



THE GLARING ISSUE



What is Glare?

Glare is a visual sensation caused by an uncontrolled light far brighter than its surroundings creating an excessive range of luminance in the eye's field, or because there is simply too much light overall. It is divided into two categories: Disability Glare which **IMPAIRS VISION**, and Discomfort Glare which is annoying and **CAUSES EYE STRAIN**.

We have all dealt with glare in our everyday lives and are familiar with the effects. But when it occurs in a locomotive cab the immediate downside of not being able to view and process key information can be highly impactful and long-term effects may be greater due to the prolonged exposure to glare inherent in being a locomotive engineer.

The problem has now become more acute as advances in train control technology led to greater human machine interface and dependence on in-cab displays. Glare from a computer screen, or "Screen Glare" can cause several vision problems, collectively known as computer vision syndrome (or digital eye strain). Screen Glare is not just caused by the brightness of the screen itself, but also reflections on the screen from indoor lights and sunlight coming through windows. Also, viewing a computer or digital screen is different than reading a printed page. Often the letters on those screens are not as precise or sharply defined, the level of contrast of the letters to the background is reduced, and the presence of glare and reflections on the screen may make viewing difficult.



While glare can be adversely impactful to train operation, simple to implement, cost effective solutions do exist that:

- Increase Safety
- Contribute to Employee Well-Being
- Provide Cost-Saving through extended life of in-cab displays

The Technology Environment

Trains need to keep moving 24/7/365 meaning locomotive operators need to deal with varying lighting conditions based on time of day, location & terrain and weather conditions. Simply rounding a curve can cause a sudden and drastic change in the visual environment in the cab.

These types of visibility issues are not new to locomotive engineers. However, in 21st century the stakes have gotten higher with the advent of more sophisticated computer technology. As recently as 2010, the launch of the hi-tech signaling system on the Cambrian Coast Line in the UK had to be postponed because sun glare meant locomotive engineers could not see the in-cab screens to control the train and advise the drivers if the speed is too fast.

A locomotive engineer told the Daily Post: “When the sun shines all I can see in the screen is my reflection”.

Positive Train Control (PTC), is one of the most significant safety advancements in the history of Rail and as of the end of 2020 has been deployed across all 57,536 required US freight and passenger railroad route miles. PTC relays crucial information from multiple points along the train’s route to the locomotive cab, alerting the engineer to upcoming dangers, allowing the operator to adjust the locomotives speed or even bring the train to a stop.

Now, with advanced computer technology and warning systems, engineers can see approaching terrain and possible problems. Before they roll up to the station, computer screens can relay the video camera feed. This increase in Human Machine Interface (HMI) is one of the most valuable improvements for railroad companies and employees.

PTC along with related Advanced Train Control technology such as video camera feeds and advanced real-time performance analysis represent valuable improvements for railroad companies and employees, but the impact can be severely diminished if a Locomotive operator is unable to properly view the displayed information.

In response to these challenges, ACS Railroad Solutions [ACSRS] has partnered with 3M to create an in-cab anti-glare solution. When applied these filters can allow train crew to see the screens clearly and without distractions.



The Problem

With the continuing advancements in technology and the increased HMI, Screen Glare from screens in the Locomotive cab poses significant **SAFETY RISK.**



The Solution

Anti-Glare Filters are an excellent solution for electronic displays in the Railroad environments, providing durable protection and greatly improved viewing quality in a variety of lighting conditions.



Safety

At present, without fully automated locomotives, the Operator has the ultimate fiduciary responsibility for the safety of the system. Therefore, the Operator must be fully informed and CLEAR visibility of the computer screens in the locomotive cab is essential

Both Disability Glare and Discomfort glare can impair visibility that can lead to serious consequences arising from:

- Missed signals
- Missed alerts
- Diminished ability to decipher screen commands (PTC, Speed Restrictions, etc.)

Disability glare occurs because light scatters when it enters the eye, raising the differential light threshold and causing reduced contrast on the target viewing object. With most locomotives having IFD and CDU screens in the cab, the negative effects of Disability glare can be a quite common and at its most extreme can fully inhibit viewing of operational data.

Discomfort glare only adds to the issue as outside reflection off smooth, shiny surfaces such as water, sand or snow may cause an Operator to shield their eyes and avert their view from their in-cab displays.

Application of Anit-glare film can have a positive impact on the ability to view the in-cab CDUs across a range of lighting conditions



Before



After



Side-by-Side

Employee Wellbeing

The most common effects of Screen Glare, according to the AOA, include:



Eye Strain



Headache



Blurred Vision



Dry Eyes



Neck/Shoulder Pain

Besides the soft benefits of being empathetic to the challenges of your employees working environment, implementing an anti-glare solution can provide tangible benefits in terms of a reduction in missed workdays and employee turnover.



Cost Savings

A Locomotive Cab is a naturally rugged environment where damage can easily occur from continuous scratching and accidental knocks. In addition to the Safety and Employee Wellbeing benefits, implementation of an anti-glare solution can contribute to your bottom line by extending the life of your displays.

The cost of anti-glare film is ~2% of the cost you would incur to replace a damaged screen. When a Locomotive is in the repair center for scheduled maintenance, the film can be added in 10 minutes per display by your mechanics without any additional training.

Conclusion

Glare on computer screens inside a locomotive cab presents a significant safety risk by impairing the vision of the train driver. This can result in risks to both CREW SAFETY/WELLBEING and TRAIN SAFETY.

Anti-Glare Filters from ACS Railroad Solutions are both an inexpensive and effective way to reduce glare. Once attached to your screen they,

- Do not change color of screen images.
- Make screens appear less smudgy.
- Provide protection from scratches.
- Protect your screens from damage resulting in significant repair cost savings