AirSpace Transcript - Season 9 Episode 11: Flak-Bait, Ooh Ha Ha!

AirSpace theme in then under

Matt: Welcome to AirSpace from the Smithsonian's National Air and Space Museum. I'm Matt.

Emily: And I'm Emily. If you've been out to the museum's Udvar-Hazy Center, you may have looked down into the restoration hangar and seen *Flak-Bait*, a bomber from World War II.

Matt: Flak-Bait has such an amazing service record that the Army Air Forces saved it from the scrap heap after the War. But years of public display, storage, and outdated restoration techniques have left *Flak-Bait* in challenging shape.

Emily: Our amazing staff of conservators and curators are working to stabilize the plane and preserve it for future generations. We're inside the Restoration Hangar and we've brought you with us, today on AirSpace

AirSpace theme up and out

Matt: We're here today in our Mary Baker Engen Restoration Hangar at our Stephen F. Udvar Hazy Center[1] in Chantilly, Virginia. It's our museum's second location, and we're joined today by *Flak-Bait*'s curator,

Jeremy: I'm Jeremy Kinney[2], and I'm the curator for the World War II U. S. Army Air Forces collection at the Museum

Matt: as well as one of the conservators who has spent a lot of time working on the plane.

Lauren: Yes, I'm Lauren Horlick[3]. I'm an objects conservator here at the National Air and Space Museum.

Matt: What is conservation?

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[1] https://www.si.edu/museums/air-and-space-museum-udvar-hazy-center
[2] https://airandspace.si.edu/people/staff/jeremy-kinney
[3] https://airandspace.si.edu/people/staff/lauren-anne-horelick

Lauren: So conservation is an interdisciplinary field. It involves studio art, material science. And, um, normally anthropology or archaeology. My background is as an archaeological conservator. Most of what I bring to bear on *Flak-Bait* draws on that background

Emily: So does that mean that everybody working on *Flak-Bait* has different specialties? You have some that come from an art background, some that come from sort of an anthropological or archeological background?

Lauren: Yes. And material science

Emily: And so you, ooh, material science. I love geology. It's all, it's all around

Lauren: It's It's more. It's more chemistry and polymer science and analytical techniques that these are the tools of the conservator. So most of what we do here is diagnose exactly what's wrong with an artifact and treat specifically that. So if something comes to the lab that has a certain type of deterioration, our goals are to arrest just that deterioration.

So this is what sets us apart from restoration. Conservation is focused on stabilizing original materials, whereas restoration is often thinking about things in terms of their appearance. How does this look?

Sometimes in a conservation the final step of it will include a restoration notion, which is really more about how do things tie together aesthetically. But everything that we do in conservation aims to be reversible and re-treatable. So that way if there's a later interpretation desired in the future, or if some of our treatments are not holding up very well, we can reverse it and re-treat it.

And you'll see as we talk about *Flak-Bait*[4], some of these themes are going to come back up

Matt: Yeah. Well, we're going to get into the whole process of preserving *Flak-Bait*. But first, I think we need to know a little bit about the plane's service record and why it's an important airplane to preserve. So, Jeremy, can you tell us the story of *Flak-Bait*?

Jeremy: Sure, *Flak-Bait* is a B-26 Marauder made by the Martin Aircraft Company. It's the American airplane that flew the most missions of any other during World War II, just around 200.

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4 https://airandspace.si.edu/collection-objects/martin-b-26b-25-ma-marauder-flak-bait/nasm_A19600297000

And, that means it's a survivor. That from the summer of 1943 to the spring of 1945, this airplane was flying over Nazi occupied Europe, taking the war to the Nazis. And it's a technology of, you know, it's called a modern airplane, that's what it looks like, that's how it's designed from the late 1930s. We have this artifact in the collection because of those 200 missions, it being a survivor.

But we are able to tell so many stories with it. It's the story of the people who built it, the people of Martin Aircraft[5] in Middle River, Maryland, just northeast of Baltimore. They made this airplane, you know, that idea of Rosie the Riveter, the people on the home front.

But it's also the story of the young men who flew this aircraft in combat. Which we think just over 300 individual Americans flew in this airplane over the course of its 200 missions.

It's also the story of the men who actually kept these aircraft flying during the war. In which many things we're going to see and talk about when we see this artifact finished. You're going to see the traces of those people who maintained it, flew it, and built it.

And that's why we want to tell this World War II story[6] at the museum. And it's an amazing provenance, an amazing artifact that allows us to do that when you look at *Flak-Bait*.

Lauren: In regards to our preservation efforts, everything that we're doing is to honor those stories.

Jeremy: Yeah, that's what's really neat about that is that there's a objectivity that comes about in collections care. You know, it doesn't matter what the object is, we should take care of it. That's what a museum does. But we kind of really leverage this idea that this is a story of people, uh, and, and we talk about people's stories and artifacts at the museum and *Flak-Bait* is one of those stunning examples of that in the collection.

Lauren: Absolutely. And most of the preservation approaches that we'll talk about today really highlight how the treatment techniques were guided by this philosophy of really bringing forward the people stories first.

Emily: Can we start a little bit at the beginning of the story? I mean, Jeremy you got us to sort of introducing the airplane and the history of the airplane. How did it get *here*, right?

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[5] https://www.mdairmuseum.org/martin-and-community
[6] https://storymaps.arcgis.com/stories/3cf6e35e5f1c43a6906cdc961ad768cf

What, what pathways did it have to go through from active service to coming here to the Smithsonian so that it could be cared for?

Jeremy: Well, on April 17th, 1945 is the 200th mission of *Flak-Bait*. Flying with the 9th Air Force, the Allies, the Soviets coming from the east, the British and Americans from the west are really, they're going to join. They join a day later after this bombing mission.

And *Flak-Bait*, and that 200th mission, it's seen by the head of the Army Air Forces, Hap Arnold[7]. This is a special aircraft. And back home in the United States, it's the National Aeronautical Collection[8] that's being created by the Smithsonian. And so he specifically sets *Flak-Bait* aside for this National Aeronautical Collection.

And so, but then it's deemed that this aircraft is too, it's not safe to fly back across the Atlantic Ocean to the United States. And so at a field outside of Munich, Germany, a maintenance crew is detailed with taking the artifact apart in 1946. And so it's crated, put on trucks, it's taken to the coast, and it's taken by ship back to the United States.

And it's stored in what this place is pretty mythical now in the lore of the museum, the Park Ridge[9] facility outside of Chicago, Illinois, in which there's this large World War II collection. Not only *Flak-Bait*, but American aircraft, British aircraft, and the Axis aircraft, or German and Japanese aircraft. Park Ridge closes in 1960, the Air Force transfers *Flak-Bait* to the Smithsonian, and it's brought to what we call the Paul E. Garber facility now, or Suitland, Maryland.

And it's there that the aircraft is in storage, primarily from 1960 to 1976[10], when the forward fuselage is installed in the new, at that time, World War II gallery at the new National Air and Space Museum on the National Mall in July 1976.

Matt: Right, so the forward fuselage is the part of the airplane that went on public display. And there were things done to it after it arrived and before it went on display. You know, attempts, I guess, by the best 1970s standards to restore it. Um, but that, you know, Lauren has been working to reverse here.

So what were those measures that were taken when it was first put on display?

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[7] https://www.af.mil/About-Us/Biographies/Display/Article/107811/henry-h-arnold/

[8] https://airandspace.si.edu/explore/collections#:~:text=The%20National%20Air%20and%20Space,Columbia%2C%20highlight%20the%20National%20Collection.

[9] https://airandspace.si.edu/about/history#:~:text=The%20National%20Air%20Museum&text=Since%20there%20was%20no%20room,Illinois%2C%20a%20suburb%20of%20Chicago.

[10] https://airandspace.si.edu/stories/editorial/where-flak-bait

Lauren: The exterior was overpainted[11]. The very top surface was overpainted with a green paint to cover up all of the battle damage and damage from wear and tear, which is exactly what we aim to highlight now because that makes it authentic that this look is very authentic.

And then the interior, the cockpit was overpainted black. So all of the instrument panels, all of the bulkheads, those were painted black. And then so there are fabric panels that are throughout the entire forward fuselage. So they're in the bombardiers, the cockpit and the radio navigators, they, they line the entire side. So only the people that were in the forward fuselage got insulation. The fabric panels are made from fulled wool and they clip into the side of the fuselage.

At some point in the artifacts history, there was a webbing clothes moth infestation and the webbing clothes moths, um, used the fabric panels as, um, for food. So it's, it's wool, so it's, it's protein for them and that's what they eat. So at some point between Park Ridge and going on display, this infestation happened[12].

So to cover up that damage fabric patches were applied with an adhesive on top of the moth damage and then spray painted. So a lot of our work was to reverse that to do a more sympathetic treatment to remove the patches, remove the adhesive that was embedded in the fulled wool, and to compensate for the losses that the moths had made from their eating activity.

Matt: Yeah, we're not trying to preserve the story of the moths, right?

Lauren: No

Matt: But you showed me when we were inside of that forward fuselage earlier that there was a hole that was also patched that was not a moth hole. It was a hole that was created by flak

Lauren: Flak damage[13]

Matt: that had actually hit the the airplane.

Lauren: yes

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[11] https://airandspace.si.edu/stories/editorial/preserving-flak-bait-reversing-1970s-restoration
[12] https://airandspace.si.edu/stories/editorial/preserving-flak-baits-fabric-panels
[13] https://www.smithsonianmag.com/air-space-magazine/hundreds-holes-iflak-baiti-180954662/

Matt: So that was part of the story of the crew that flew that plane during that mission and we don't want that to go away

Lauren: Right, so a lot of our philosophy when we first started looking at the airplane and what, what's our, defining what our goals were going to be, was really examining how much authentic material is really here and how much of the story of the survivors we can bring out by preserving what we see here.

So with that particular fabric panel, we removed a patch that was made to it kind of indiscriminately because most of the repairs that were done were extremely indiscriminate in terms of distinguishing between battle damage and moth damage and possibly handling damage. So anything that looked like it was damaged was repaired with methods that were deemed okay at the time.

Jeremy: Yeah. And due to the long storage, as well as the long display of the parts of the object, we, we had to become experts on determining what's post-historic damage and what's historic damage.

Lauren: Right,

Jeremy: Uh, cause you know, there's also all the, the paint chips that are all over. And you know, when people would see, you know, the, the nose section in the World War II gallery, and that was a very popular artifact but the logic at the time was, well, people can touch the object, and then the object was prepared to make it look good. And so not only do we have the storage damage, the infestation, we also had visitors actually wore the paint off the nose and the rear of, you know, over those years.

So are you a glass half empty or half full person? You know, people are connecting with an amazing, iconic artifact of World War II, but it's also they wore the paint off. And it's like upwards of 350 million people if you count our visitor numbers over those years, so it actually fared pretty well.

Uh, but the idea was that we had to determine what needed to be addressed and what's not, so that's kind of where we, we stopped in 1946. After Hap Arnold sets this aside, it's, the word gets out, this artifact, this airplane is going back to the U.S. So what do the young Army Air Force's personnel do? They sign the artifact[14]. In China ink, they scratch it in the paint with graphite pencil, and that all over the bottom of the object. Uh, so we, what's, what do we want to keep? What do we need to address?

Lauren: and, and what's the story we wanna tell by what do we wanna keep?

[14] https://airandspace.si.edu/multimedia-gallery/nasm2020-03454jpg

So one of the things that had happened in the 1970s when they overpainted it, was that the overpaint covered up most of those signatures. So by reversing that, we can really celebrate the servicemen, and the, the crew, the disassembly crew. And that's a huge part of what we're trying to to do here.

Jeremy: And it's fascinating because it's the rank, name, the hometown, and the duty station of Oberpfaffenhofen, which is the field outside of Munich, Germany. And so you can see just this cornucopia of Americans across the bottom that all they had to do was sign the object. That's not even the over 300 Americans that flew in the airplane over the course of its combat career.

Matt: Let me ask you a question about the wonderful *Flak-Bait* name and you know, it's one of the most sort of eye-catching parts of this airplane, is where it's painted on the forward fuselage along with all of the bomb symbols that, do those represent each mission that the plane flew? I assume those were also added by the ground crew. Can you tell us about, you know, how that came to be?

Jeremy: Yeah, if you look at the port or left side of the nose, you see the nose art that says *Flak-Bait*.

And that's one of the most iconic things that comes out of World War II, is that bomber crews, fighter crews, they would put some sort of personalization on their aircraft, nose art[15].

And *Flak-Bait* is, you know, very unique in the sense that it has this original, uh, art that was devised by the original pilot, Jim Farrell,

Flak is the German abbreviated word for anti-aircraft artillery. It's shot at aircraft. B-26 crews called themselves flak bait, but Jim Farrell also had his brother's dog back home named Boots. Her nickname was Flea-Bait. So he combines flak with Flea-Bait to create *Flak-Bait*.

He draws this out on a, basically a napkin, and hands it over to the squadron, the 449th Bomb Squadron's nose artist, Ted Simonitis, and he paints that art on the side of the nose of the aircraft.

Like other bomber crews, you have your nose art, and then you mark each mission with a bomb. The first ones are yellow, they're overpainted red over time. And so each bomb represents an individual mission. And if you take the time, you can count 199 little bombs and one big 200th bomb.

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[15] https://en.wikipedia.org/wiki/Nose_art

But when we look at the bombs what's really neat, is that the first ones are yellow, they were overpainted red, you'll see a black one for a night mission, and then every fifth bomb has a white tail on it, so you can actually go 5, 10, 15, 20 and count the bomb missions really quickly.

There's some duck decoys in which the crew would actually fly missions, they would drop chaff, you know, aluminum foil to, you know, fool the Nazis radar, or they would drop leaflets, and when they would do that, the target, the intended target. So decoys, they don't count, they don't really count as combat missions, even though I would, because they still get shot at.

And there's one swastika on the nose that, uh, denotes the actual one confirmed arial kill from the tail gunner on the airplane.

Emily: I got an opportunity to walk behind this wing, um, to go look at the front of the plane. I guess that's what geologist call the front of the plane.

Jeremy: Works for us

Emily: I'm sure there's a, I'm sure there's an actual name for this

Jeremy: The forward fuselage

Emily: Sure, is that what that front is? Yeah, cool. Um, and you can see the signatures that you were talking about earlier. And I'm having a really hard time understanding as a person who's attempted to remove layers of paint off of my walls.

How do you take a layer of paint off of an artifact and keep pencil drawn signatures? Where do you, how do you even know they're there? I have so I have so many questions about this.

Lauren: So we knew they were there. We did two things. So first we did extensive documentation of the surface using a variety of photographic techniques. Diagnostic imaging is one of the things that I kind of geek out about. So we did a bunch of ultraviolet light photography and also infrared reflectography[16]. So this allows us to see through the paint layer.

We did this across the entire forward fuselage. It's pretty painstaking because you can only do one frame at a time. And so we were able to understand better the extent and

[16] https://airandspace.si.edu/multimedia-gallery/flak-bait-figures-10-and-11jpg

location of where the signatures were. We also had the benefit of having the rest of the aircraft available to us for solubility testing.

So the paint layers I can test in discrete areas on other parts of the aircraft to understand the paint's material properties. So knowing what the solubility parameters are for the rest of the airplane, I know what not to use because I don't want to damage the original paint. Our main goals here are to save the paint and then I can also test on the aircraft, on the forward fuselage, what the solubility parameters were for the overpaint that was done in the 70s.

So, because conservation involves a lot of chemistry, I had to, um, basically develop a protocol for removing the overpaint very carefully. So it's, it's part using chemistry and part technique to carefully remove it and, um, stop where we see the original paint. Fortunately graphite is not soluble but it can smudge so that's where the technique part comes in handy.

Emily: Were there challenges in the places where millions of people had touched this? I still can't believe people used to touch things in museums. Um, that's really hard for me to imagine, but does that, I mean, hands are gross, right? Does that change how that paint behaved

Lauren: the hands wore off the paint so that, that whole, that whole

Emily: Oh! Good paint and bad paint

Matt: yeah. It's shiny aluminum.

Emily: It's shiny aluminum?! Does that mean you maybe lost signatures or is it a small area over which this happened?

Lauren: Well, we can't know. Yeah, we can't know

Jeremy: Okay. Uh, but yeah, why don't you talk about the technique, how you're going to address that visitor wear?

Lauren: Yes, I will. So we have developed a protective coating that we're going to be applying over all. We've, we've already used it on most of the components that are completed. So if people come out to visit us at Udvar-Hazy, the completed rudder, the engines and their cowlings, and pretty soon the propeller blades and the turret will be out on display, but the rudder is probably the best example of this.

Um, we, we have a coating that we've developed and it really brings out the original color. It doesn't impart any gloss to the original surface, but it's a two part process where the first layer of the coating essentially creates an isolation layer.

And it also optically saturates the original paint. So once that isolation layer is, is on, I can do what we call toning. So I'll tone out, I'll match the color to the adjacent area where it's lost and I'll tone it to match that color. And then we'll put another protective layer that has a bit of a matting agent over top of the whole thing. So in the end, it'll all look totally cohesive.

The goal of the project from my, my goals are so that you never see my hand. I want everybody to appreciate the object for how it was intended to look and so that all the battle damage and not visitor damage is obvious. So we will not be toning out areas that would be suggestive of battle damage. So any kind of paint chips that you see here or wear. Any, anything that's referential to its use is what we want to highlight.

Emily: But are you also mapping and keeping track of everything that you're doing so that in 50 to 100 years when things need touch ups, they need additional care because, you know, things get old?

Lauren: One of the basic premises, and it's, it's also the, the ethics of conservation to do documentation. It's, it's one of the first things that we learn, um, in graduate school. And it's one of the main things that we do here in the museum. Everybody does this in the museum is document our work. We're documenting what we did and mainly why we did it. And this is also so that if something needs to be reversed in the past, people don't have to reverse engineer it to figure out, 'Oh, what did they do?'

Um, yes. So we, we document everything with written, um, and photographs, a lot of photographs.

Jeremy: And, uh, *Flak-Bait*'s been the pioneering project for that for the museum. Is that we've had these large artifact treatment projects before, but it wasn't until 2012 when we got the Mary Baker Engen Restoration Hangar that we could really kind of start new and had a facility that we could actually work on *Flak-Bait* in a way that, you know, follow these best practices. And so it's going to be clearly the most documented object in regards to the treatment program, what we're going to see with that.

So part of the process is that we'll have that report at the end. That we start with treatment guidelines, what the themes are and then we work towards the end and everything will be documented that way it'll be a hell of a space on the server,

Lauren: It already is, yeah

Jeremy: Yeah. But it's amazing to see that documentation there because it's that forever idea that the Smithsonian really holds very dear.

Matt: Jeremy, there is a lot going on, on the surface of, of this plane in terms of the insignias that it has on the wings and the ways that those were changed during the war and also stripes that were added. Tell us about, you know, how the, the surface of the plane reflects how it was used in the War.

Jeremy: You know, since this is a survivor and we've adopted this preservation theme for the treatment project, we're able to see the changes on how the Army Air Forces conducted the war, but how they went about the actual very specific, very geeky things about how to you identify aircraft in the air. And so when Flak Bait-left the Middle River factory at Martin, it had the national insignia was a blue circle with a white star. And if you look on the wing here, you see that blue circle and the white star, but you see that by the time the aircraft gets to England, there are two white bars put on either side of the circle, and there was a red outline going over the entire insignia.

By the middle of the summer of 1943, that red outline is painted, overpainted blue. And you can see that by looking at that insignia. You can also see that the paint really stuck from the Martin factory. It didn't really stick, uh, in terms of the two white bars on the top of the wing, uh, that you see there.

And if you get really close, though, you can see the brush marks, you can see the red under it. And you can really see those different tones, the different things. And so what that shows us is that those changes were made by that ground crew and they you can see that story of that going through combat in that way.

Now for the Normandy invasion every allied aircraft participating specifically in the invasion had alternating white and black stripes[17] on the tops and bottoms of the wings and the fuselage. *Flak-Bait* had those, it flew through missions on D-Day and by virtue of surviving D-Day and surviving the War uh, the stripes were removed by the end of the summer of 1944.

And so, the same ground crew had to go out and remove those stripes, and Lauren can talk about what the stripes tell us about what they're made out of and everything. But, you can look on the bottoms of the wings and see the remnants of those invasion stripes

[17] https://www.smithsonianmag.com/air-space-magazine/dday-veteran-earned-its-stripes-180972226/

You see those white and black stripes, and they are there so troops on the ground won't shoot at the airplanes with the white and black stripes on them.

They did anyway, but that's another story that this airplane was in D-Day. So, and this Air War also flew the Battle of the Bulge, and it was flew that push across into Germany in 1945. So, the story of its service, the combat in which the Americans flew in it, can be seen in these changes and the, in the patina, uh, of it.

And also one thing on the wings, uh, just back to wear and tear, all that wear is from the mechanics walking on tops of the wings, rubbing the paint off as they worked on the airplane.

Lauren: Yeah, one thing I wanted to add about the paint is that because *Flak-Bait* wasn't expected to survive over 200 missions, there was no primer ever put on the airplane on the interior or exterior. So one of the big challenges that we have to preserve it, is that because there's no primer, the paint wants to flake off.

So when I was talking before about the preservative coating that we're putting on top of it, that will also help to keep the paint intact on this aluminum surface.

Jeremy: Yeah, just to drive this point home, is that the paint sprayed one coat, green and gray at the Martin factory, the markings, the brushstrokes, the changes. That's all by the people that lived that history. And if we had adopted a technique that might have been applied to this object, you know, 20 years ago, it had been stripped and repainted to make it look like it was at the end of World War II and you just can't replicate all of this. It's just amazing to think all these very fine details in regards to what brings out that true story of the people who, you know, built, flew and fought in this aircraft.

Lauren: Yeah, I like everything that Jeremy just said, because we're very fortunate that *Flak-Bait*'s time is now. Because what he's saying really represents this, from my perspective, really wonderful shift in thinking about authenticity of artifacts.

Emily: What are the kinds of things that you're doing on the interior, specifically with the fabrics? Because if you've ever had moth infestations in your sweater collection, it is really, really, it's devastating. I'm still like reeling from it because you know, natural fibers are just magnets. And I cannot imagine the fact that you have all of these fabric panels, plus wool insulation, and you're not trying to do what the rest of us do, which is like, you know, throw out what you can't save and patch up what you can. It's trying to keep as much of that as possible and I can't even fathom what that's like

Lauren: So the process that we developed after we removed the patches that were applied from the 70s restoration basically involved us first finding a sympathetic material that is distinguishable from the original.

And we found that, uh, the type of fabric that you would use on a pool table. Has a sympathetic kind of nap. The, the fabric panels are a little on the fuzzy side. So it's, um, it's called baize. So there are different levels of fuzzy that you can get.

So, um, one of the mechanics that I was working with on this project, we went to a, a store here in Northern Virginia that sells pool table fabrics and cause we couldn't tell online and we went and touched all the different samples that they had and we're like this, this is the one. So once we had determined what the actual like nap of the fabric is, which you could really only tell from touching it. We ordered a bunch of it. I forget how many yards now.

We had it custom dyed to match the two different colors of fabric panels that we have on the inside. They're brown and green. And once we got that, in stock, we then started to take each panel, panel by panel, all 52 of them, and we took mylar, which is, you know, that clear material, placed it over top of the moth damage, and traced out the shape of the losses from where the moths had munched, scanned it, and turned that into a vector file, and then our friends in exhibits could cut out with the laser cutter exactly the shape of the loss on the replacement material. So then each one of those little organic shapes was hand stitched using couching stitches into place.

So we had a backing fabric that it's attached to. In some places the losses were quite extensive to the point that you couldn't handle the panel. So this is a really, in some ways, very structural. These were structural repairs and also aesthetic.

Matt: So Lauren, aside from the technical work that you've been doing returning the aircraft to its historic, um, you know, state as it was when it was first decommissioned, you've also been doing a little bit of archaeology on the plane as well, recovering a lot of materials that were left behind by the crews that flew on the plane.

Lauren: Yes

Matt: So you must be learning a lot about how people inhabited and used the plane, and in some ways, reconstruct the lives of the people who flew the plane.

Lauren: Yeah, when we first started evaluating all three components when they came from Garber it was really, really exciting. It was the first time that all of the sections of

Flak-Bait had been together in one place. So this was really momentous for the museum. And I think for the *Flak-Bait* community to see everything all together.

One of the really interesting things that we started finding and collecting[18] are in these boxes that are right next to Matt right here. So there are three boxes, one for each of the main components, one for the forward, mid and aft fuselage. And inside the boxes are trays and since my background is a little bit in archaeology, I started collecting the things that we found and keeping the locations or sort of the provenance associated with it.

And we find in the mid section, a lot of these, this is my favorite part of *Flak-Bait* actually is in terms of the small finds are the bomb tags. So the mid section is where, is the bomb bay section. So this is where the bombs are dropped. And if you can hand me that tray. So I didn't know what these were at first, but put it together as soon as I found one that had all the writing intact.

So these are, um, these are the tags that were connected to the cotter pins that would have been deployed to arm the bomb[19]. Yeah, so, uh, should I read it?

Matt: Yeah.

Lauren: Ok, so it says 'pin not to be removed until fuse is about to be placed in bomb. If fuse is removed from bomb, replace pin at once!'

Like there's no exclamation point. I added that, but, I just think this is amazing finding these bomb tags and we find chewing gum in this box. We're also looking at, um, a chewing gum wrapper, match sticks. In one other box, we have a, uh, sardine can opener and, um, so all of these little nuanced things really remind us of the people who really lived and survived in *Flak-Bait*.

Emily: After the museum did an enormous amount of work on Neil Armstrong's original space suit, there was a lot of work that was done in preserving the stuff on the outside of that suit namely a lot of the hitchhiking Moon rocks, if you will, um, in the form of Lunar dust.

Are there things on the outside of *Flak-Bait* that aren't the paint, good and bad, um, that you wouldn't think needs to be kept as part of this project, but making sure that you're preserving.

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[18] https://www.smithsonianmag.com/air-space-magazine/secrets-flak-bait-revealed-180954682/
[19] https://www.historynet.com/b-29-tail-gunner-bomb-tags-world-war-2/

Lauren: So the mud that's on the nose gear doors[20] is from its last landing. So we want to keep that because it's part of our story about its mission history up to the day of its last landing. So, you know, maybe this seems completely wild from an airplane restoration approach, like what? You're keeping the mud?

But the thing is, we, um, are very lucky to have some partners at the Smithsonian Natural History Museum, who are total *Flak-Bait* fans. And they volunteered to let me use their scanning electron microscope, um, with their help, of course, to characterize the mud samples, because we were really looking to make sure that there's no chlorides in the mud, which is harmful for the aluminum.

And then taking it one step further, we want to try to link this mud back to that airfield. It turns out that airfield is, we're not able to get like good samples from it right now, but we can at least double check that the mud that's on the nose gear doors is the same that's on the tires. And this lends credibility to why do we want to keep it, and especially with the fact that it's not harming anything. And it's, it's part of the narrative that we want to share

Matt: Yeah, it's like CSI Smithsonian edition

Lauren: Yes, yeah

Emily: a geologist, I don't need an explanation for keeping the mud. I mean, right? Like, that's all, that's obvious to me

Lauren: Yes. And since my background is in archeological conservation, the idea of keeping things in situ that are related to its use and its life, it's a no brainer. But, you know,

Jeremy: Yeah, in our guiding picture of the color *Flak-Bait* is at the end of World War II, you see the mud, you see the mud stains and everything and that’s what we wanna keep that

Lauren: So, in addition to the mud that we're preserving on the nose gear doors, there's also grease.

So, so the wings, as you see them right now are vertical. So they've been in this vertical orientation at Garber, since, since, since we received them. When we started doing the examination before we moved the wings, we opened up the, the main gear doors. And at

[20] https://insider.si.edu/2015/06/to-preserve-rare-wwii-bomber-conservators-turn-to-science/

the very top, um, had to get on the tallest ladder available. To look at this more closely, there are tic-tac-toe games played in the grease

Emily: Stop it. I'm so excited. I love, I love this kind of accidental graffiti. Obviously it wasn't accidental. You don't just accidentally tic-tac-toe, but, um, these are the kinds of cool, is there a blog post about this? I want to read it

Lauren: Not, not yet but

Emily: this is so cool

Lauren: Yeah, so so, in service when the doors would be down, if it was raining or people are just hanging out, they'd be able to, you know, the doors would be kind of at this, at this height. So we don't think that this was done later. The doors have been closed. They were shipped to us closed.

This lends credibility to this being service graffiti, if you want to call it that. So one of the challenges we have, especially in conservation is, how do you preserve grease?

Jeremy: Because bare metal in the gear door but we also have it impregnating the paint, which is also stained by exhaust and the fear is that if you actually just touch it you could actually just wipe it away and have bare metal under it so we want to make sure we keep that because we like exhaust and then also the exhaust burnt the paint off the side of the nacelles, which is really cool. So and then you got, and you, you get all that grease too from changing engines.

So just like, you know, you're dealing with your mechanic. Sometimes the oil gets everywhere and that's, they just, they, they meant for this airplane to fly so they didn’t wipe that down when they changed the engine, which they could have. So they uh, it’s really just amazing to have that, once again another one of those things we have to figure out how to do it, but then it's a, but that’s probably, we’re keeping that on the down low a little bit I think, so

Lauren: spoilers.

Matt: Not anymore.

Lauren: Yeah, that's, that's what's coming up next in terms of conservation research that needs to be done so that we can preserve that grease. And that's in addition to finishing up the work that we already started in characterizing the invasion stripe material.

This is, this airplane is the only one that we know of that has the original invasion stripe material. So we want to know what the pigments are and what the binders are, because this is, the artifact is really a primary document. A lot of other aircraft that you see that have been restored have invasion stripes with modern paint painted on it.

But we want to know what is the invasion stripe material made from because that speaks to the economy of materials at the time. And we're just fascinated by what, what could this be? And then of course, this helps us with our preservation approach.

Jeremy: And then also the, you don't even see the stripes at all on top of the wings or the fuselage it's like, we have a picture of it with its stripes, you can't see where they are now. So how'd they disappear? Pretty amazing.

Matt: So Lauren, you're the one here talking to us today representing the conservation of *Flak-Bait*, but there have been other people as well who've worked on this. Can you tell us a little bit about the team and what specialties they brought to bear on this project?

Lauren: Absolutely, yes. So the conservation effort that I spearhead normally involves defining our methodologies and making sure that our goals are well understood and um, elaborated through the treatment process. So I'm very fortunate to also be the, um, supervisor for the Engen Conservation Fellowship Program.

So we have two postgraduate conservators come and work in the lab, um, for the last eight years. And normally the Engen fellows are very interested in dealing with something really complicated. And there's always something really complicated on *Flak-Bait*. So more recently one of our Engen fellows, Emily Brezinski, worked with me for the last two years on the top turret. We also had Engen fellows for a couple of years helping with all the fabric panels. And we also had a volunteer Gretchen Remy, who helped with a lot of the hand sewing.

In terms of the restoration hangar, we have specialists who deal with engines, so the engines have already been treated. And presently, my partner on this, Chris Ryderson, is assisting with how we're going to join all the fuselage sections together.

So on that note, we also have two amazing volunteers who love hardware, and they spent most of COVID finding, sorting, and treating all of the hardware we're going to need for the join and that's in that cabinet over there.

So, between the volunteers, the restoration shop specialists, um, who really help with major structural problems, and conservation, we're able to move forward with *Flak-Bait*.

So as, as we get into it, once we're done with our major museum renovations downtown, we will really be relying on our, uh, restoration preservation unit folks to do sheet metal work. We have a lot of sheet metal problems, especially in the aft fuselage. And then of course, joining all of the sections

Emily: You and Jeremy have done an enormous amount of work to try and share all of these levels of detail that go into like, it's not just painting it to look pretty, right? Because pretty isn't the goal, because pretty means different things to different people. But you've worked really hard to share all of that kind of stuff. 'cause not everything can be seen from up there where the visitors can sort of look down on, um, what's going on in this hangar.

Lauren: Mostly the outreach is to ensure the *Flak-Bait* community that we're doing our very best to care for this very special artifact. It's the, the intention is really not like, 'Hey, look at this cool stuff that we're doing.' It's really, we are caring for this. We're caring for it to share the stories of survival. These are the stories that we think are really important to get out and it gets into this whole narrative of what are we repairing and what are we not repairing and why. And the ideas behind that really, you know, predicate our processes.

Jeremy: Yeah, we made this reference to the *Flak-Bait* community because when you have just over 300 individual Americans fly in the aircraft as well as work on it, there's a legacy there in terms of people, families.

What another awesome surprise for the project was that we regularly have *Flak-Bait* families come and visit the artifact. Uh, and we have this list of the crew. They'll go, 'Hey, my grandfather flew on this. My father flew on this date.' Look at the date, you check it off. 'Yeah, come on by, we'll, we'll show you the artifact.'And people have those connections, uh, in regard to that. And it gets, and it gets, as the families get bigger they connect that way.

And so it's very deeply personal for a lot of people but it's also, people are very proud to see, uh, an object from World War II in this new way.

Matt: Well, eventually the work will be done. And you will be able to put *Flak-Bait* together and put it on display. What are your display plans for *Flak-Bait*, Jeremy?

Jeremy: Well, the intention is to display *Flak-Bait* in the Boeing Aviation Hangar at the Stephen F. Udvar Hazy Center. At the center of the aviation hangar is the World War II collection, so it'll be in that area.

We're kind of working out where it's going to go and where we have some of these, you know, we have the B-29 Superfortress Enola Gay[21], the first atomic bomber. We have this B-17, you know, built by Boeing called Shoo Shoo Shoo Baby[22]. Uh, we have the JRS, the Pearl Harbor Survivor[23], so we've got to fit all these objects to tell this fuller story.

So we have these stories of World War II in which *Flak-Bait* is a central one. And then we have this very original artifact, uh, to be able to tell that particular story, that air war over Europe.

AirSpace theme up and under

Emily: AirSpace is from the National Air and Space Museum. It's produced by Jennifer Weingart and mixed by Tarek Fouda.

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21 https://airandspace.si.edu/collection-objects/boeing-b-29-superfortress-enola-gay/nasm_A19500100000

22 https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196270/boeing-b-17g-flying-fortress/

23 https://airandspace.si.edu/collection-objects/sikorsky-jrs-1/nasm_A19610112000