- Current nonskid products do not meet mission durability
- Current nonskid products cannot support continuous JSF and/or MV-22 operations

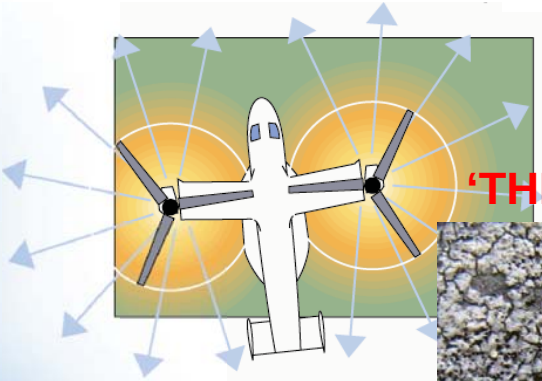
http://www.nstcenter.com/docs/PDFs/MR2010/Tuesday-1-Presentations/11-Lemieux.pdf

  - Thermal stability limit for present system: 350°F
    - JSF: Up to 1700°F
    - MV-22: 380°F (recent NAVAIR study on US WASP)

Revolutionary Research . . . Relevant Results

Intercoat Delamination

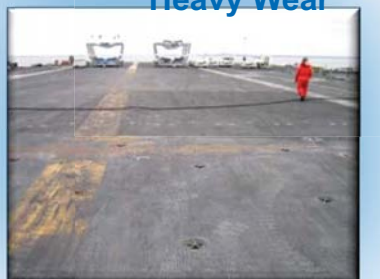
Welds see more impact

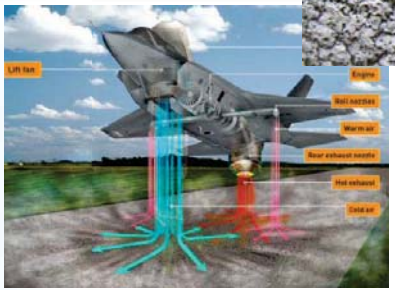


'THERMION'

Corrosion

Heavy Wear



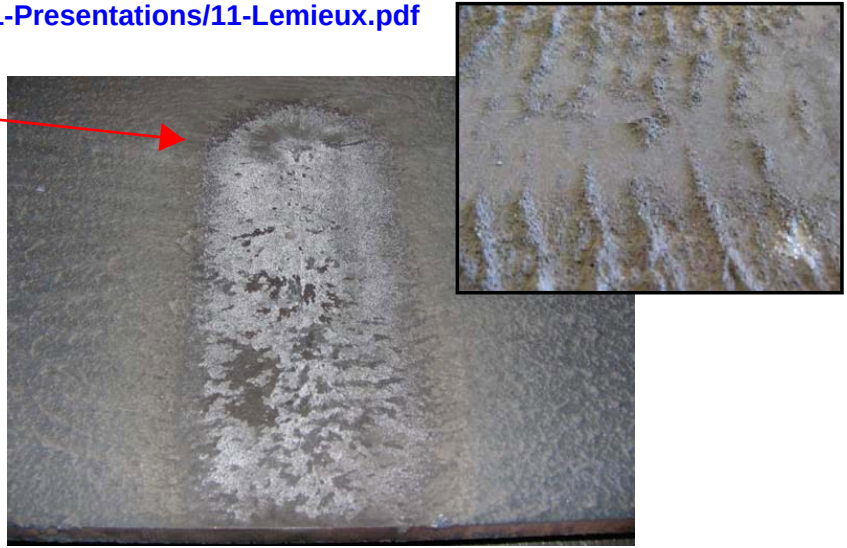


NEXT PAGE

http://www.nstcenter.com/docs/PDFs/MR2010/Tuesday-1-Presentations/11-Lemieux.pdf

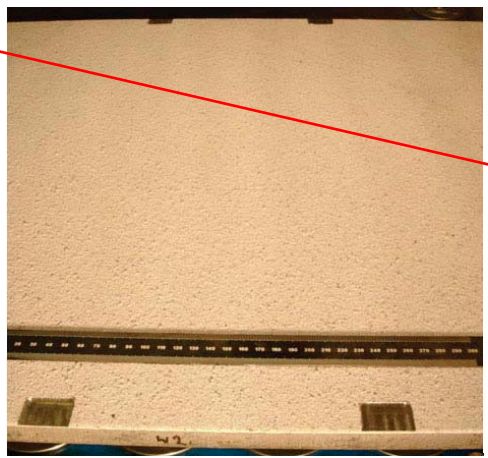
Organic Systems

- Product chemically changed
- High erosion behavior
- Service life less than a few landings.
- Prolonged exposure, exponential damage.
- High probability of FOD generation.

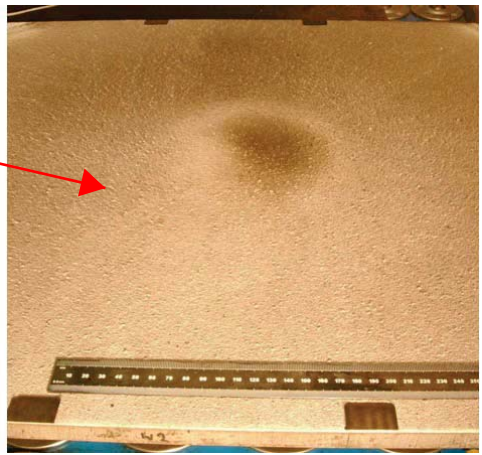


Thermion – BAE Testing

- No damage, jet exhaust particulate residual
- Last lab test required prior to Demonstration Test #1 Planned on USS WASP (LHD-1)
- Tested at NFSEC without damage



BEFORE



AFTER 50 VERTICAL LANDINGS

A COST EFFECTIVENESS ANALYSIS OF USING ALTERNATE MATERIALS FOR NON-SKID IN SHIPBOARD APPLICATIONS

June 2003 Kurt P. Boenisch, Hector A. Cervantes, Andrew J. Clark IV, Jesse G. Espe, & Erik B. Lohrke: http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA417331

"...ABSTRACT

This MBA project investigated and evaluated the cost effectiveness of using alternative materials in shipboard construction, specifically in the area of non-skid application on surface ships. This project identified the costs and benefits of different alternatives to the currently used non-skid and identified whether these alternatives would be feasible for use onboard Navy ships. The analysis indicates that the Thermion alternative shows the potential for the most significant cost savings across the Surface Fleet, while the Liquidmetal alternative also shows potential for savings compared to the current status quo. It is recommended that both the Thermion and Liquidmetal alternatives be prototyped on Navy warships to better define their costs and benefits and evaluate their suitability for use....

...D. Thermion Coating Process

Thermion, Inc. supplies a aluminum-ceramic core non-skid that is a promising alternative to current Navy non-skid. Thermion's purpose is to provide a wear resistant surface to steel and aluminum that is long lasting and protects against corrosion. The Thermion coating is made up of 54% aluminum & 46% ceramic powder. This makes the coating extremely light, only 0.5 lb/ft², which exceeds the specifications for weight as set by NSTM chapter 634. When the non-skid is applied to a steel surface, the material forms a tough coating that bonds to the metal. The aluminum element in the coating acts as a binder for the ceramic powder, which results in a sealant that is extremely resistant to corrosion & wear.

The theoretical life of the product, based on the properties of the material, is 50 years. However, Thermion's process has only been used commercially during the past 5 years. As a result, testing data on the useful life of the product are not available to support the contractor's claim. The contractor recommends a lifespan of 10 years based on the lack of testing data in a harsh naval environment. Therefore, it is recommended that this material be prototyped onboard a Navy surface vessel for testing and evaluation to verify the durability of the material....

...Comparing the ten year costs of each application, reduced to net present value, it is clear that Alternative 1, the Thermion case, is significantly lower in costs than the status quo .... Alternative 1 is less expensive than the status quo by a factor of four over the 10 year period, despite a somewhat larger initial investment,....

...V. CONCLUSION AND RECOMMENDATIONS

While our analysis concludes that the Thermion alternative is superior because it exhibits the least cost incurred, it potentially has several other advantages. Thermion has the advantage of reducing topside weight and its effects on a ship's calculated stability and its coefficient of friction is greater than the standard set forth in NSTM 634. Whenever a naval architect is able to reduce topside weight, a ships stability and seakeeping ability is improved. Thermion's coefficient of friction is 1.1, which surpasses the NSTM minimum dry specification of .95. Thermion's improved coefficient of friction has the potential of reducing shipboard injuries and improving the efficiency of topside operations.

Based on our analysis, we propose that Alternative 1 [THERMION] be adopted as a potential replacement for the status quo non-skid on Navy Surface ships. We recommend that the Thermion process non-skid be prototyped on a surface ship to test the durability characteristics in the real world environment. We recommend a two year test of the Thermion coating in a real world environment, with application of both the new coating and the status quo coating on the same ship. The results of that test could be extrapolated to reflect the full useful life of the Thermion coating...."

THERMION PATCH OCT 2011

http://blogs.defensenews.com/farnborough/files/2012/07/f-35B-landing-sea-trials.jpg

UK Armed Forces Commentary

News, rumours, analysis and assorted ramblings on the strategies, the missions, the procurement of kit and the future of the Armed Forces.

http://ukarmedforcescommentary.blogspot.co.uk/2012/05/does-it-melt-decks-or-not.html

Does it melt the decks or not...? Friday, May 25, 2012

There are many ways to give an answer. Words can be used, with some smartness, to tell a story that, while generally true, hides a few factors.

When F35B went to sea for trials on the USS Wasp, the US Marines needed a success to show to the public and to Congress, to have the F35B taken out of probation and saved from the many threats surrounding it.

One of the things they had to demonstrate during the trials was the resistance of the ship's deck to the F35B engine's exhaust. They had to counter the famous "it will melt the deck!" claim (which, by the way, is born out of a real concern apparent from official documents relating to the F35B development prior to sea trials, and not by an urban legend).

The F35B did not melt the deck, just as the C did not melt the Jet Blast Deflectors on trials. The USMC were also quick, when they released the Wasp trials videos, to specify that the very evidently freshly re-coated flight deck of the LHA had been treated with the usual, standard coatings, and specifically so that, after using the F35B on it, it would be possible to analyze the eventual damages.

The trials confirmed that most of the fears were fortunately unfunded, but despite the triumphant claims made by the USMC publically, the DoD documents show that there still are some issues and worries.

The F35B jet blast generates a 75 feet danger radius that must be kept in consideration during all deck ops, and while it does not melt the deck, it does degrade the coatings and paint much, much faster than any other aircraft but the MV-22, which has the same kind of hot exhaust issues, even if the propulsion is entirely different.

The US Navy official announcement at the end of the trials eventually specified that the new coating on Wasp **was actually not entirely legacy and standard**, after all. Landing Spot 9, used for the Vertical Landings, was coated with a new, experimental non-skid material, the **Thermion**.

With the words of the US Navy statement:

Also being tested is a newer non-skid deck surface, Thermion, which is supported by a mechanical bond of ceramic and aluminum that makes the surface more resistant to extreme heat and better endures the wear and tear of flight operations. The Thermion covers landing spot nine on the flight deck, a small area used for vertical landings.

"The Thermion shows no signs of heat stress, which is good for the F-35, and eventually good for all surface ships," said Kalnajs. [topside design and integration technical warrant for Naval Sea Systems Command (NAVSEA)]

In addition, a series of other modifications were made to the USS Wasp for enabling it to work with the F35B, some of them definitive, such as the re-location of some antennas and radomes, some of them made for prudence and likely to be only temporary, such as replacing the rear Sparrow missile launcher with a dummy one, laced with sensors to measure heat, vibrations, overpressure, and sound levels, to make sure that aircrafts coming in to land won't damage the actual launcher or, worse, cause a missile cock-up inside it.

An almost certainly definitive change is the moving (of) the flight deck's "Tram Line," or yellow line, which is used by pilots to guide them when performing short landings, closer to the port side of the ship.

This is due to the larger wingspan and greater sizes of the F35B compared to the Harrier. In total, JSF modifications ammounted to 6.4 million dollars in expenditure.

It is fair to expect the presence of Thermion in the deck coatings of the LHDs and LHAs of the USMC in the future, and it would be no surprise at all if Thermion made its way onto CVF as well.

So long as it works, all is good....

Investigation of Non-Traditional Non-Skid Technologies for the U.S. Navy

https://www.corrdefense.org/Technical%20Papers/Investigation%20of%20Non%20Traditional%20Non%20Skid%20Technologies%20for%20the%20US%20Navy.pdf

“ABSTRACT

Current deployment of technologically advanced aircraft such as the MV-22 Osprey and the future deployment of the Joint Strike Fighter F-35B are pushing the envelope of current non-skid technologies. With these new aircrafts a cast of new performance requirements are emerging, forcing the U.S. Navy to rethink its position on non-skid technology and how it will be used for flight deck service. Thermal spray coatings, mechanical surface alterations, alternative coating chemistries, overlays, and removable or replaceable decking are among some of the technologies being investigated. Traditional non-skid materials have had a constant struggle to provide sufficient service life and maintain readiness under current conditions of high traffic, wire wear and impact. However, future demands for Short Take-off and Vertical Landing (STOVL) and Vertical Take-off and Landing (VTOL) aircraft will further complicate the issue adding requirements for high temperature resistance and extreme durability. This paper will focus on the investigation of alternative materials that will improve the current performance state of traditional non-skid as well as discuss the status of current ship board demonstrations of non-traditional non-skid materials.

SUMMARY

This program will develop, evaluate, qualify, and install non-skid coatings, which will have a minimum threshold of 15,000 traps and an objective of 20,000 as compared to the Type I requirement of only 10,000 traps. The proposed coatings will have increased thermal resistance: High Heat variant maximum 400ºF [204ºC] for 90 minutes, Extreme Heat variant maximum 1700ºF [927ºC] for 7 to 20 seconds, enhanced overall weatherability and chemical/mechanical resistance as compared to the current “legacy” non-skid systems. For example, increased thermal resistance will reduce foreign object damage (FOD) from overheated and subsequently disbonded non-skid coating during JSF aircraft operations. The proposed system will have twice the service life of the legacy system in relation to mechanical resistance from landing aircraft, and thus reduce the down time required for repair of the present system. Lastly, the system will possess superior color retention which will significantly reduce and/or eliminate the need for surface color topping to maintain proper visual contrast ratios. These new coatings will differ in both their chemical and physical properties from the current MIL-PRF-24667 approved coatings.”

Thermion®

The Original and Reliable

Non Skid Coating

http://www.thermioninc.com/nonskid.php

The twin wire arc spray process is used to apply the material and form a coating, this process is simple, easy to learn, highly productive, and economical to operate. The process can be controlled to produce coatings with a surface profiled of different degree of roughness from slight to a very aggressive rough surface. Aluminum spray wires are known to provide long term corrosion protection to steel and this material duplicates the long-term protection plus the benefits of high wear properties. This coating system is especially beneficial for use on steel and aluminum, however it can be applied to other metals and materials, including concrete and plastics.

View Non Skid Coating Spec Sheet

TH604 Anti-Slip & Anti Corrosion System

The purpose of the ceramic composite coating is to provide a wear resistance surface while also providing corrosion protection of the coated object. The coating material, a "Ceramic Core" tubular **aluminum spray wire** is filled with up to 46% ceramic, when sprayed onto an object produces a ceramic composite coating of aluminum and ceramic. The aluminum spray wire serves as a binder for the hard ceramic and provides the corrosion protection to the underlying article, the ceramic material provides for wear resistance and adds long life to the coating.

Benefits of Coating System

- Continuous Safe Non-Slip Surfaces
- Variable Surface Textures and Profiles
- Usable on All Metals
- Immediately Usable No Cure Time
- Apply at all Temperatures
- Use in all Weather Environments
- Can be Colored
- No VOCs
- Highly Wear Resistant and Long Lasting
- Low Tech Application Methods
- Not Environmentally Sensitive
- Non Hazardous and Non Combustible Coating

Application Details

- Bond Strength 2500 PSI
- Spray Rate 240 Ft2/Hr
- Coverage 8-12 Ft2/Lb
- Material Costs $1.00-$1.50 Per Ft2

Life Cycle Cost

- Initial Application Cost $4.00 Per Sq. FT.
- 10 Year Min. Life Expectancy
- No Maintenance Required
- Damage Resistant
- Lawsuit Resistant
- Permanently Safe Surface

Coating Qualities

- Continuous Safe Conditions For Customers, Personnel & Vehicle Traffic
- Affordable

Coating Procedure

- Prepare surface by Grit blasting or grinding on Aluminum
- Apply non slip coating using Twin Wire Arc Spray Process
- Apply Sealer

Coating Properties

- High Bond Strengths (2500 psi) using portable tester
- Resistant To Wear (Ceramic Rc60+)
- Resistant to Impact (Passes US Navy Ball Drop Test)
- Withstands Flexing (Passes Bend Tests)
- Resists Oils and Fuels
- Coefficient of Friction (1.1 average)
- Unaffected By Weather or Sun
- Resistant to Cracking

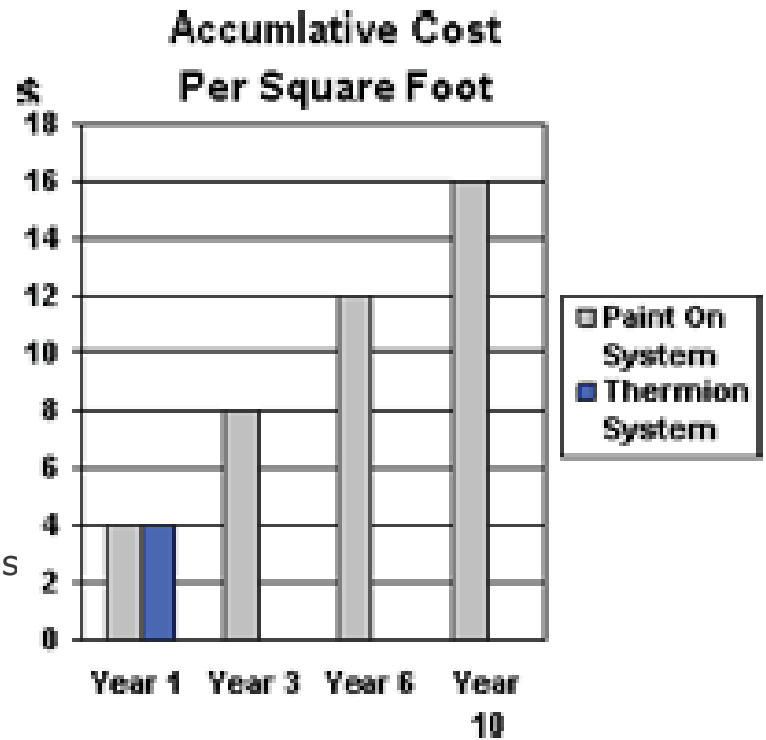
Long Lasting (10 years min.)

http://www.thermioninc.com/nonskid.php

- Attractive
- Can Be Cleaned By Scrubbing and/or Pressure Washing
- Protects Steel Surface From Corrosion
- Will Not Peel Due to Undercoat Corrosion
- Applicable to Steel and Aluminum

Coating Method

- 240 Ft2/Hr
- Low Operational Costs ($1.00 Per/Hr)
- Simple Operation (Low Skill Level)
- Operates From Existing Commercial Services
- Industrial Designed With Robust Features
- Simple and Easy Maintenance & Repair



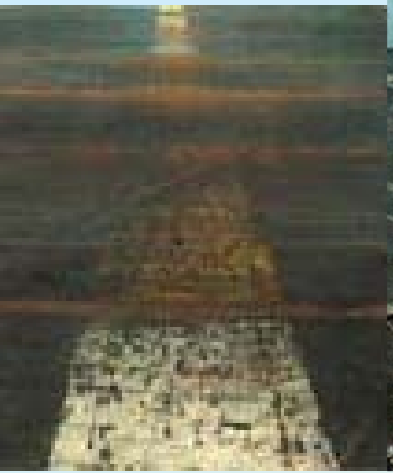
Typical Nonskid Life

http://www.ncms.org/wp-content/NCMS_files/CTMA/Symposium2007/presentations/Track%201%20-%20Tuesday/Tues%20T1%200400%20Tricou%20DNSC.pdf

- CVN Hangar Bay: ~ 3 years
- CVN Flight Deck: 2½ - 3 years
- LHA Flight Deck: 2 - 3 years
- CVN Landing Area ~ 9,000 – 13,000 traps
  - Constellation: 8,818 traps between 2 & 3 wires (in presence of slight deck waviness)
  - Lincoln: 13,000 traps
  - Stennis: 12,500 traps (Ships force felt coating was still functional and ship could still go out.)
- CVN Under Wire: ~1000 – 2000 traps

PENNSTATE iMAST
Applied Research Laboratory
Institute for Manufacturing and Sustainment Technologies

Durability: Summary



Repair and Replacement Cost

- Repair is time-, material-, and labor-intensive.
- Repair costs Range from \$13- \$25 /ft^2
  - **CV 63 (November 2000)**
    - » 116,000 ft^2
    - » Labor: \$22.50 / ft^2
    - » Material: \$ 2.80 / ft^2
  - **CVN 72 (April 2004)**
    - » 70,000 ft^2
    - » Cost: \$1.4 Million (\$20 / ft^2)

Durability Issues

- Approximately 80% of CVN flight deck nonskid coatings are replaced following each deployment. Extending the durability and functionality of nonskid coatings to last through 2 full deployments will save the Navy ~ \$5M per year.
- Nonskid coatings in arrested landing areas are removed and replaced 2 or 3 times per deployment cycle.

Marine Corps demonstrates F-35B at sea

By Dave Majumdar | Oct 18, 2011 [‘new material’ is ‘THERMION’]

http://www.marinecorpstimes.com/news/2011/10/dn-marine-corps-demonstrates-f35b-at-sea-101811/

“...NAVSEA also used the F-35B trials onboard the Wasp to evaluate some non-skid material on one of the deck spots on the giant vessel, Kalnajs said. The new material [‘THERMION’] was tested on a 90 square foot spot, said Navy Capt. Brenda Holdener, commander of the Wasp.

The rest of the flight deck is covered in standard material, however parts of it look different because it is newer, she said. Observers had questioned why portions of the Wasp’s flight deck had a different hue than other parts of the deck surface.

Non-skid materials have and continue to be a vexing problem for the Navy, breaking down after only 6 or 7 months, Kalnajs said. He said the Navy hopes the newer material being evaluated will last for years at a time....”

THERMION, THERMION

AVIATION WEEK

Ares

http://www.aviationweek.com/aw/blogs/defense/index.jsp?plckController=Blog&plckBlogPage=BlogViewPost&newspaperUserId=27ec4a53-dcc8-42d0-bd3a-01329aef79a7&plckPostId=Blog%3a27ec4a53-dcc8-42d0-bd3a-01329aef79a7Post%3a5c5289ef-25a0-486b-9895-d111599748de&plckScript=blogScript&plckElementId=blogDest

A **Defense Technology** Blog

A Morning on the USS Wasp ... With BF-4

Posted by Amy Butler at 10/18/2011

A year ago, the F-35B was in the doghouse owing to lackluster performance in testing. Now, however, that has changed. The jets are up, operating and ticking off test points. And the timing for the turnaround is potentially fortuitous for the project as only miles inland in Washington, officials overseeing the F-35 development program are trying to defend it from bean counters on the prowl for savings in the defense budget.

In the final days of initial shipboard trials of the F-35B, the Pentagon gave a group of media a firsthand look at the testing Oct. 18. BF-2 and 4 are likely to leave the ship this week and return to NAS Patuxent River, Md.

Media were transported to the ship, which circles in a 20x20 mi. box off Wallops Island, Virginia, via MV-22.

"...The much reported problems with heat on the deck & other issues appear to be non-issues. Noticeably, the F-35B needs only about 50% of the WASP deck to take-off, which is a clear indication that there are many ships on which this bird can land & take-off...."

http://www.sldinfo.com/an-update-on-the-f-35b-transition/

photos: Amy Butler/AWST

Once onboard we received briefings on the status of the ship and the aircraft.

There have been many questions from Ares readers about why the aft section of the deck where spots 7-9 is darker than the front of the deck. Ansis Kalnajs, a Navsea test director, explained that the rear portion of the deck had been poured at a later time than the front, accounting for the difference in color. Both are made of standard nonskid material used on ship decks. However, there is a small portion in spot 9 of Thermion, a newer deck material that officials are testing out on the Wasp. Kalnajs says Thermion may prove to be a better future material owing to reduced maintenance demands. The nonskid deck material now need frequent replacing, he says.

The Thermion is in the area where you see the lighter yellow centerline.

Media spent a few hours onboard viewing multiple vertical landings and short takeoffs. Thus far, testers onboard the aircraft say the two aircraft have accomplished more than 60 vertical landings and STOs. BF-2, the first to arrive, conducted its first VL Oct. 3. BF-4 followed shortly after. Specific numbers were not available.

Though formal data hasn't yet been analyzed, Briggs says that the aircraft is performing as predicted by the models in terms of heat ingestion on the ship. Officials had been concerned that the F-35B would reingest its own hot exhaust, causing problems for the propulsion system. However, thus far, Col. Roger Cordell, F-35 naval variants lead at Pax River, said that there have been no performance impacts resulting from hot air ingestion. Overall, he says, the testing has gone better than expected. "We feel like we are running where we intended to crawl," he said.

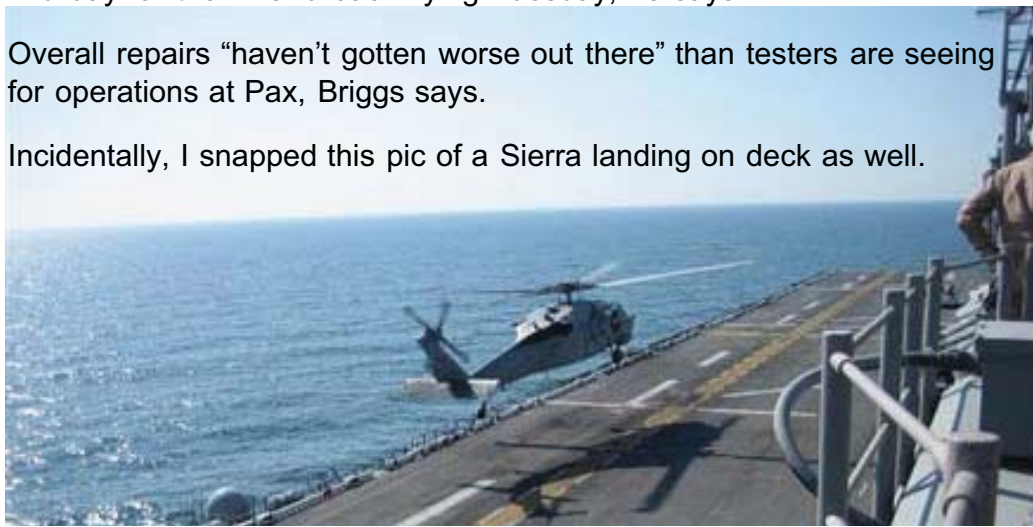
During this visit, BF-4 was conducting the testing; BF-2 had "returned to the beach" at Pax River for repairs, said Capt. Brenda Holdener, CO of the Wasp. Officials onboard did not say what repairs were needed. Last week, BF-2 was fixed after a fuel leak was discovered. Many routine repairs have been conducted on the ship, according to Tom Briggs, the integrated test team lead at Pax who is helping to oversee the trials on the ship.

Among the repairs conducted on the ship were replacement of a flat tire. Incidentally, Briggs says that the aircraft are using tires at a slower rate while on deck than during testing at Pax. There, testers found they were having to replace tires faster than expected in crosswind conditions.

Maintainers also replaced an upper lift fan door actuator on BF-4 while on the ship, Briggs says. The aircraft was down for maintenance Sunday mid-day for the fix and back flying Tuesday, he says.

Overall repairs "haven't gotten worse out there" than testers are seeing for operations at Pax, Briggs says.

Incidentally, I snapped this pic of a Sierra landing on deck as well.



F-35 Introduces Change Across the Maritime Fleet Oct/31/2011

http://www.sldinfo.com/the-f-35-introduces-change-across-the-maritime-fleet/

"During the visit to the USS Wasp on October 18th, the NAVSEA 05 Engineering Director provided an update on both the preparation for tests aboard the USS Wasp as well as a sense of test results and the relationship between the tests and the way ahead. Ansis Kalnajs, the NAVSEA 05 Engineering Director, made it clear that the ship was well instrumented to determine impacts of the F-35B on the ship. And in some cases the changes being tested aboard the USS Wasp are being put in place to shape new capabilities down the road. One key example is the new surface coating [THERMION] which is being laid down for F-35B tests. It must be remembered that many changes which are being made with the introduction of the F-35s are really being down to enhance capabilities across the fleet. The new shipboard surface is a case in point.

SLD Question: Presumably this change in the flight deck, the material that you've laid down might be applicable to other amphibious ships?

Kalnajs: One of the reasons we are looking at the non-skid surface on the USS Wasp for the tests, is the deck coating tends to break down after six or seven months of activity. The materials we are looking at now may be able to last for years and give us a new longevity for the surface of the Amphibious fleet. Not to have to change that nonskid every 6-12 months would be a big gain.

The NAVSEA official provided insight into the types of sensors inserted on the deck to inform the F-35 program about test results.

Kalnajs: On the deck, we have thermacouples on the underside, and we also have the sensors to measure the deflection and also screenings. That enables us to understand what the thermal effects are and what the resulting stresses are on the underdecks. And we also instrumented the ship with acoustic sensors. And our updated collection is very repeatable, which give you good predictions.

Kalnajs was asked by a reporter on board the USS WASP the following question: Have you been able to see any of the data and thermal data to determine yet if there are any effects that are out of the norm?

Kalnajs: We have real time data, but it's not anything out of the norm. So, we're pretty confident that there's nothing mysterious going on that will affect us at this point.

Of course, NAVSEA has seen this process before with the MV-22 & shipboard testing.

SLD Question: You went through this with the V-22, right?

Kalnajs: The V-22 was a big lesson learned for us because the V-22 was a new thermal environment to the ship, so based on that knowledge that we have now, we were evaluating it's total effects as well. It's not just a matter of real loads anymore, it's a matter of thermal effects as well."

Lockheed promises tailhook fix to Navy's F-35C 10 Apr 2013 Richard Sisk

http://www.dodbuzz.com/2013/04/10/lockheed-promises-tailhook-fix-to-navys-f-35c/

"Lockheed Martin has come up with a new design for the tailhook on the F35 Joint Strike Fighters that should allow the Navy variant, the F-35C, to land on carriers and speed the long-delayed process of getting the aircraft out to the fleet, Lockheed and Navy officials said Wednesday. Navy officials also said that they'll have to do refits of the big-deck L-class of helicopter assault ships to accommodate the extreme heat and noise generated by the Marine Corps' vertical-landing version of the Joint Strike Fighter, the F-35B.... [Vice Adm. David Dunaway, head of the Naval Air Systems Command]..."I can promise you that problems will occur" in the process of acquiring 260 F-35C Navy versions of the JSF, and 353 [?] F-35B Marine versions, Dunaway said....

..."Our original design was not performing as expected," said Lorraine Martin, Lockheed Martin's executive vice president for the F35 Lightning II program. Martin said the "toe" of the tailhook, the part that grabs the wire, had been re-designed along with the "hold down damper" gear that forces the tailhook down on the deck. "It's now in line with what the legacy aircraft uses," Martin said of the new F-35 tailhook. She said the new assembly will be tested this summer at the Navy's Lakehurst, N.J., facility and carrier tests were expected later this year. Dunaway said he believed Lockheed Martin had found the right tailhook fix before he beck pedaled and said: "I will be a trust but verify person." Rear Adm. Randollph Mahr, the deputy Program Executive Officer for the F-35, said "I have high confidence that that tailhook will be catching wires at Lakehurst."

In other testing, the Navy found that its L-class ships would have to be adapted to the F-35, & "ship change notices are going out now to the L-class ships," said Rear Adm. Mark Darrah, commander of the Naval Air Warfare Center Aircraft Division. "We have to adapt the ships to the new environment" that comes with the F-35s, he said. The Navy was adding ~~thermite~~ [THERMION - not 'thermite'] coating to the flight decks to guard against the heat blast from the vertical-lift engines of the F-35Bs, Darrah said. Additional baffling will be added to the substructure to lower the decibel level below decks, he said...."

SNA 2014: Heat From F-35, MV-22 Continue to Plague Big Deck Amphibs

15 Jan 2014 Carlo Muñoz

The Navy is continuing to wrestle with landing deck issues aboard its amphibious ships, tied to flight operations with the F-35B Lightning II Joint Strike Fighter (JSF) and MV-22 Osprey.

Naval Sea Systems Command have drafted a plan to cope with the problem, using a combination of limited operations and deck modifications to allow the JSF and Osprey to fly off the service's large deck amphibious warships.

Program leaders are working through 14 different ship modifications aboard the USS America (LHA-6), the first ship in the Navy's new class of large-deck amphibs, designed to preserve the warship's landing deck, Capt. Chris Mercer, head of Navy's amphibious warfare shop, said Tuesday.

Along with those modifications, Navy leaders are also limiting the number of flight operations being conducted off of America, as part of deck preservation plan, Mercer said during a briefing at the Surface Navy Association's annual symposium in Crystal City, Va.

But Mercer did note the strategy in place for the America will not be necessary for the next two of the LHAs in the class.

USS Tripoli (LHA-7) and the yet-unnamed LHA-8, "will be able to carry out "complete unrestricted operations" with the F-35 and MV-22, Mercer said.

The B variant of the F-35 is a short take-off and vertical landing (STOVL) aircraft that produces much more heat when it lands and takes off than the current AV-8B Harrier fighters currently flown off of big decks. Likewise, the exhaust heat from the nacelles of the Osprey has damaged flight decks in the past.

Both warships will be able to handle the deck heat issues, based on the lessons learned from the strategy in place aboard the America, Mercer said.

Deck damage issues related to jet engine downwash from the Osprey and F-35 have long plagued the Navy's efforts to get those aircraft aboard the amphib fleet.

That said, Navy leaders "fully understand… the stresses and failures that the flight deck can accept," Mercer said.

But when pressed as to why service officials have yet to come up with an answer for the deck heat issue, he said program officials were still struggling with finding a "cost-effective solution" to the problem.

However, Mercer was adamant the operational restrictions aboard America would not affect the combat effectiveness of the ship, given its mission.

The caps "are not going to be a problem" since the primary mission for the Navy's amphibs was quick assault operations, not sustained warfare missions carried out by the service's aircraft carriers," Mercer said.

Since the LHA is not designed to support a sustained air campaign, the deck modifications and operational caps will not affect deck reliability aboard the America "as long as we spread [combat sorties] out," he said."

http://news.usni.org/2014/01/15/sna-2014-heat-f-35-mv-22-continue-plague-big-deck-amphibs

Marines Put F-35B STOVL Jet Through Paces At Sea **[DT-II]**

COLIN CLARK on August 29, 2013 at 3:32 PM

http://breakingdefense.com/2013/08/29/7646/

USS WASP: The Marines and Navy have spent most of the last three weeks putting the new F-35B through its paces here, executing more than 90 short takeoffs and vertical landings, including 19 at night.

More than 1,200 Marine test pilots, engineers, experts from the Joint Program Office running the program and Navy and industry civilians are collecting enormous amounts of data from the two aircraft, BF-1 and BF-5, and the ship itself to ensure the planes are performing as they should. The Marine version of the Joint Strike Fighter is designed to take off from smaller aircraft carriers, some other Navy ships, roads and land bases. It can land vertically and usually does a short take off.

I headed out to the Wasp yesterday morning with a small group of journalists on V-22s, Marine aircraft capable of taking off and hovering like a helicopter and flying like a plane. Ironically, both JSF planes had glitches while we were out on the ship, though BF-1 began flying again soon after we left. The second plane appeared to have a “pretty significant problem,” a crew member told me. Its Integrated Power Package, a sort of super generator that powers many of the plane’s sophisticated electronics would not start. I’ve emailed the Joint Program Office for an update and will update this as soon as we hear from them.

One of the biggest concerns about the F-35B, which directs most of the engine’s power directly down to the ship’s deck as it lands, was that it would damage the ship’s deck so much at each landing that the Wasp and other ships — or the F-35B — would have to be redesigned to mitigate that problem. I spoke with several deck crew, the men and women who wear yellow shirts on the carrier deck and execute the dangerous ballet of launching and retrieving aircraft from the Wasp. They say that, after taking off and landing several times almost every day since Aug. 12, they are seeing less damage to the deck than it sustains from some other aircraft that routinely fly from the Wasp and other LHD class ships.

The Navy and Marines have added a new coating to the deck where F-35Bs land, called Thermion. From all accounts, it's a remarkable product composed of aluminum and ceramic bonded together by heat at application to form a very smooth and tough heat-resistant coating.

There is one part of the ship that is sustaining unanticipated — if not critical — damage, namely the edge of the bow. Nets to catch crew members who might lose their footing in rough seas or be blown down by a passing aircraft are being severely rattled by the enormous downwash from the F-35B's jet engine as it passes low over the end of the ship. The wire netting is snapping and some of the structure that supports the nets is being bent. And lights just under the deck's lip are being shattered.

Chief Steven Vlasich, who is responsible for maintaining the deck, took me up to check the damage. I leaned over the bow, saw a few snapped wires. It didn't look too bad, but then Vlasich and his crew had been fixing everything they could. The chief and three other yellow shirts told me the Thermion appeared to be working well. But Vlasich said he'd like to keep much of the deck covered with its current aluminum product, which is much rougher than Thermion. He thinks it gives crew members better traction, especially when the deck is wet and covered in leaking hydraulic fluid and oil.

Joe Spitz, a systems engineer with Naval Sea Systems Command, told me they've got several solutions they're considering for the nets. One would be pretty simple: drop them down as the jets take off.

He doesn't agree with Vlasich about Thermion. He says it is safer than the older surface and grips better. Perhaps most important, you can clean oil and other fluid from it more effectively, Spitz says. The Wasp is reportedly going to have its entire deck coated in Thermion.

But these are secondary, if important issues. What really matters to those on the Wasp is that they are getting the F-35B into the air consistently and safely.

If you want to get some idea of just how much this means to the Marines, note the applause by crew lined up on Vultures Row as the F-35B lands on the deck in the video above.

To give you an idea of how well run this ship looked to be run, the captain kindly let us eat in the officer's mess (we all paid our $5) and we were treated on Slider Wednesday to some of the tastiest cheeseburgers and freshest condiments any of the press corps could remember. The Army may march on its stomach, but the Navy may be sailing past them.

F-35B DT 2 Update: A few hours on the USS Wasp

by Amy Butler in Ares 05 Sep 2013

http://aviationweek.com/blog/f-35b-dt-2-update-few-hours-uss-wasp

The U.S. Marine Corps invited the media Aug. 28 to visit the USS Wasp amphibious assault ship where the second set of developmental test trails for the F-35B are taking place. Being the savvy PAs that they are, USMC shipped us out and back on their newest rotorcraft, the Bell/Boeing MV-22 to see their newest fighter. (They also happen to be the Pentagon's most expensive rotorcraft and fighter).

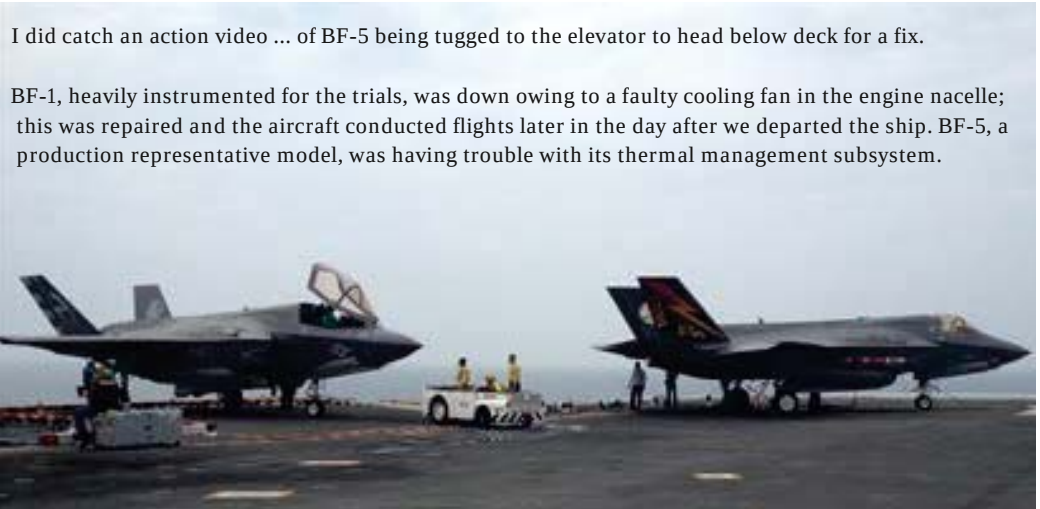
Here are few statistics they shared:
As of the morning of Aug. 29, the BF-1 and BF-5 had conducted 94 short takeoffs (STOs) and 95 vertical landings (VLs).
They also conducted 19 night sorties, including STOs and VLs.

DT-2 is a follow on Aug. 12-30 to expand the envelope for the aircraft operating around the ship to include night operations, and landings using various headings on the aft parking area of the USS Wasp.

Officials reported a 90% availability rate of the two aircraft during the trials as of Aug. 28, but unfortunately both BF-5 (left) and BF-1 (right) were both down in the morning when we were on the ship owing to maintenance issues.

I did catch an action video ... of BF-5 being tugged to the elevator to head below deck for a fix.

BF-1, heavily instrumented for the trials, was down owing to a faulty cooling fan in the engine nacelle; this was repaired and the aircraft conducted flights later in the day after we departed the ship. BF-5, a production representative model, was having trouble with its thermal management subsystem.



Peter Wilson, a BAE test pilot, was able to test the F-35B landing at four headings, each 90-deg. apart. He says the testing validates the aircraft can conduct VLs at any heading on the ship.

The VLs were conducted on spots in the aft portion of the ship that have been treated with Thermion, a new heat resistant coating the includes ceramic and steel; it is a vast improvement over the current anti-skid coating used on the deck and might be applied to other F-35 ships in the future, says Joe Spitz, lead tester on deck for Naval Sea Systems Command.

During one of the tests, Wilson landed an F-35B with its nose off toward the port side of the deck and its engine and hot nozzle exhaust on the port side. During this test, the engine nozzle was just at the demarcation on the deck between the Thermion and baseline anti-skid coatings on the deck. The effects are obvious. The anti-skid coating is brown as a result of the intense heat, while the Thermion appears unaffected.

Spitz says that while the anti-skid coating typical on can handle F-35 operations, its service life could be compromised over time. So, the Navy is assessing whether it will outline decks – or at least portions to be used by the F-35B – with this Thermion material in the future. The performance tradeoff is cost; Thermion is more expensive, he says.

However, heat output is an issue also with the MV-22s landing on the decks of carriers and small-deck ships, so it is possible the Navy will take into account the operational use of these tiltrotor aircraft as it plots a way forward for the use of Thermion.

Below, the dark section on the right is the Thermion coating. You can see on the left where Wilson landed with the engine nozzle just over the divider between the Thermion and standard anti-skid -- the the latter a bit toasted.

The F-35Bs, made by Lockheed Martin, have also flown with internal weapons stores using a variety of inert AIM-120s, Jdams and Paveways. These were used to alter the aircraft's center of gravity for approaches, VLs and STOs. Pilots on deck report not anomalies.

The insert weapons were stored on deck as seen below. First, you'll see the Jdams, followed by the AIM-120s with Paveways in the background of the second pic below.

photos and video by Amy Butler

Remember that testy F-35 Integrated Power Pack? Well, the USMC has welcomed it on deck with its own parking spot.

Finally, I couldn't help by include these two quick videos. I managed to get a first-class jump seat in the Block C MV-22 from VMX-22, a New River, NC, based unit used for test and evaluation of equipment for the Opsrey. Below is our wingman's launch from the Wasp.

And, at the request of the one-star on board, we did a flyby of the Wasp on our way back to Andrews AFB, Md. Thanks to the tiltrotor technology, we managed to travel roughly 200 mi. in about 35 minutes.