SUBJECT: Regional Airline Passenger Head Injury Report

One of the International Association of Machinists and Aerospace Workers (IAMAW) top safety concerns pertains to passengers injuring their head on the main cabin entryway on regional aircraft. This safety issue goes back to 1975 with the birth of the regional airline industry and the introduction of smaller regional aircraft such as the Fokker F-28.

To ensure the safety of passengers during the boarding and deplaning process a removable cushion device was used to avoid potential passenger head injuries on the shorter F-28 main cabin entryway. Unfortunately, when the F-28 was retired in the 1980’s the entryway cushion device was not adopted by other regional aircraft manufacturers and air carriers, despite that passenger head injuries are much more prevalent now than in the past.

The “Regional Airline Passenger Head Injury” report published by JDA Aviation Technology Solutions (JDA) underscores the significance and severity of this safety issue. IAMAW concurs with the findings and analysis and strongly supports the recommendation made by JDA. To ensure that all future passenger head injuries are documented IAMAW has urged that its members submit voluntary safety reports to the Aviation Safety Reporting System (ASRS).

Respectfully,

John Hall, Director
District 142 Flight Safety
Reduction in Head Injuries in the Regional Airline Industry

Reducing Aircraft Related Head Injuries in the Regional Airline Industry

January 23, 2013

Not only have I witnessed a large number of passengers hit their heads on the main cabin entryway but I have hit my head countless times as well. In fact, it happened to me again a few days ago while commuting to work. I have seen passengers receive cuts that caused bleeding as I have received similar cuts to my head causing pain, bleeding, and eventually bruising.

Thanks for finally bringing this safety issue to light. I know a safety device will make flying even more safe and pleasurable to the flying public and for the crewmembers.

Flight Attendant Quote Number 432
Express Jet Flight Attendant
This report is a publication of JDA Aviation Technology Solutions.

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Flight Safety Director John Hall
1.0 Introduction

JDA Aviation Technology Solutions (JDA) was contracted to conduct an independent safety review and analysis pertaining to passenger and crewmember head injuries that happen while boarding and de-boarding regional jets (RJ’s). The head injuries occur due to the reduction in height of the main cabin entryway on RJ’s operated by the regional air carriers. This report presents the findings, analysis and recommendations from the data collected from two independent safety surveys of regional airline flight attendants and regional airline passengers.

2.0 Background

Deregulation in 1978 more firmly established the role of regional air carriers in the commercial aviation industry. The Deregulation Act of 1978 allowed regional or commuter airlines to offer scheduled service of up to 30 seats, with this limit subsequently being raised to 50 seats. The growth in the regional airline industry as shown in (Exhibit 1) is evident with demand continuing to increase. Today there are more than 13,000 regional airline flights every day with Regional Airlines carrying more than 50 percent of the nation’s commercial schedule all operating smaller transport category airplanes.

Exhibit 1
One of the most important developments in the regional airline industry has been the introduction of the RJ. The RJ is a small jet aircraft that holds between 30 and, in the most recent models, 100 passengers. RJ’s were first introduced in Europe at the end of 1992 and in the U.S. in early 1993 by Comair, a regional partner of Delta Air Lines. The RJ’s replaced a lot of the turbo prop airplanes that were used for providing commuter flights and trunk operations for the major air carriers.

In the Late 1970’s small air carriers like Empire Airlines and Altair Airlines saw opportunities to grow using a fleet of 80-seat Fokker F-28 RJ’s. With the introduction of the F-28 (Exhibit 2) a safety issue pertaining to passengers and crewmembers hitting their head on the entryway became more evident. The solution to the problem was the installation of a portable cushioning device that protected passengers and crewmembers through the main cabin entryway. However, the use of the cushioning device ceased when the F-28 aircraft was retired. Today, passengers and flight crewmembers hitting their head on the main cabin entryway are still a very serious and significant safety issue due to the increasing demand for RJ’s.

Since this remains to be a significant problem why isn’t more being done to prevent probable head injuries from taking place on the main cabin entryway?

3.0 Data

In the air carrier industry when there is a reported safety issue a hazard analysis and risk assessment usually takes place followed by a risk mitigation strategy or solution. The included flight attendant survey reports and the NASA ASRS report are examples of reported injuries. The data reveals passenger head injuries are occurring daily.

From January to March of 2012 JDA Aviation Technology Solutions, in cooperation with the International Associations of Machinists and Aerospace Workers and the Association of Flight Attendants, conducted one of two independent safety surveys (see Appendix A)
regarding these specific types of head injuries which included over 1000 Flight Attendants from the Regional Airline division. Both surveys validate that head injuries are occurring on a daily basis on the Regional Airlines.

- 97.9% of the Flight Attendants surveyed have witnessed passengers hitting their heads on the main cabin entryway numerous times.
- 42.9% of the Flight Attendants witnessed passengers receive a head injury that involved a cut, bleeding, a bump or a bruise while entering or exiting the aircraft.
- 75.1% of the Flight Attendants believe there is a safety concern regarding the amount of head injuries.
- 71.7% believe that some type of removable cushion safety device would reduce or eliminate the number of head injuries.

The percentages and statistics from the Flight Attendants surveyed confirm there are more than 2.7 million passengers per year; or 1 out of every 60 passengers, hitting their head on a daily basis. The calculations also indicate there are more than 1.16 million passengers per year; or 1 out of every 141 passengers per day, that received a head injury that involved a cut, bleeding, a bump or a bruise from hitting their head on the main cabin entryway.\(^1\)

There were six different types of RJ’s that were acknowledged in the safety survey. 79.3% of the Flight Attendants were qualified on more than one aircraft. They reported that head injuries occur on both types; if not all, regional aircraft. The majority of the Flight Attendants that were surveyed were either a Flight Attendant on the CRJ or the ERJ.\(^i\)

Previous to the Flight Attendant Survey a general safety survey was conducted in June and July of 2011. The preliminary survey included the flying public which revealed the following results. For the Survey Results, Comments and Recommendations from the initial survey (See Appendix B);

- 87.7% witnessed passengers hitting their head on the main cabin entryway while entering or exiting a RJ.
- 67.9% had hit their head on the top of the main cabin entryway while entering or exiting a RJ.
- 64.4% believe there is a head injury safety concern associated with the RJ airplane main cabin entryways.
- 31.2% experienced or seen a head injury while entering or exiting a RJ.

4.0 Hazard Analysis

The passenger head injuries are due to the reduction of the height in the main cabin entry way on RJ’s. The height of an average male is 5’ 10” and 5’ 4” for females. The heights of the regional aircraft main cabin entryways range from 5’10” to less than 5’ 4”.

\(^1\) [http://www.surveymonkey.com/sr.aspx?sm=VSEha3Se7QofoFrgmHUJEMGD68B3aucXosMIdFLyl60M_3d](http://www.surveymonkey.com/sr.aspx?sm=VSEha3Se7QofoFrgmHUJEMGD68B3aucXosMIdFLyl60M_3d)
The entryway in (Exhibit 3) is a CRJ 700 Regional Aircraft with an entryway of 5’ 10”. The measurement is taken from the floor to the top of the aircraft and doesn’t allow for the loss of height due to the hardened steel door locks and frame shown in (Exhibit 4).

Exhibit 3

Exhibit 4

The loading and off-loading of passengers on RJ’s is commonly done on airport tarmacs by way of the air stairs. The air stairs requires a passenger, who usually has carry-on items, to climb the air stairs looking down to focus on the steps while trying to hold onto the hand rails shown below in (Exhibit 5). When a passenger gets to the top of the steps they usually straighten up and step forward. It is at this time that passengers will hit their head on the
main cabin entryway with the top of their head or look up just in time to strike their forehead on the aircraft.

Exhibit 5

Another concern associated with a head strike is the passenger losing their balance. The natural reaction after a passenger hits their head is to take an immediate step backwards which provides an even greater risk of injury to themselves or other passengers on the air stairs. By either falling back down the steps or into passengers behind them can cause further injury to other passengers during the loading process (Exhibit 6). Loading and offloading passengers who have hit their head tend to collapse and fall forward into other passengers in front of them.

Facial injury from falling down stairs.  Deep cut head injury from hitting sharp entryway.

Exhibit 6
A major contributing factor in these scenarios is the lower height of the RJ’s doorway in relation to the attached airports terminal jet bridge. Jet bridges were not designed to descend down to the lower height of an RJ main cabin entryway and connect correctly to the aircraft. When the jet bridge is dropped to its lowest point, it is still necessary for the gate agent to put a connecting ramp for the passengers to cross over to the RJ (Exhibit 7). Depending on the angle and height of the jet bridge, this can result in a 3 to 6 inch decrease in the height of the entryway to 5’4” to 5’ 7”. This ensures that a 5’ 10” passenger has much less clearance through the entryway, which could lead to a head injury. It also puts the passenger in a situation similar to boarding via the air stairs where the passenger’s primary focus is downward on the crossover bridge. The reduced height of the RJ entryway is a significant contributor to head injuries upon entry or exit of the RJ. If you add foul weather conditions to the scenario the crossover ramp becomes more hazardous.

(Connecting Ramp/Crossover Bridge View from inside the Main Galley)

Exhibit 7
The majority of the airports, terminals, gates and jet bridges are not new. Many of the airports were designed decades ago when RJ’s like the CRJ and the ERJ were not being operated or even designed. As a result; the size, dimensions and unique characteristics of the RJ’s were not considered in the jet bridge design.

The RJ and a jet bridge that is designed for larger main line aircraft do not adjoin at all. As a result, the jet bridge design is not as compatible for newer/smaller RJ’s, which contributes to the risk of passenger head injuries; (Exhibits 8 and 9).

Connecting Ramp/Crossover Ramp Height Increase
Exhibit 8
5.0 Other Risks

After a passenger or crewmember has hit their head on the main cabin entryway another concern is the potential bio-hazard caused by an open wound. Blood spills are universally classified as a bio hazard in all 50 states due to the potential for contamination and exposure to infectious diseases from blood borne pathogens. The edges of the metal entrance/door frame are potential sources for head wounds, cuts that bleed extensively along with bumps, bruises and swelling. There are flight crewmembers that will attest to the multiple injuries and the need for medical attention to passengers and crewmembers that occur on a daily basis.

When a passenger gets an open bleeding wound it also risks other passengers and flight crew, exposing others to the potential health risks including Airline Maintenance Workers, Caterers, Baggage Handlers, Gate Agents, and Cabin Service Personnel.

Another serious concern is Traumatic Brain Injury (TBI). TBI can result when the head suddenly and violently hits an object. Symptoms of a TBI can be mild, moderate, or severe, depending on the extent of the damage to the brain. A person with a mild TBI may remain conscious or may experience a loss of consciousness for a few seconds or minutes.

Other symptoms of a TBI include headache, confusion, lightheadedness, dizziness, blurred vision and trouble with memory, concentration, attention, or thinking. More than half are bad enough that people must be hospitalized. The worst head injuries can lead to permanent brain damage or death. Symptoms of a TBI may not appear until days or weeks following after the passengers have completed their trip.  

6.0 Safety Risk Management

Since we have successfully identified a hazard and the probable consequences, the next step in safety risk management is to estimate the risk probability.

Estimate Risk Probability

1. Is there a history of occurrences or is it an isolated event? The survey data clearly proves that head injuries happen frequently.
2. What other equipment might have similar events? The survey data shows that all regional aircraft are susceptible to an event taking place.
3. How many personnel are susceptible to having the event affect them? Passengers and crewmembers that are 5’ 4” or taller can be subjected to a potential head injury on a Regional Airline.
4. What percentage of time is a passenger exposed to the potential safety issue? The passenger is exposed to the problem during the boarding and deplaning process.
5. Is there management or regulatory implications that might reflect greater risks to public safety? Not taking action to mitigate the safety problem could lead to serious injury and potential law suits against the air carrier and the airport.

Estimate Risk Severity

1. How many lives may be lost (employees, passengers)? Unknown but the potential exists that severe head trauma could occur.
2. What is the likely extent of property or financial damage? Property damage would be negligible but law suits will result in significant financial impact to regional operators, airline insurance companies and airports.
3. What is the likelihood of environmental impact? There is a potential bio hazard impact with blood borne pathogens if a passenger has a head wound.
4. What are the likely political implications and or media interest? The flying public will be upset by the lack of safety oversight to this problem and the lack of concern from government agencies and the regional airlines concerning the safety oversight.

To determine the levels of probability (likelihood) and severity the acceptable levels of risk through probability and severity definitions, values and descriptions as shown in Exhibits 10, 11 and 12 must be determined.

<table>
<thead>
<tr>
<th>Qualitative Definition</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>Likely to occur many times (has occurred frequently)</td>
<td>5</td>
</tr>
<tr>
<td>Occasional</td>
<td>Likely to occur some times (has occurred infrequently)</td>
<td>4</td>
</tr>
<tr>
<td>Remote</td>
<td>Unlikely, but possible to occur (has occurred rarely)</td>
<td>3</td>
</tr>
<tr>
<td>Improbable</td>
<td>Very unlikely to occur (not known to have occurred)</td>
<td>2</td>
</tr>
<tr>
<td>Extremely Improbable</td>
<td>Almost inconceivable that the event will occur</td>
<td>1</td>
</tr>
</tbody>
</table>

Exhibit 10
<table>
<thead>
<tr>
<th>Aviation Definition</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>• Equipment destroyed</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>• Multiple deaths</td>
<td></td>
</tr>
<tr>
<td>Hazardous</td>
<td>• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Serious injury</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>• Major equipment damage</td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Serious incident</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>• Injury to persons</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>• Nuisance</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>• Operating limitations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use of emergency procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minor incident</td>
<td></td>
</tr>
<tr>
<td>Negligible</td>
<td>• Little consequences</td>
<td>E</td>
</tr>
</tbody>
</table>

Exhibit 11
<table>
<thead>
<tr>
<th>Effect on Airplane</th>
<th>No effect on operational capabilities or safety</th>
<th>Slight reduction in functional capabilities or safety margins</th>
<th>Significant reduction in functional capabilities or safety margins</th>
<th>Large reduction in functional capabilities or safety margins</th>
<th>Normally with hull loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect on Occupants excluding Flight Crew</td>
<td>Inconvenience</td>
<td>Physical discomfort</td>
<td>Physical distress, possibly including injuries</td>
<td>Serious or fatal injury to a small number of passengers or cabin crew</td>
<td>Multiple fatalities</td>
</tr>
<tr>
<td>Effect on Flight Crew</td>
<td>No effect on flight crew</td>
<td>Slight increase in workload</td>
<td>Physical discomfort or a significant increase in workload</td>
<td>Physical distress or excessive workload impairs ability to perform tasks</td>
<td>Fatalities or incapacitation</td>
</tr>
<tr>
<td>Allowable Qualitative Probability</td>
<td>No Probability Requirement</td>
<td>Probable</td>
<td>Remote</td>
<td>Extremely Remote</td>
<td>Extremely Improbable</td>
</tr>
<tr>
<td>Allowable Quantitative Probability: Average Probability per Flight Hour on the Order of:</td>
<td>No Probability Requirement</td>
<td>$&lt;10^3$ Note 1</td>
<td>$&lt;10^5$</td>
<td>$&lt;10^7$</td>
<td>$&lt;10^9$</td>
</tr>
<tr>
<td>Classification of Failure Conditions</td>
<td>No Safety Effect</td>
<td>Minor</td>
<td>Major</td>
<td>Hazardous</td>
<td>Catastrophic</td>
</tr>
</tbody>
</table>

Note 1: A numerical probability range is provided here as a reference. The applicant is not required to perform a quantitative analysis, nor substantiate by such an analysis, that this numerical criteria has been met for Minor Failure Conditions. Current transport category airplane products are regarded as meeting this standard simply by using current commonly-accepted industry practice.
A Risk Matrix as shown in Exhibit 13 is used for Risk Assessment to define the various levels of risk as the product of the harm probability categories and harm severity categories. This is a simple mechanism to increase visibility of risks and assist management decision making.

Exhibit 13

If we use the survey results and plot the **Likelihood** that the event will happen, it showed a range of Probable to Frequent. In similar fashion, the **Severity** ranged from No Safety Effect to Catastrophic resulting in a classification of 5A, 4A, 3A, 2A, 1A and 5B, 4B, 3B, 2B and 1B.

Using the data results from the two surveys we classified the **Likelihood** and **Severity** of a passenger or flight crewmember head injury on an RJ as 3B (probable and major). A risk mitigation strategy can now be employed to determine the best corrective action to solve the safety issue.
7.0 Safety Risk Control and Mitigation

Based on the risk analysis (Exhibit 14) we have identified the safety hazard, assessed the **Likelihood** and **Severity** and whether the risk is acceptable. The Survey data indicates that the risks are unacceptable and high enough that a mitigation strategy should be put into place immediately.

In evaluating specific alternatives for safety risk mitigation it must be kept in mind that not all alternatives have the same potential for reducing safety risks. Proposed safety risk mitigations should be examined from the following perspectives:

1. Effectiveness
2. Cost/benefit
3. Practicality
4. Challenge
5. Acceptability
6. Enforceability
7. Durability
8. Residual safety risks
9. New problems

Exhibit 14
When implementing a hazard or risk control the order of precedence for addressing the hazard is:

1. Modify the system
2. Physical guards or barriers
3. Warning or alert signal
4. Procedural and training change
5. Advise people

In the case of passenger head injuries it would not be feasible or cost effective to redesign the main cabin entryway. The installation of a removable guard or barrier is a practical and cost effective solution. Other hazard controls could also be implemented such as positioning a flight attendant at the door to alert passengers but this is a mitigation strategy that cannot be guaranteed for every flight. Signage could be employed but this would not guarantee that the passenger would not hit their head and be injured.

8.0 Most Effective Solution

The simplest and most cost effective solution is to use the removable cushioning device again.

The removable cushioning device is directly related to passenger, crewmember and public safety and is designed and developed for the prevention of head injuries. It clips on the top of the main cabin passenger entryway to prevent the aforementioned head injuries from occurring during the boarding and deplaning process.

The cushioning device is compliant with FAA requirements. It is manufactured and assembled using pre-certified products in accordance with FAA regulations. The main frame member is pre-cast and the cushioning device is specifically designed to form and adhere around each passenger entry doorway overhead. This is the main key to the design; no moving parts and it takes less than 5 seconds to install and remove.

The cushioning device is only used during passenger loading and off-loading. This will allow the Regional Airline operator to eliminate passenger head injuries during the loading and off-loading time. Using the device will also allow the flight attendant to do their other pre-flight duties and not have to monitor the cabin entryway for potential head injuries. (Exhibit 15 and 16)
The entire airline industry is regulated by the FAA for passenger safety. The cushioning device is directly related to passenger safety and mitigates any future personal head injuries and lawsuits against any regional/commercial passenger airline or the airport authority. The cushioning device is directly related to passenger safety and was used in the past to prevent head injuries; why isn’t it being used today?
9.0 Future Direction

Regional Airlines fly more than 52% of the United States transportation movements between the top 150 airports. Of these Regional Airlines, 14 are listed as the largest passenger airlines in the top 25 list according to the Airlines for America (A4A).

Over the course of the last 10 years the Regional Airlines have had the largest growth ever recorded in the airline industry. Regional aircraft sales continue to grow at a rate faster than sales of larger aircraft to mainline carriers. System wide passengers are projected to increase and over the forecast period from 2012-2032, domestic enplanements are projected to grow at an average annual rate of 2.4 percent with mainline carriers growing more slowly than Regional Airlines.4

Regional Airline Association President Roger Cohen told members of the House Aviation Subcommittee. “Flying is the safest form of travel, and we want to keep it that way.” “We need to take bold action to address every single issue that could possibly affect the culture of safety that is the fundamental cornerstone of the aviation industry.”5 Mr. Cohen is correct and we must “address every single issue” especially those safety issues that affect; on average, more than 447,945 Regional Airlines passengers on a daily basis. The 1000 plus Flight Attendants that have participated in the safety survey and addressed this head injury issue have found the way to solve this safety issue; use the removable cushioning device.

Regional Airlines are called "common carriers" -- entities that transport the general public for a fee. The law imposes a heightened duty of care on common carriers. Regional Airlines and other common carriers must act with a high degree of care and use the vigilance to protect passengers from any potential harm. This standard of care extends to the airline's employees as well (including pilots, flight attendants, ground crew, maintenance workers,

Exhibit 17

Regional Aircraft Totals

Regional Airlines are called "common carriers" -- entities that transport the general public for a fee. The law imposes a heightened duty of care on common carriers. Regional Airlines and other common carriers must act with a high degree of care and use the vigilance to protect passengers from any potential harm. This standard of care extends to the airline's employees as well (including pilots, flight attendants, ground crew, maintenance workers,

4 http://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast.pdf
5 http://www.raa.org/LinkClick.aspx?fileticket=qGISTdeY2ve%3d&tabid=77&mid=417
and the airline’s own safety inspectors). **Airlines also owe this heightened duty of care to passengers while they are boarding the plane, traveling onboard the aircraft, and getting off the plane.** Once the passengers disembark, however, the airline is no longer legally responsible and the degree of care is now the legal responsibility of the airport authority. 

The two safety survey statistics confirm this is an overlooked safety issue that should be addressed and the removable cushioning device provides the best solution to remove the safety risk to passengers, crewmembers and the public.

**10.0 Conclusion**

The USA had 163.5 million regional aircraft enplanements in 2010 according to the Bureau of Transportation Statistics, showing steady growth for the last 5 years. The regional aircraft fleet will double in the next 10 years with expected revenues to be in the billions of dollars. We can alleviate any risk to the 163.5 million plus regional airline passengers by using the preventive measures that were once used before when the F-28 regional aircraft was in service; use the removable cushioning device.

As many as 5 million new head injuries could occur while boarding or de-boarding regional aircraft each year. Most head injuries result in nothing more serious than bumps and bruises. The bumps and bruises that result from striking the top of the main cabin entryway are usually cared for by crewmembers and or airport medical assistance. Yet complications that require emergency treatment and possibly hospitalization at a later period could take place. Even an apparent minor head injury can lead to dangerous complications. Whether the head injury is closed or leaves an open wound, head trauma can lead to debilitating mental and physical conditions which may take days or weeks to surface after the passenger’s trip.

This safety issue has been discussed among certain FAA Safety Inspectors, NTSB Investigators, Flight Crewmembers, personnel at the NASA Aviation Safety Reporting System, the Center for Disease Control, OSHA, and acknowledged by Airline Directors of Safety as a safety issue to address.

According to the Flight Safety Organization; aviation industry personnel encounter hundreds of more people daily than healthcare workers do and without precautions to blood-borne pathogens caused by an open wound from a head injury. The best safeguard to prevent any further head injuries and risks is to use the removable cushioning device.

This is a safety issue that has an immediate solution. Regional Airlines should employ the removable cushioning device to eliminate day-to-day head injuries from occurring. It’s good for passenger safety, public safety, crewmember safety and it sends a very positive signal that safety is a priority in the Regional Airline Industry.

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7 [http://www.transtats.bts.gov/OneWay.asp?Display_Flag=0&Percent_Flag=0](http://www.transtats.bts.gov/OneWay.asp?Display_Flag=0&Percent_Flag=0)
11.0 Appendices

Appendix A – Flight Attendant Survey Results;

How many years have you been a flight attendant for your airlines?

- Less than a year (118) [11%]
- 1-3 years (156) [16.30%]
- 3-5 years (175) [14.50%]
- 5 years or more (627) [58.30%]

Which airline do you fly for?

- American Eagle (267) [24.80%]
- Atlantic Southeast (58) [5.40%]
- Chautauqua (66) [5.40%]
- Colgan (47) [6.10%]
- ExpressJet (215) [20.10%]
- GoJet (48) [4.50%]
- Horizon (28) [4.50%]
- Mesa (37) [2.60%]
- Mesaba (31) [2.90%]
- Piedmont (38) [3.40%]
- Pinnacle (205) [3.20%]
- PSA (34) [3.50%]
- SkyWest (29) [3.50%]
- Other (29) [5.00%]

Which Aircraft are you a Flight Attendant on?

- CRJ (597) [55.50%]
- ERJ (511) [47.50%]
- Q400 (65) [5.70%]
- ATR (38) [6.00%]
- Dash 8 (54) [3.50%]
- Saab (61) [2.80%]
- Other (30) [5.00%]
Have you ever seen anyone hit their head on the main cabin entryway while entering or exiting your regional aircraft?

- Yes (1053)
- No (23)

![Pie chart showing 97.90% Yes and 2.10% No.]

How many times have you witnessed someone hit their head on the main cabin entryway?

- 1-10 (262)
- 11-25 (211)
- 26 or more (603)

![Pie chart showing 56.00% 1-10, 19.60% 11-25, and 24.30% 26 or more.]

Have you ever witnessed a passenger or crewmember receive a head injury that involved bleeding with a cut, bump or bruise?

- Yes (462)
- No (614)

![Pie chart showing 42.90% Yes and 57.10% No.]

© Reducing Head Injuries in the Regional Airline Industry.
Do you believe there is a safety concern regarding the amount of head injuries when entering or exiting a Regional Aircraft?

- Yes (808) 75.10%
- No (268) 24.90%

Do you believe that a removable cushioning safety device that is used during the passenger boarding and de-boarding process would reduce or eliminate the amount of the head injuries?

- Yes (772) 71.70%
- No (304) 28.30%
Appendix A1 – Flight Attendant’s Survey Comments and Recommendations;

Regional Airline Flight Attendants submitted over 400 comments and recommendations. The safety survey validates that head injuries in the main cabin are occurring on a daily basis. We would like to share five comments from the survey and a comment from one NASA report.

- “I wonder how many paxs have hit their heads and gone on only to develop something worse than a headache, bump, cut or bruise. A simple little bump on the head from falling off a bicycle can cause a head injury-related death and disability. Head bumps may seem like no big deal at first but they can develop into something worse if not properly treated right away after an accident. It doesn’t take much to get a mild concussion; I say a cushion is a great solution.”

- “This has always been a safety concern of mine. Seeing someone hitting their head is terrifyng and seeing them go through the agony and pain is painful for us all in the cabin entryway. Trying to have a good day after that happens to you is impossible. Thank you for addressing this.”

- “Speaking for myself I would love to have had a cushioning safety device when I have struck my head, once causing a bad cut. Speaking for the passengers that have hit their heads and gotten injured. I am positive that they would have liked to have had a cushioning device to soften the blow and prevent their injury.”

- “I saw 3 paxs make solid contact this morning doing an out and back. Bad day for the 1st class suit and tie that got cut; I thought he was going down, definite head injury. As for the other 2 I know they have to have a headache and a bruise. Any type of a cushioning device would be good and be avoidance to the abovementioned.”

- “Head injuries are painful and legal issues are even more so. I knew that someday this would become a problem since there are so many regional jets now. Thank you for asking the flight attendants opinion.”

NASA ASRS excerpt; “We parked at gate x, 1 of 3 jet bridges that does not compensate for the height of the aircraft once it is downloaded. This results in a gap between the aircraft and Jet Bridge of about 10 inches. We always caution pax to watch their step as they deplane. So this pax is watching his step and I thought he was going to duck (low overhang). He hit the top of his head on the rail (for the curtain) above the door. I saw the blood squirt out. I knew he was hurt so I followed him onto the jet bridge. I went back on the aircraft to get towels and first aid kit and went with him to the gate so he could sit down. CABIN ATTENDANT RPT ON A JET BRIDGE THAT IS A SAFETY HAZARD TO ENPLANING DEPLANING PAX AT ORD ARPT. THE JETWAY IS NOT ADJUSTABLE TO COMPENSATE FOR ACFT HT AND CREATES THE NEED FOR A STEP-DOWN OR UP DEPENDING UPON THE ACFT LOAD AND ACTIVITY INVOLVED. A PAX AND THE RPTR WAS INJURED DURING A DEPLANING PROC.”

11 [http://www.surveymonkey.com/sr.aspx?sm=VSEba3Se7OqfoFrngHUEMC68R1aucXueMidFyl60M_3d]

© Reducing Head Injuries in the Regional Airline Industry. 22 | P a g e
Appendix B - General Public Survey Results:

Have you ever hit your head on the top of the main cabin entryway while entering or exiting a commercial airplane?

- Yes (171)
- No (81)

Have you ever witnessed anyone hit their head on the main cabin entryway while entering or exiting a commercial airplane?

- Yes (221)
- No (31)

How many times have you hit your head on the main cabin entryway?

- More than 5 (93)
- 0 (83)
- 1 (14)
- 2 (27)
- 3 (21)
- 4 (11)
- 5 (3)

How many times have you witnessed someone hit their head on the main cabin entryway?

- More than 5 (162)
- 0 (30)
- 1 (16)
- 2 (17)
- 3 (18)
- 4 (5)
- 5 (2)
Have you ever experienced or seen anyone get a head injury while entering or exiting a commercial airplane?

- Yes (78) 31.20%
- No (172) 68.80%

Do you believe that there is a passenger and flight crewmember head injury safety concern associated with airplane entryways?

- Yes (161) 64.40%
- No (89) 35.60%

Do you believe that a removable safety device used during passenger loading and deplaning is needed for the main cabin entryway?

- Yes (133) 54.70%
- No (110) 45.30%
Appendix B1 - General Public Survey Comments and Recommendations;

- “I use to travel weekly for business and witnessed head injuries occurring on smaller/regional aircraft.”

- “Jet bridge is safer then step way between jet bridge and plane. The step is elevated and causes taller individuals to hit their head on the way down to the A/C.”

- “Although I only fly 6 - 7 times a year on commercial flights, this appears to be an issue based upon the number of passengers I see hitting their heads. Any type of guard that can be quickly put in place and removed should be required to reduce the number of injuries along w/possible law suits.”

- “Head injuries are very serious even a slight bump on the head. Fix the problem before it turns into more than the airlines can handle.”

- “Glad to see someone thinking about more areas of safety.”

- “The liability for head injuries is huge while millions and millions of passengers plane and deplane on aircraft. It’s just a matter of time before someone has a lawsuit against an airline. If history has shown us anything. Once one lawsuit is filed the next hundred are not far behind. Something NEEDS to be done to prevent these injuries.”

- “About time someone has noticed the entry door is not safe!”

- “Being 6' 7" I am always very aware of my head and doorways as I am used to ducking. The hazard is often times from folks whom are not used to such practices. Some type of pad for doorways certainly would help protect pax and the airlines from a potentially expensive lawsuit.”
Appendix C- Quotes/Scenarios

Several pilots, flight attendants and FAA personnel have provided written testimony and will also provide verbal testimony concerning the need for using the removable cushioning device again for the passengers, crewmembers and the public’s safety. The common sense for the immediate implementation of the cushioning device to avoid further head injury to passengers and crewmembers entering and exiting regional passenger aircraft should not ever be questioned.

On April 25th, 2012 Chairman Petri held a hearing to review the U.S. Aviation Safety system. During the meeting Chairman Petri said: “While the U.S. aviation system enjoys a high level of safety, there are areas in which safety can be improved. It is our responsibility, regardless of how safe the system is, to conduct oversight to address any possible safety issues that may be present or arise in the future.”13 We unanimously agree with Chairman Petri that “there are areas in which safety can be improved” and this is a safety area that must be addressed in order to keep passengers from harm’s way.

Dana Sutton-Regional Airline Flight Attendant

“The FAA can very simply address this problem by utilizing a device that will conform to the overhead of the passenger entryway; I know it is already designed for each type of regional aircraft. It should also be made a requirement immediately for all regional passenger service aircraft operators to employ the head guard protection device and start to use it for the passenger safety purpose it is designed to do before you allow anyone else to be harmed.”

Captain James F. Whisnant-Regional Airlines.

“In the seven years of working on this aircraft, I have witnessed numerous passengers strike their heads on the overhead portion of the entryway. Any delay by not using the head guard device is one more day of more passengers getting injured and we fail at “PASSENGER SAFETY”.”

Sara Potts-Regional Airline Flight Attendant

“I have seen many passengers and crewmembers strike their head and either collapse foreword, try to grab on to something to maintain balance, start to fall down the aircraft stairs and fall back into boarding passengers behind them on the steps or Jet Bridge.”

Tom Budde-Regional Airline Flight Attendant

“During my tenure as a flight attendant assigned to passenger safety and for greeting passengers as they board. I have witnessed several passengers striking their forehead or top of their cranium before I could warn them. I have had a need, on more than one occasion, to make use of the on board first-aid kit to assist passengers with cuts, bumps

and open area bleeding caused by this exposed metal. I recall one occasion when a passenger hit his head so hard he collapsed and medical personnel had to be called; it wasn’t the last occurrence and the bio-hazard is another issue that we must consider caused by the passenger entryway.”

Troy A. Zwicke-Airline Passenger for four decades, a professional pilot for two decades, and an aviation safety inspector for almost one decade.

“I have personally hit my head on several instances and witnessed numerous other passengers bumping, bashing, smashing, lacerating and even seeing stars after a head to entry door encounter. This situation needs to be rectified; it is only a matter of time until a serious passenger or flight crew injury occurs.”

Katheryn O.-Regional Airline Flight Attendant

“I feel strong enough about this constant problem to write a letter urging the FAA to enforce regulation requiring airline carriers to provide head guard protection on the main cabin door. Please ensure safety for all who cross this doorway. I urge the FAA to prevent any more bruises, headaches, bleeding or lacerations from occurring on our aircrafts.”

Victoria H.-Regional Airline Flight Attendant

“One of the most delicate parts of our body is the top of our head and forehead; it should be guarded against injury since it does bleed so easily. Bleeding in public is considered a bio-hazard.”

Captain Kyle Payne-Regional Airlines

“I feel the most suitable and economically sound device to prevent these injuries to our passengers and a crewmember is to make mandatory the use of a safety pad that has already been designed and adheres to each and every make, series and model of regional aircraft and other passenger aircraft alike with the same reduced passenger entryway.

Captain Kristina Brown-Regional Airlines

“One of the worst accidents I saw involved a three year old boy who was being carried by his father. While the flight attendant warned the father to "watch your head" his focus was on navigating the steep stairs and he didn’t lower his child through the doorway of the jet. The child was hurt and terribly upset by having his head "smashed" into the aircraft.”

Kristin Hesse-Regional Airline Flight Attendant

“I have witnessed many occurrences of head injuries that required medical or first aid attention due to passengers and crewmembers not considering the top of the passenger entry doorway upon entering and exiting due to its decreased height opening compared to other commercial aircraft.”
Captain Matt B.-Regional Airlines

“My greatest fear as a Captain is to have a passenger critically injured on one of my flights. I feel it is just a matter of time before I witness that fear manifest itself from the main cabin door entry height and a serious injury and law suits begin to develop. Fortunately I have only witnessed cuts, bleeding, bruising and permanent scars; all of which are bio-hazards in a public place and a closed aircraft cabin.

References

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1 The totals of 2.7 million passengers per year hitting their head and 1.16 million passengers per year who received a head injury were derived by using the percentages from question number 6 from the safety survey and multiplying it times the number derived from question 5 that was quantified and verified, to statistical manipulation.

2 The CRJ and ERJ aircraft transports 69.8% of all Regional Airline passengers per year or 114.1 million passengers per year. [http://www.transtats.bts.gov/Oneway.asp?Display_Flag=0&Percent_Flag=0](http://www.transtats.bts.gov/Oneway.asp?Display_Flag=0&Percent_Flag=0)
Congressman Tom Petri  
2462 Rayburn House Office Building  
Washington, DC 20515

CERTIFIED MAIL 7010 0780 0001 3690 6554  
RETURN RECEIPT REQUESTED

Subject: Regional Airline Safety Oversight involving Head Injuries and Bleeding in the Main Cabin

Dear Congressman Tom Petri:

As Flight Safety Director for the International Association of Machinists and Aerospace Workers, Air Transport District 142, representing more than 2000 ExpressJet Flight Attendants, I respectfully request the Aviation Subcommittee, the National Institute for Occupational Safety and Health and the Centers for Disease Control and Prevention address the safety issue regarding passengers who hit their head during the ingress and egress process thru the regional jet main cabin entryway. ExpressJet is the United States largest Regional Airline with more than 28 million passengers per year.

Our safety concern for passengers receiving head injuries and bleeding in the main cabin amongst other passengers and crewmembers is a serious issue that must be solved. This safety issue has become an open conversation among FAA Safety Inspectors, NTSB Investigators, Flight Crewmembers, Flight Safety Coordinators, CDC, OSHA and the Director of the NASA Aviation Safety Reporting System.

When a passenger gets an open wound and is bleeding it not only risks the passengers and crewmembers around the injured commuter but all of the people after they depart the aircraft and go into the general public. This also affects the Airline Ground Crew, Maintenance Workers, Caterers, Baggage Handlers, Ramp Agents, Gate Agents, Aircraft Groomers, Flight Dispatchers, and Fuelers. Airlines should be responsible for maintaining safety for all of their passengers and employees at risk for secondary infections from a bleeding passenger. After a passenger bleeds in the aircraft and it isn't cleaned up how many passengers who get on board afterwards for the next destination are affected? This is a bio-hazard for everyone and nothing is being done.

The safety issue I am asking you to address in this letter was recognized before and a removable cushioning device was used to prevent head injuries and bleeding in the main cabin. The use of the removable cushioning device was dropped when the F-28 aircraft was retired in the late 1980's. Regional Airlines today operate more than 50 percent of the nation's commercial schedule with more than 13,000 regional airline flights every day transporting more than 160 million passengers per year. We are endangering the health and safety of each passenger, employee and the general public by avoiding the safety issue. We realize that the airline industry is very much cost sensitive, especially when it comes to safety issues, and many airlines have put a moratorium on purchasing anything that is not "Mission Sensitive". The removable cushioning safety device is available with little or no cost to all regional airlines so they may resolve any future head injuries.

From January to May of this year we conducted a safety survey regarding head injuries that included over a 1000 Regional Airline Flight Attendants. The safety survey now validates that head injuries and bleeding in the main cabin are occurring on a daily basis. The percentages and statistics confirm there are more than 2.7 million passengers hitting their head on a yearly basis on the regional jet main cabin entryway due to the reduction in height. The percentages and statistics also
confirm there are more than 1.16 million passengers per year that received a head injury that involved bleeding, with a cut, bump or bruise from hitting their head on the main cabin entryway due to the reduction in height.\footnote{http://www.surveymonkey.com/s/SEba3Se7QofoFrqnHUEMGD6883aucKqsMldHFy60M_3d}

Please devote the time to this critical safety oversight and solve it before the worst case scenario happens. It needs to be addressed and it can be eradicated immediately with the simplest and quickest solution; use the removable cushioning device again. The longer we wait the more of a problem it becomes and we risk getting behind the power curve and watching this safety issue spiral out of control. Safety is the goal no matter if you are at 35,000 feet or parked at the jet bridge.

We must all do our part to make safety, in all capacities, our unrelenting pursuit in the aviation industry. This commitment is what will enable us to attain a higher safety level; one we will all continue to strive to achieve. The proven number of recurring head injuries must be dealt with and ceased or we stand to lose the faith many entrust us with to protect them from harm’s way.

I respectfully ask for:

1. A timely response to the safety issue at large.
2. Your words of reassurance that this problem will be solved rapidly.
3. Input on what we need to do to get the removable cushion back in use.

Trust my premonition and my fellow crewmembers awareness to this safety oversight and mutual concern. It is just a matter of time before a passenger’s accident or a fatality transpires into a lawsuit. There are articles in aviation industry related magazines about this safety issue and even in the New York Times. The odds are getting stacked against the airlines during each boarding process and so are the chances of the worst case scenario.

We cannot allow the same mistakes and accidents to continue or we not only fail ourselves and the passengers that trust us, but we fail the whole airline system that believes in all of us to protect them from harm’s way.

Respectfully;

\[Signature\]

John Hall
IAM District Lodge 142 Flight Safety Director

cc: United States Senate Subcommittee on Aviation Operations, Safety, and Security
    Dr. Frieden, Dr. Howard and the Honorable Members of the Congressional Aviation Subcommittee

“We need to take bold action to address every single issue that could possibly affect the culture of safety that is the fundamental cornerstone of the aviation industry.” RAA President Cohen

“While the U.S. aviation system enjoys a high level of safety, there are areas in which safety can be improved. It is our responsibility, regardless of how safe the system is, to conduct oversight to address any possible safety issues that may be present or arise in the future,” Chairman Petri

“We are accountable to the American public and our stakeholders.” FAA Mission Statement

\footnote{http://www.surveymonkey.com/s/SEba3Se7QofoFrqnHUEMGD6883aucKqsMldHFy60M_3d}