

Space Shuttle Challenger Disaster A Personal Perspective

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Some events are indelibly inscribed in our consciousness such as Pearl Harbor, 9-11-2001 and the Challenger Disaster on January 28, 1986. Here is my personal recollection of Challenger.

By the time we were ready to launch our second Space Shuttle Orbiter, Challenger on its tenth mission the Kennedy Space Center launch team has successfully launched twenty-four Space Shuttles including a Columbia mission just two weeks earlier carrying U.S. Representative Bill Nelson from our home district. The only major flaw in any of those missions had been July 29, 1985 occurring on Challenger when a faulty sensor caused a main engine (SSME) early shutdown and a abort to orbit on two engines, but all mission objectives were achieved.

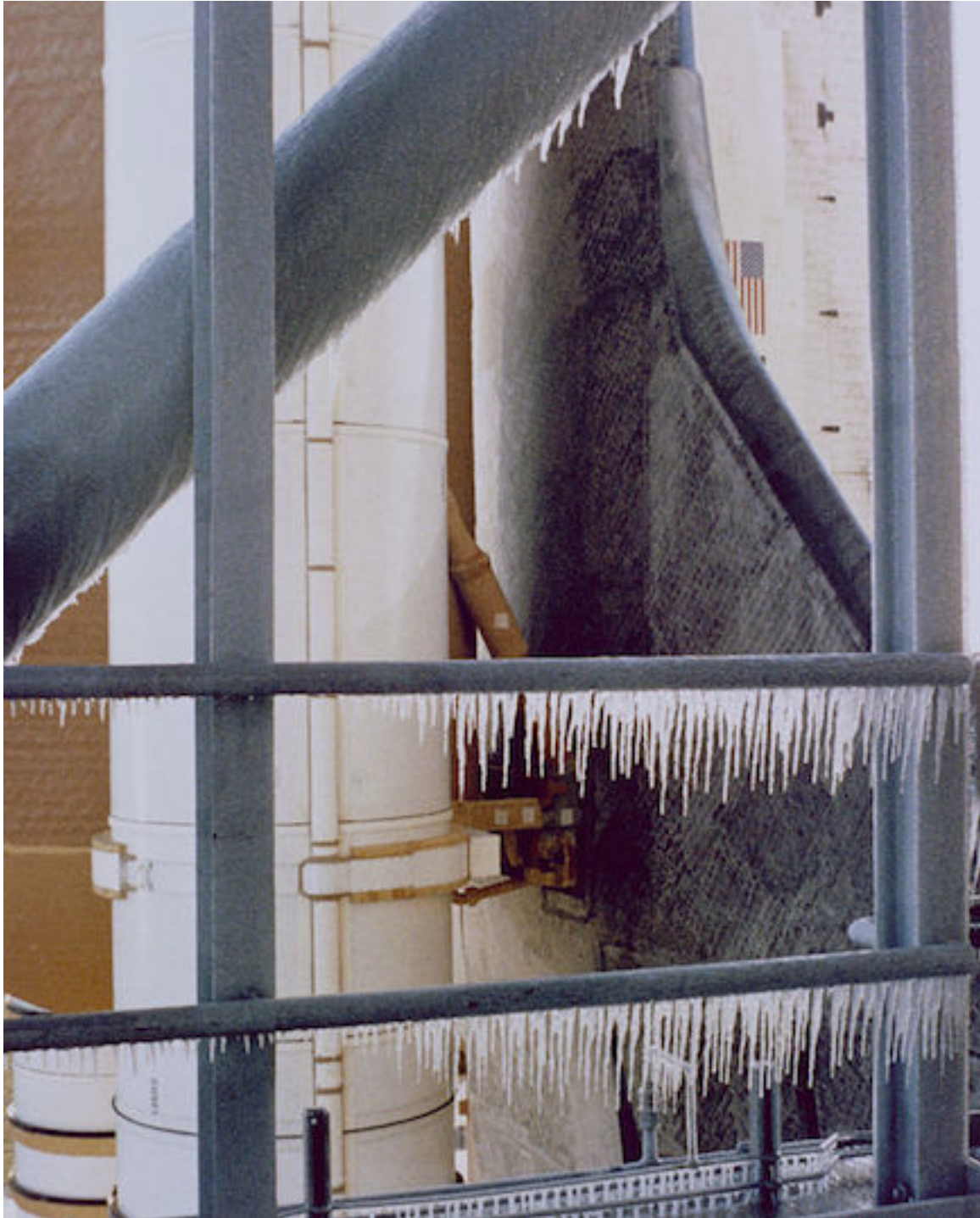
The launch team and all of NASA were confident and launching had become fairly routine. I had participated in all the pre-launch processing and the Challenger was ready for flight. For the first several Space Shuttle flights I had been the Supervisor of Main Propulsion Engineering (MPS), but after a contract change I was now a MPS System Specialist, an advisor to the new prime contractor.

Up to this time I had supported every mission for twenty-one years in the blockhouse or firing room and eventually supported one hundred and fifteen launches including Apollo, Atlas-Centaur and Space Shuttle. But on this particular Challenger mission another System Specialist and I agreed that only one of us needed to support the launch and we would alternate missions. He drew Challenger. So for every launch over thirty-three years that I was involved in this was the only one I didn't directly support on a launch console.

As the countdown progressed I was instead standing out in the Launch Control Center parking lot with all the other employees looking forward to actually seeing a launch in person and not on a small black and white TV screen at my console.

I was very nervous because the outside temperature was below freezing. I had earlier experience with equipment problems in cold weather back in the Apollo days which caused line ruptures and a

pressure related explosion in my GSE which caused some damage on the ground. The previous night's low temperature was an unheard of eighteen degrees and icicles were hanging from the launch tower.



I kept trying to come up with a good reason to approach management but analyzing the MPS and engine systems couldn't come up with a cold related problem. After all, these systems operated in a range from -423 degrees to 3000 degrees so a little cold shouldn't affect them. I presumed all the other systems and contractors were doing the same thing.

The launch occurred without incident and at T+73 seconds right at the "Go for Power Up" call the explosion occurred. I saw the big cloud and solid rockets fly off wildly and immediately knew something had gone terribly wrong. I raced the few yards into the control room and asked my vice president what I should do. He told me to go home, come in early the next day because we'd have lots of work to do. The firing room was locked down and everything was sealed.

For several weeks I poured over all of the thousands of pieced of flight data from the MPS system. Every instrument was totally normal until suddenly data just stopped at T+73 seconds like it had been cut by a knife. So a review of MPS and SSME data didn't provide any answers. Considering all of the onboard systems, the MPS and SSMEs had to be a prime suspect for any explosion like this.

Barges, submarines and surface ships combed the seabed and recovered most of the Challenger pieces. These were laid out in a big tent. I had to walk through all this wreckage and examine each broken piece of my system to try to find a cause of the explosion. It was very emotional. The SSME power heads looked fine although everything was bent up. No obvious culprits were found in my systems.

I considered the most likely part of the MPS system that would cause an accident of this kind were the two seventeen inch disconnects between the external tank and the orbiter. Inadvertent closure of either valve in a 17-inch disconnect during space shuttle main engine thrusting would stop propellant flow from the external tank to all three main engines. Catastrophic failure of the main engines and external tank feed lines would result.

There had been test failures and we had performed modifications on the valves to prevent them from slamming closed during 25000 gpm flow of LH2 and LO2 to the engines. Finally both disconnect plates were retrieved from the ocean and thankfully for me both were still locked in their open position. This eliminated them as a cause of the disaster.

Finally a sharp eyed engineer who was reviewing the launch camera films discovered a puff of smoke from one of the solid rocket segments and then flame from that joint. The cause had been found. The SRB leak occurred in exactly the wrong place impinging on the strut that held the external tank to the solid rocket and cutting through it. This caused the SRB to swing away from the external tank at the bottom and crush it at the top causing the explosion.





Finally the cause had been found and in my sorrow I could at least be thankful it wasn't my system that had caused the accident. Quickly it was determined that the cold weather had hardened an o-ring in one of the solid rocket joints. It didn't seal and the leak occurred.

I stayed in my position as MPS system Specialist for another eleven years and the day to day test and operations work was fine, but the last few minutes before launch was misery for me and I was extremely nervous at liftoff. Never after the Challenger disaster did I enjoy those last few minutes leading to lift off. It wasn't until years

later that I understood how profoundly the Challenger accident had affected my psyche.

I've recently visited the KSC Visitor Center and each time I gazed at the SRB my first thoughts are about the accident. I would bet that virtually every other KSC employee has the same feeling.