

## Re: Buran Website Finds So Far

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*Source:* <http://sci.tech-archive.net/Archive/sci.space.history/2005-06/msg00378.html>

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- *From:* Peter Stickney <[p-stickney@xxxxxxxxxxxxx](mailto:p-stickney@xxxxxxxxxxxxx)>
  - *Date:* Thu, 09 Jun 2005 10:54:46 -0700
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Jorge R. Frank wrote:

> Dale <[drc@xxxxxx](mailto:drc@xxxxxx)> wrote in  
> [news:6afga1dppa1obklqf5dkattf7ajih7sl80@xxxxxx](mailto:news:6afga1dppa1obklqf5dkattf7ajih7sl80@xxxxxx):

>> 34 years without a fatal accident while operating in an environment  
>> that few would consider to be a "safety culture" can't just be  
>> luck, can it?

Yes, it can. There just isn't the number of flights to make a statistically significant sample.

> Right. It's not just luck; it's extremely low flight rate. Years  
> aren't relevant. 34 years \*sounds\* impressive, but Soyuz has had  
> only 82 flights without a fatality in those years. The shuttle had  
> 87 between Challenger and Columbia.  
>  
> The overall numbers on fatal accidents (2 in 92 for Soyuz, 2 in 113  
> for shuttle) and fatalities (4 in 219 for Soyuz, 14 in 672 for  
> shuttle) represent a statistical tie. Within the margin of error  
> imposed by the small sample size, both vehicles are about 98% likely  
> to get you home safely.

More to the point, rather than just quoting the number of fatalities, it should be noted that crew losses in each accident are 100%. The only reason that Soyuz hasn't killed more people is that it doesn't carry more people.

The plain fact is that spaceflight is dangerous. It requires powerful, complicated machines to get you to and unforgiving, hostile environment. There's no way it's ever going to be as safe as driving to the corner store.

As to the "Safety Culture" – I submit that that really doesn't come into play, here. Up to this point, neither us or the Russians have lost spacecraft to simple, obvious problems[1]. Nor have we lost spacecraft to the same problem more than once. "Safety Culture" protects you against known failures, and works when problems don't recur.

[1] "But what about the O-Rings on Challenger, or the Foam Strike on

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Columbia?", I hear you say.

That there were problems with the O-Rings sealing properly was known. But in most cases, the O-Rings did seal properly, and they were felt to be understood. If launch conditions had been slightly different, or if the burn-through had occurred on the other side of the joint, it would have been just another incident to go into the stack of data.

The same goes for Columbia – While there was concern that the foam strike (Once it was identified) had damaged to tiles, nobody at the time was concerned about the leading edge RCC panels. Those were known to be tough – so tough that when the rain erosion and particle damage tests were performed early in the program, it was impossible to damage them. What hadn't been anticipated was the embrittlement that occurred in the panels after having been flown a number of times, and the effects of an almost impossible square strike on the leading edge. (Due to the curvature of the leading edge profile, the chances of a hit not glancing off are extremely small.) That the hit occurred in the worst possible locations – where the bow shock impinges on the wing during re-entry, was the icing on the frosting on the cake.

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Pete Stickney

Java Man knew nothing about coffee.

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### • *Follow-Ups:*

- ◆ ***Re: Buran Website Finds So Far***  
◇ *From:* Jeff Findley
- ◆ ***Re: Buran Website Finds So Far***  
◇ *From:* Pat Flannery
- ◆ ***Re: Buran Website Finds So Far***  
◇ *From:* Neil Gerace

### • *References:*

- ◆ ***Re: Buran Website Finds So Far***  
◇ *From:* Dale
- ◆ ***Re: Buran Website Finds So Far***  
◇ *From:* Jorge R. Frank

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