Reason designed the "Swiss Cheese" model to visualize organizational challenges relating to conditions. Each hole is a process deficiency; the larger the problem, the larger the hole. And when they line up, well, you know what happens.



As you dig deeper a few things begin to emerge:

- The new G550 aircraft was the first of its type in the fleet; company X has had three G450 aircraft for several years
- This is the first time the G550 aircraft has been towed into the hangar when OAT was less than 40 degrees F
- The tug driver has been with the company for 10 weeks, and has seven years of experience in ramp / aircraft movement operations
- The tug driver had documented indoc training upon joining company X
- The G450 aircraft was the largest aircraft in company X's fleet prior to the arrival of the G550

Deeper still:

- The wingspan of the G550 is 93'6"
- The wingspan of the G450 is 77'10"
- An internal risk analysis survey was not conducted when the new aircraft entered company X's fleet
- At indoc training, the tug driver was instructed on the use of the aircraft specific paint lines for opening the hangar doors
- The aircraft specific paint lines are clear and discernable
- There is only one Gulfstream paint line to mark the hangar door opening width, and it is 90' wide

Lack of a risk assessment survey coupled with the dynamic change of accepting a new aircraft model into the company X fleet created multiple latent conditions waiting to emerge. The causal factors are obvious; it's too easy to wonder how that could have happened, how could anyone be so careless? But that's how it goes; incredibly obvious after the fact, no worries before hand.

A thorough risk assessment survey relating to acceptance of a new aircraft (change) could have revealed the need for:

- Training specific to the new aircraft model
- A new hangar door paint line for the G550
- Re-evaluation of the aircraft movement policy
- Improved communication throughout company X

Remember, initial risk management assessments will never be perfect. Practice, experience, and actual event results will necessitate change and contribute information that facilitates decision-making and constant evaluation.

Close the holes.