PRISM

A member of the SGS Group

FIXED WING NEWSLETTER

January 2022 | Volume XXII | Issue I

SAFETYWIRE

FAA'S WINTER WEATHER SAFETY TIPS

Page 1

HIGH LEVEL ICE CRYSTAL ICING: EFFECTS ON ENGINE

Page 4

SAFETY MANAGER'S CORNER: SAFETY CULTURE SURVEYS

Page 8

FAA’s Winter Weather Safety Tips

(Source: FAA)

Pilots face new challenges as temperatures drop and precipitation falls. Here are the FAA’s top tips for pilots operating in winter weather:

1. **Understand runway and weather conditions** for your arrival airport during your pre-flight briefing.

   Before you take off, make sure you have reviewed weather reports at your destination and en route, and that your aircraft is equipped to handle icing conditions and has adequate fuel.

   If you are headed to destinations in Alaska, Colorado, or Hawaii, you can also look ahead with weather cameras.

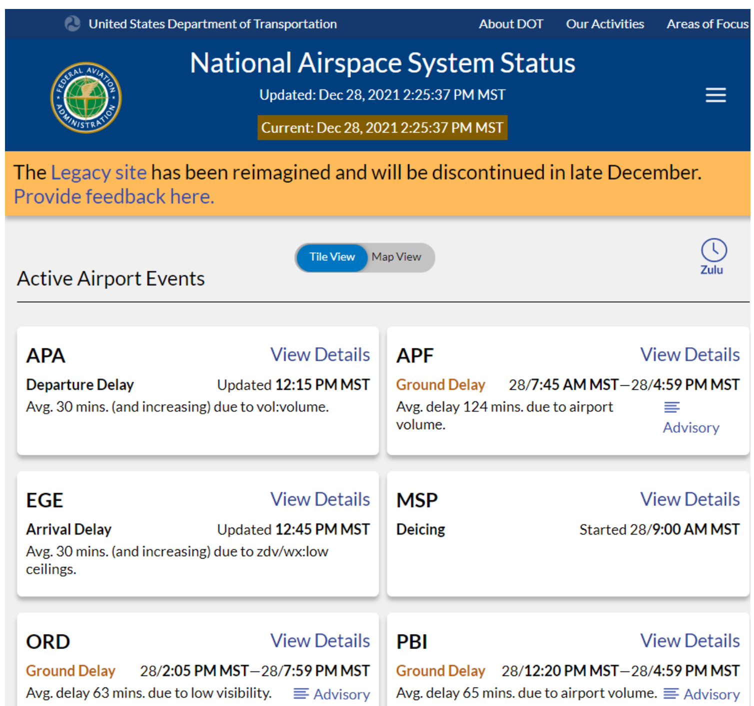
2. **Communicate with Air Traffic Control**. If a weather-related concern or runway contamination leaves you unable to accept instructions, remember that the Tower is there to help.

   As for non-towered, remember that you can always call the airport beforehand to get an update on runway conditions, or review the airport’s weather report.

3. **Ensure a thorough weather briefing** for your planned destination airport prior to departing. The FAA provides pilots with weather planning tools to check the National Airspace System status, airport status and delays and Surface Weather Observation Stations.

4. **Check and understand Notices to Air Missions (NOTAMs)** for your departure and arrival airport, especially if they pertain to snow and ice.

5. For air carrier pilots, **verify your understanding of arrival and departure windows.** Winter weather may require Prior Permission Required (PPR) or Slot Times.



6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111

+1 513.852.5110
+1 800.361.2216

argus.sales@argus.aero

6. **Go slooooowwwwww**. Plan extra time to enter and exit runways due to winter weather.
7. **Learn the jargon** air traffic controllers and airports use to assess runway conditions for pilots.

   The FAA's Takeoff and Landing Performance Assessment (TALPA) is a method for airports and air traffic controllers to communicate actual runway conditions to the pilots in terms that directly relate to the way a particular aircraft is expected to perform. The TALPA initiative improves the way the aviation community assesses runway conditions, which provides an aircraft operator with effective information to anticipate airplane braking action.

   TALPA is mostly used at major airports, but all pilots could benefit from understanding more efficient ways to communicate and understand braking conditions with each other and airport personnel.

8. During snow removal on the airport, **use caution for additional vehicles on movement areas**. Learn more about how to stay safe when snow removal vehicles are in the mix.
9. No matter the weather, **file a flight plan**.
10. **Help out your fellow pilots**. Ask for and provide pilot weather reports (PIREPs) in flight so that other pilots can have information on the weather you are experiencing.

11. **Lookout for the signs.** Snow drifts can obscure airport signage and markings both on the surface and alongside the runway or taxiway, making it difficult for a pilot to know where to hold short or turn.

    One way to prepare for this possibility is to get familiar with destination airports before you fly by reviewing airport diagrams. You can also browse our From the Flight Deck video series for first-person footage of safe landings at airports throughout the country.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

12. **Understand icing conditions and when they occur in flight.** Check out this Advisory Circular on Flight in Icing Conditions.

The National Weather Service also has predictive models for aircraft icing, including icing PIREPs. Learn more about how the FAA contributes to current and forecast icing products (CIP/FIP).

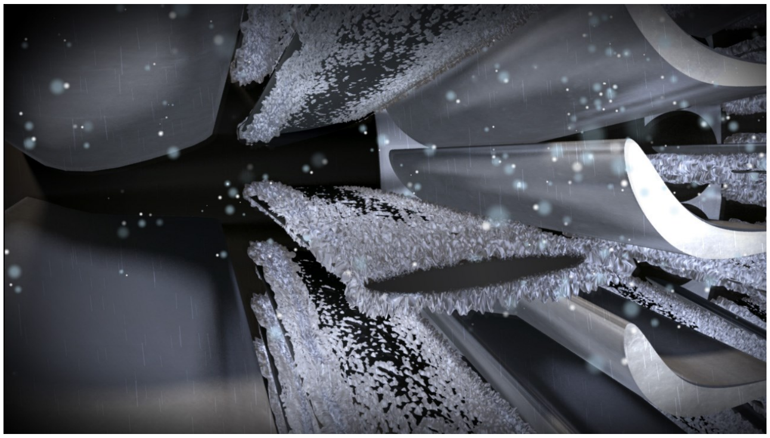
13. **Check your tire pressure before departing.** Cold weather will affect tire pressure.

14. **Stay Warm**. This may seem trivial, but long-term exposure to the cold can have a physiological effect on both your body and your mind, affecting response time and basic motor functions. Not only should you dress warmly enough, but you might also consider packing some high energy food, a Mylar blanket, some warming packets, or a change of clothing in case yours gets wet.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

High Level Ice Crystal Icing: Effects on Engines

(Source: Skybrary)



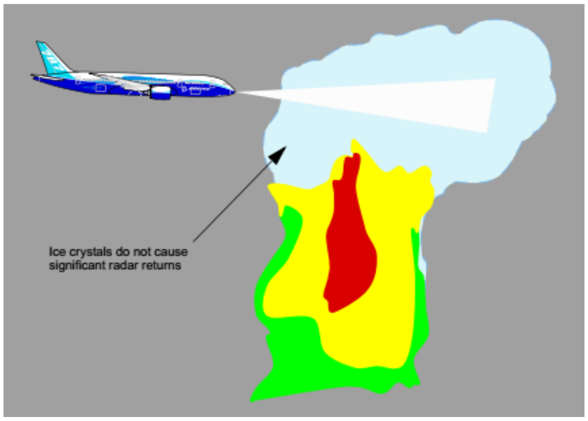
Description

For a number of years, it has been apparent that the detail design of some gas turbine engines has made them vulnerable to the risk of sudden loss of engine thrust if high densities of small ice crystals are encountered in very cold air. This **Ice Crystal Icing (ICI)** hazard has not usually resulted in complete engine failure (although there have been such instances) but more than one engine may be affected simultaneously. The risk occurs outside of flight conditions which are currently defined by the regulatory authorities as "icing conditions" and therefore defined as such in the applicable Aircraft Flight Manual (AFM). In the light of evidence found during investigations of in-service occurrences of the phenomenon by engine manufacturers and the relative success of design modifications, which have resolved problems with particular engine types, the main regulatory agencies have been considering how to respond to this situation for a number of years now and have, at various points, issued interim operational guidance.

Ice Crystal Icing Occurrence

Satellite data has confirmed that areas of very small ice crystals in high concentrations exist within, and in the vicinity of, convective weather systems (whilst large scale convective systems are more likely to produce ICI this can also happen in smaller storms, just less regularly). This is most likely to occur in tropical latitudes where these systems are at their most extensive because warmer air can "hold" much more moisture, especially so when such convection occurs over the oceans where greater uptake of moisture is possible. Such strong convection produces cloud tops that, in some cases, can break through the Tropopause (Satellite evidence shows that even relatively small storms, in terms of spatial extent, can break through the tropopause). High altitude ice crystals may be present for some time after the active convection which produced them has begun to decay. They are extremely small - probably only about 40 microns in diameter - and even at high concentrations, are unlikely to be evident visually even by day. With a radar reflectivity of only about 5% of that of average-sized raindrops, they will not appear on airborne weather radar displays because the temperatures which prevail at the altitudes where they are mostly found are too low for supercooled liquid water to survive - so that what are now termed **'glaciated conditions'** exist. At lower levels though, small ice crystals can occur in the presence of some supercooled water droplets and this combination has been termed "mixed phase" conditions.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero



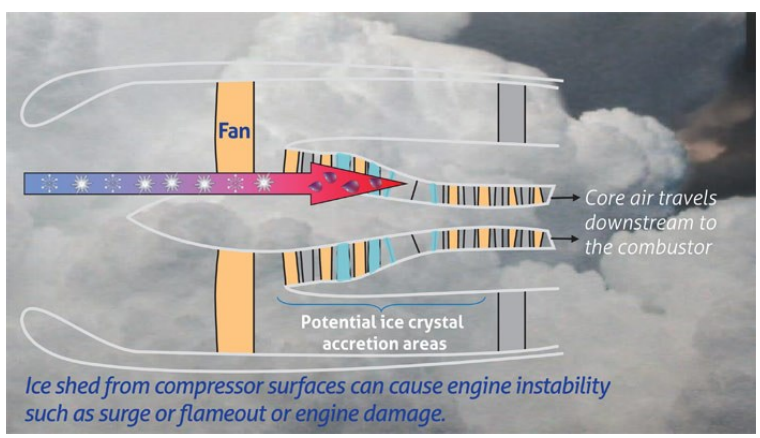
The main risk of encountering high crystal concentrations appears to be downwind from the tops of large areas of convective cloud - the area where the visible anvil shape is seen when viewed from a distance. Overshooting tops (dome-like protrusions from the top of an anvil cloud) are an indicator that significant convection is occurring and that ICI may be a possibility.

A clear distinction should be drawn between the high concentrations of very small ice crystals which have caused engine malfunction and the entirely different collections of larger crystals at lower densities that give rise to high level Cirrus, Cirrostratus and Cirrocumulus cloud, which are not hazardous.

Ice Crystal Icing Effects

High altitude ice crystals will not adhere to the external airframe, or protrusions from it, because these are considerably warmer than the ambient temperature as a result of kinetic heating. Therefore, their presence will not activate conventional ice detectors.

The microphysics which underlies the potential hazard, in respect of engine malfunction, is extremely complicated and has tended to manifest itself in slightly different ways in different incidents. This is because any undesirable effect caused by the ingestion of very small ice crystals at high densities has usually been shown to have been a function of details in engine design not originally foreseen as relevant. The common feature of most investigated incidents appears to be the initial accretion and aggregation of the ice crystals on relatively warm surfaces within the forward part of an engine followed by their subsequent detachment and partial melting as they progress through the engine core. Un-commanded thrust reduction may occur because of either direct or indirect effects of this passage and, even without any effect on engine function discernible to the flight crew, engine damage can result. The sign that a significant ICI encounter is in progress has usually been seen in a gradual reduction in engine rpm and a simultaneous rise in EGT. Thrust lever movement becomes ineffective and engine ‘rollback’ may continue until a sub-idle condition is reached. Other incidents attributed to ICI have arisen when a disrupted intake airflow has created an abnormal pressure gradient in the engine core which has led to a sudden airflow reversal.



6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

The majority of recorded events of engine malfunction attributed to this cause have occurred during the early stages of descent from high altitude with thrust reduced to Fight Idle. Recorded events in the cruise have usually followed a progressive build up of ice during a much longer period of exposure to high crystal densities than has appeared to be required to cause effects in the flight idle/ descent case. However, it has sometimes been challenging to identify where the ice accretion actually occurred since any effects will not necessarily occur whilst the accretion is still continuing and it appears that the glaciated conditions at an intensity to cause problems occur in relatively small 'pockets'.

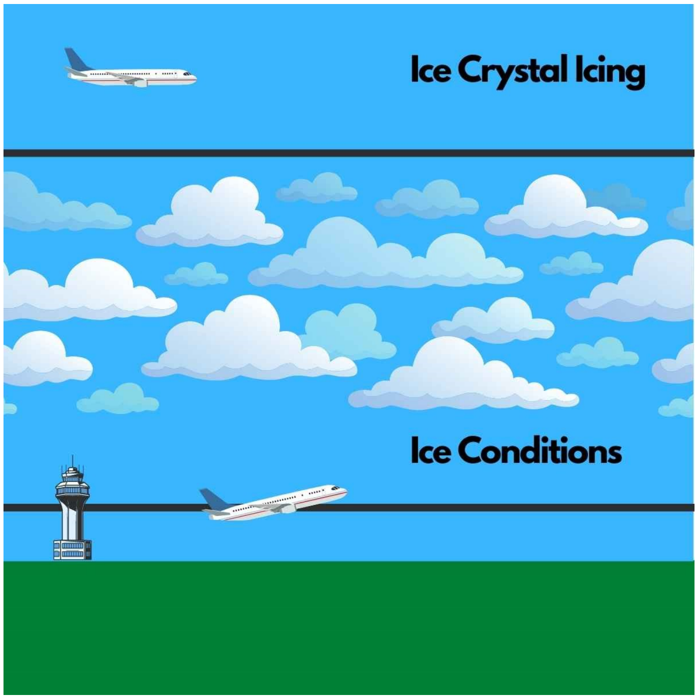
It is currently being suggested that such localized areas of high ice crystal density have up to 8 grams per cubic meter of Ice Water Content (IWC) compared to the current engine design standard for super cooled liquid water which is only 2 grams per cubic meter. In this respect, the effect which these ice encounters appear to have had on engine function represents a new challenge rather than a failure to meet existing reliability standards.

Ice Crystal Icing Avoidance

Apart from following guidance provided in Aircraft Flight Manual (AFM) and / or the Operations Manual, the best way to avoid high concentrations of very small ice crystals is the effective use of the aircraft weather radar to ensure that significant convective activity at altitudes below typical jet aircraft cruise levels is detected and the assumption then made that at the levels above this should be avoided. When particular susceptibility to ICI is known, deviation by more than the typically-recommended margin of 20 nm from all areas where large convective cells are present is advisable. Where particular engine types have been identified as at risk pending modification, a distance of 50 nm from such areas is usually recommended.


Avoid flying over the anvil of a Cumulonimbus cloud. ***Image from wikicommons.***

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero



This tactical strategy can be supported by considering the ICI risk when reviewing meteorological forecasts at the pre flight planning stage. Since there will not be any forecast of areas to avoid specifically because of an ICI risk, the probability that it is likely to be a feature of all large convective systems in tropical latitudes, especially those over oceanic or coastal areas, should be the assumption. Operationally, the best advice should be provided in the Aircraft Flight Manual (AFM) and / or the Operations Manual. However, subject to any specifically applicable requirements or guidance, it is currently considered that the use of a thrust setting above Flight Idle during initial descent from high cruise altitudes in the tropics is a sensible precaution.

A number of clues to the presence of ice crystals at densities with the potential to affect engine function have been deduced from past events and include:

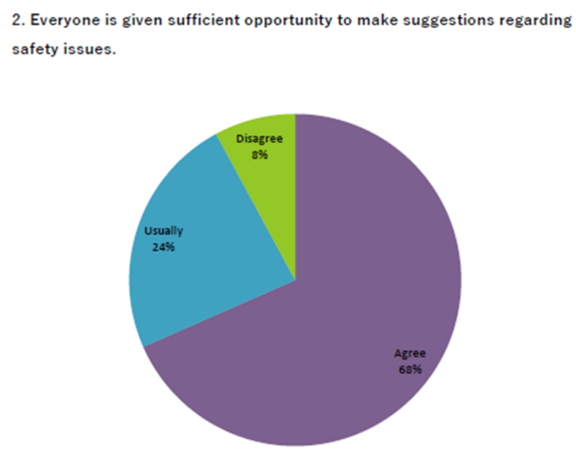
- An air temperature significantly in excess of the corresponding International Standard Atmosphere temperature.
- The presence of some turbulence but rarely more than at light-to-moderate intensity.
- Areas of heavy rain detected on weather radar below the freezing level.
- The appearance of St Elmo's Fire on the flight deck windscreens.
- The appearance of small droplets of moisture on the flight deck windscreens - the result of impacting ice crystals being melted on contact with heated screens.
- Transient failure of the TAT annunciation due to ice crystal accretion within the pitot probe / head which exceed the capacity of the heating system.
- The absence of airframe icing.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

SAFETY MANAGER'S CORNER

Safety Culture Surveys

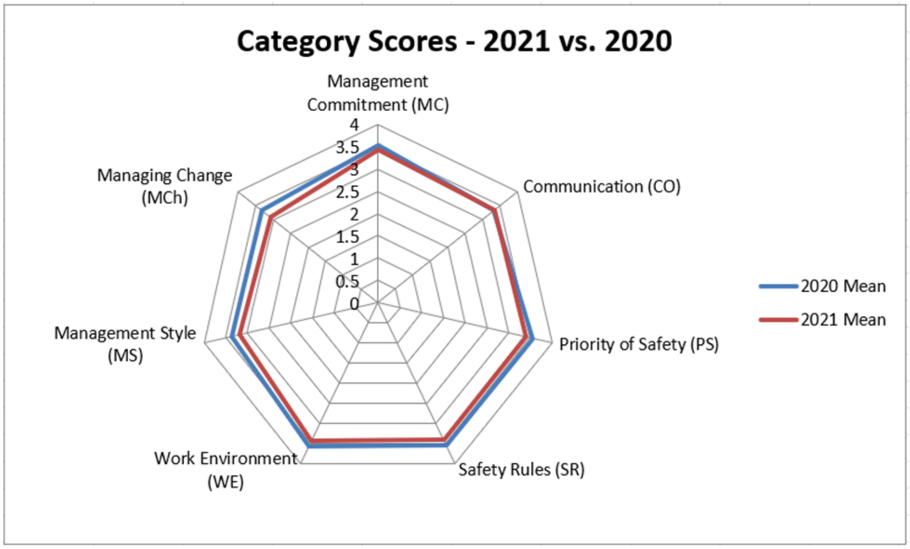
In order for your organization's Safety Management System (SMS) to be successful, you must have an effective and 'just' Safety Culture. But how do you know what kind of a Safety Culture you currently have? That is where a Safety Culture Survey comes in. PRISM's online safety culture survey assesses your operational climate and identifies leading indicators that may be indicative of strengths and weaknesses in your safety culture.



The survey is performed by a member of the PRISM Team, using an online survey tool. All you have to do is select which questions you want from (from a list we provide to you) and give us the Names and Email addresses of who you want to participate in the survey.

PRISM will build and administer the survey to the selected employees. The survey is confidential and all responses are completely anonymous. After the survey has closed, PRISM will produce a final report for you. The survey report will contain an analysis of the following categories measured as strength, effective, or weakness

⇒ Management Commitment
⇒ Communication
⇒ Priority of Safety
⇒ Safety Rules
⇒ Work Environment
⇒ Management Style
⇒ Managing Change



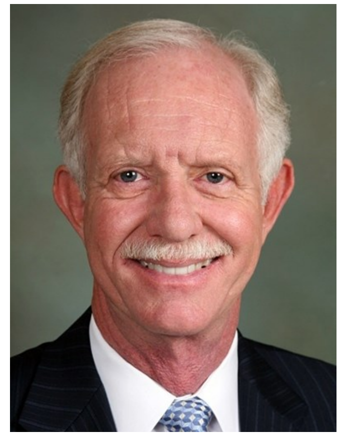
This service is available at **no cost** to PRISM Pro subscribers or for a small fee for PRISM Essential subscribers. Please contact PRISM for more details.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

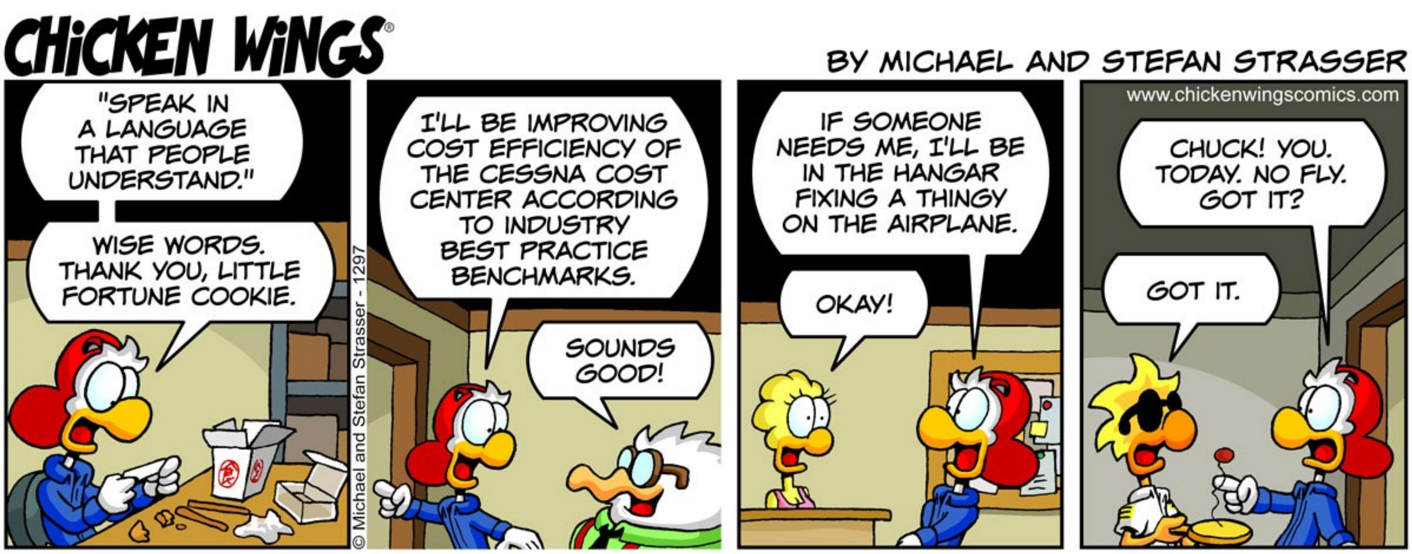
Quote of the Month

Never stop investing … never stop learning

BY: Chesley B "Sully" Sullenberger III



We operate in a dynamic environment that is continually evolving. If we don't evolve with the changes we will be left behind. Operators must continue to learn and grow; they can do this by investing in their team and building a strong culture that encourages everyone to do their best and contribute to the success of the organization. If operators have the mindset that they must never settle and must continually evolve they can turn adversity into opportunity and become leaders in the industry.



6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111

+1 513.852.5110
+1 800.361.2216

argus.sales@argus.aero

CONTACT LIST

Susan Cadwallader

susan.cadwallader@prism.aero

VP,SMS Services

Jenna Albrecht

Jenna.albrecht@prism.aero

Program Manager, SMS Services

Wayne Ehlke

Wayne.Ehlke@prism.aero

Safety Analyst, SMS Services

6021 S. Syracuse Way, Ste 302

Greenwood Village, CO 80111

 # PRISM PREFERS

www.argus.aero

UPCOMING COURSES

Mar 29 to Mar 31, 2022—PRISM Course
Safety Management System (SMS)
Denver, CO

Apr 4 to Apr 8, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Apr 18 to Apr 22, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Aug 22 to Aug 26, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Sept 27 to Sept 29, 2022—PRISM Course
Safety Management System (SMS)
Denver, CO

Oct 3 to Oct 7, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Nov 28 to Dec 2, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Dec 12 to Dec 16, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Go to Upcoming Training Classes to register.