Navy launches first aircraft using electromagnetic system

Jason Lomberg, Technical Editor

The Navy made history on December 18 when it launched its first rollercoaster, er, aircraft, using the Electromagnetic Aircraft Launch System [1] (EMALS) technology. The F/A-18 Super Hornet, piloted by Lt. Daniel Radocaj, was launched from Naval Air Systems Command, Lakehurst, N.J. For more than 50 years, the Navy has been using steam catapults to launch its aircraft. EMALS will replace steam catapults on future aircraft carriers.

According to a Navy paper on EMALS [2], steam catapults are large, heavy, operate without feedback control, and impart large transient loads to the airframe (damaging or reducing its life). An electromagnetic launch system will lead to substantial improvements, including reduced weight, volume, and maintenance; and increased controllability, availability, reliability, and efficiency.

In addition, “The steam catapult is also approaching its operational limit with the present complement of naval aircraft.” The paper adds that, “The inexorable trend towards heavier, faster aircraft will soon result in launch energy requirements that exceed the capability of the steam catapult.” Never mind that the F/A-18 [3]’s successor, the F-35C [4], is slower and only slightly heavier—the heretofore scorned F-22 [5] is both heavier *and* faster, but we won’t beat *that* drum.

The Electromagnetic Aircraft Launch System launches its first F/A-18E Super Hornet on Saturday Dec. 18 at Naval Air Engineering Station Lakehurst, N.J. U.S. Navy photo by Kelly Schindler.

EMALS utilizes a conventional linear induction motor. Using magnets, it produces a linear force along its length, thus launching the plane. Electromagnetic launch systems are primarily used with conventional rails, monorails, maglevs, and rollar coasters [6]. A good example was "Batman and Robin: The Chiller [7]" at Six Flags: Great Adventure in NJ.

It ought to be pointed out that "Chiller" was plagued with constant mechanical problems, required large amounts of power to operate, and was retired in '07. Linear induction systems have since given way to hydraulic-launched roller coasters like Kingda Ka [8] (previously the fastest and tallest coaster in the world). I'd be curious as to how the Navy solved LIM's massive power requirements, and how much energy it really saves over steam catapults.

Source URL (retrieved on *09/23/2014 - 9:37am*):
http://www.ecnmag.com/blogs/2010/12/navy-launches-first-aircraft-using-electromagnetic-system?qt-recent_content=0&qt-video_of_the_day=0

Links:

[1] http://www.navair.navy.mil/NewsReleases/index.cfm?fuseaction=home.view&id=4468
[2] http://www.navair.navy.mil/lakehurst/nlweb/ieeerevc.pdf
[3] http://www.navy.mil/navydata/fact_display.asp?cid=1100&tid=1200&ct=1
[4] http://en.wikipedia.org/wiki/Lockheed_Martin_F-35_Lightning_II
[5] http://www.af.mil/information/factsheets/factsheet.asp?id=199
[6] http://www.unc.edu/~bhuang/limcoasters.htm
[7] http://en.wikipedia.org/wiki/Batman_%26_Robin:_The_Chiller
[8] http://en.wikipedia.org/wiki/Kingda_Ka