

# Re: NASA Space Shuttle – The Real Problem

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*Source:* <http://sci.tech-archive.net/Archive/sci.physics/2005-08/msg00582.html>

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- *From:* Andy Resnick <[andy.resnick@xxxxxxxxxxxx](mailto:andy.resnick@xxxxxxxxxxxx)>
  - *Date:* Tue, 02 Aug 2005 13:02:10 -0400
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jmfbahciv@xxxxxxxx wrote:

In article <dcnrjsj\$3kb\$1@xxxxxxxxxxxxxxxxxxxxxx>,  
Andy Resnick <[andy.resnick@xxxxxxxxxxxx](mailto:andy.resnick@xxxxxxxxxxxx)> wrote:

<snip>

So? How old is the technology for your car engine?  
For your microwave? Refridgerator? Air conditioner?

Unfortunately, not old enough to suit me; they all have computers  
in them, no dials, and no on/off switches. Fortunately, they  
also have new technology that has reduced power consumption.

That sidesteps the real issue: my car runs on gasoline, just as the ones  
made in the early 1900s, my microwave uses 1960's era magnetar technology,  
my fridge runs a compressor, just like the ones since who knows when.  
Saying the "shuttle runs on old obsolete technology" is a red herring and  
should be labeled as such. Of course technological advances are used to  
make incremental improvements: the Shuttle was outfitted with flat screen  
displays recently.

How old are the planes you fly on? Ships? Trains?  
Construction equipment? The issue is not the age of  
the thing, but the required maintenance.

Isn't it also the planned obsolescence of the project an issue?  
If widget F00 had a planned retirement date of 10 years of  
usage, the people involved in the manufacturing, maintenance,  
documentation, replacement parts, etc. would have their product  
support starting to wind down at 5, maybe 6 years.

Maybe, maybe not. Look at military vehicles- that's a more fair  
comparison to the shuttle. What happens is that over time, replacement

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parts are more and more difficult to purchase; that's why the government purchases (for example) computer chips in huge volumes. Things like pistons, valves, hoses, cables, fittings, screws, etc. are constructed to standard sizes, pin layouts, and threads; thus, replacements can always be found. Or at least manufactured fairly easily. Computer components were the biggest headache of hardware design on my project- even 'standards' like digital cable connections were constantly in flux: RS-232/USB/USB2/IEEE-488/FireWire2/... on and on, meanwhile we needed to build a test beds from proof of concept to verification/validation testing. And never mind the software....

<snip>

At some point in the development and construction of any large item, further technological improvements must necessarily be ignored. Otherwise nothing would get built. How soon before your computer is obsolete?

Yesterday. All computer hardware is obsolete yesterday.

Right- and that's the problem. Let's say we have an experiment that's going up in December 2006. At least that's when it's expected to launch. We'll come back to that. A launch of December 2006 means the hardware has to be delivered to Kennedy Space Center by June 2006. Which means that the completed part needs to be done for final testing around January 2006. Which means construction has to begin around June 2005. That means the prototype initiated tests around June 2004, so the tests can be run and evaluated in time to start construction of the flight unit. Now, if the prototype has to be done by January 2004, that means any breadboard construction had to be done around January 2002, to allow testing and redesign work for the brassboard and prototype. So the prototype was designed using parts available around mid-2000. And this assumes a competent engineering team (in addition to the management team, the safety team, and paperwork team) working full time of sufficient staffing levels. Which happens rarely, if ever. And most importantly, \*no significant design changes after the breadboard\*. I presented an optimistic schedule here- all tests are passed, all parts are available, etc. etc.

Now, if the experiment is due to launch December 2006, it's nearly a sure bet that it won't actually launch until sometime 2009, assuming the shuttle fleet sticks to the schedule and doesn't drop/stop flights. So the high-end multi-million dollar experiment which begins taking data in 2010, to be analyzed in mid to late 2011, was built using 11 year old technology.

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And that's just a single measly experiment. Scale upwards appropriately for durable equipment designed to operate for 20 years.

<snip>

The problem is that NASA is increasingly a political animal.

I thought it has always been a political animal.

The old-timers claimed that NASA really started downhill during the Dan Goldin tenure. The claim was that the engineers used to be given the freedom to the job right, rather than the pressure to get the job done on time. The converse could be argued: the jobs used to take too long, and go too far over budget. One way favors the science and engineering, one favors the accounting. Maybe NASA should be treated the same as any other federal agency, maybe not. Maybe it should be militarized. I can't say, and it's not up to me.

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