Home Front Episode 2: 50,000 Planes

Welcome to Home Front, a production of AirSpace from the Smithsonian's National Air and Space Museum sponsored by Lockheed Martin. I'm Emily.

In this four part series, we're bringing you stories of civilian contributions to aviation during World War II.

Aviation during the war was not all flying, in fact a lot more civilian contributions to aviation were about **building** planes rather than **flying** them. Today we are talking about Rosie, Rosie the Riveter.

"Allen Miller- Rosie the Riveter" fades in
"That little frail can do, more than a male can do. Rosie the Riveter!"
Fades out

Many people today will recognize a certain iconic Rosie the Riveter image from Howard Miller's propaganda poster- polka-dot headscarf, bicep flexed, "We Can Do It" speech bubble. But Rosie was not just a character - millions of real-life women went to work in factories during World War II.

The Rosies and other war workers made aircraft, and tanks, ammunition, ships and other important supplies that were a huge asset to the war effort. When it came to aviation, the Rosies helped develop a manufacturing industry that would have been completely unrecognizable to anyone who had made airplanes in the 1920s and early 1930s.

Cory: "Looking at how aircraft were manufactured before the war versus during the war is, is really interesting."

That's Cory Graff,

Cory: "And I am a curator and the restoration manager here at the National World War II Museum in New Orleans, Louisiana."

Cory: "I'll take you back to something like January of 1936. The Boeing Company, the Boeing Airplane Company in Seattle, Washington, got an order for 13 B17 heavy bombers, and it was super exciting news.

But at the same time, Boeing was sort of devastated. Like they had nowhere to build 13 airplanes all at once. Not only physical space, but also workmanship. The, the labor force was important, what you see before the war is lots of middle aged white craftsmen who could do anything. They could do fabric, they could do wood, they could do metal, they could do riveting, painting, avionics, engines, anything that you needed to have done to an airplane, soup to nuts."

Even four years later with the War raging, American manufacturing was still lagging, though manufacturers could now make more than 13 planes at once.

Cory "Pre-war manufacturing of aircraft was sort of meager and small. Actually, when President Franklin Roosevelt said in his fireside chat in May of 1940, we are going to make 50,000 airplanes a year.

FDR Fireside Chat #15[1]: May 26, 1940
" The Government, working with industry is determined to increase that capacity to meet our needs. We intend to harness the efficient machinery of these manufacturers to the Government's program of being able to get 50,000 planes a year."

Cory: "That was sort of a, a devastating announcement. That was similar to the, we choose to go to the Moon type of thing,"

JFK (overlapping at Choose, with an echo)
"We choose to go to the moon in this decade and do the other things, not because they are easy but because they are hard…"

Cory: "Since the Wright Brothers, the inception of flight up through 1940. Only about 31,800 military planes had been made in total. So the idea of doing 50,000 in a year is just insane.

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1 https://millercenter.org/the-presidency/presidential-speeches/may-26-1940-fireside-chat-15-national-defense

During World War II if, if you, if you count the ramp up to World War II, which is helping the British, helping the French, and also building up for war, we made something like 300,000 military airplanes. That's a lot more than 30,000. It's a, it's a big jump. And, uh, they, they did that by making the airplanes in a totally different way."

In order to meet the growing need, American manufacturers had to completely change how they made airplanes.

Cory: "What industry had to do was look at the auto industry, which had been pumping out, you know, Model Ts and Model As in huge volumes and look at how they did things. The way that they actually constructed vehicles and, and airplanes would be constructed this way, you have very specialized jobs.

And airplanes move from station to station, or people move from station to station and they have a punch list of 28 things that they're responsible for. Hang the engine, make the landing gear work, do this set of rivets, uh, put in these seat belts. And they didn't have to know the whole job. They just had to know their part of the job."

Airplanes were never made in a full assembly line like cars, but the War drove manufacturing toward that method and away from the bespoke, one at a time method of the pre-war years.

This is Dr. Jeremy Kinney,

Jeremy: "I'm the Associate Director for Research, Collections and Curatorial Affairs at the Smithsonian National Air and Space Museum."

Jeremy "When we think about mass production, we think of the Model T, right? We think of, you know, the, the automobile mass production, an assembly line. Well, that never existed in the aircraft factories, but what did was bulk production.

And so it's a lot of people working in specialized tasks working as teams to create airplanes. Because airplanes aren't cars. They, they can't just be rolled down an assembly line and be kind of piece after piece, but they do move in a line. So at the beginning of the factory you have all the pieces and parts coming from specialty manufacturers, and by that time, that airplane reaches the end of the factory. It's ready to be started up and flown and tested to see if it actually works."

This change in the way planes were built ushered in an **even more** important change, who was building them.

Jeremy: "Looking at, you know, the production of, in 1939, like 2,000 airplanes with a very primarily all male workforce and very small factories in the, in the different corners of the United States. That by the end, at the high point of the American production program, you're looking at 96,000 aircraft just in 1944 alone.

And what that required was a rethinking of who was gonna make the aircraft and how they were going to be made and how that whole process was gonna come together. So as able-bodied men go into the, you know, military, the need for women, minorities and people who were, were not fit for military service or had a skill that was important for, you know, the, the production of aircraft, they went into the factories and so just over 2 million people were working in the factories at the height of the production program."

Wartime factories needed workers and the government told them if they wanted military contracts, they couldn't discriminate on who their workers were.

Cory: "The birth of, of the World War II industry workforce goes back to executive order 8802, which was in 1940. Which in essence said, if you want to get government contracts and build government machines and armaments, you have to open your doors to anyone, and that changes the world in a lot of ways."

Between President Roosevelt's executive order 8802 and most traditional factory workers shipping off to fight the war, factory doors were open to many who would have been kept out before.

Cory "Instead of these, these white craftsmen who have these jobs all of a sudden the doors are open to Latinos and Native Americans and African Americans, and as well, it it, it brings the rise to Rosie the Riveter. Women being in the workforce."

Young men of all ethnicities were needed in the military, but any person who wasn't allowed in the military would often find their way to jobs on the home front.

And many found that the things that might have made it hard for them to get **any** job before the war, were exactly what made them perfect for these factory jobs.

Cory: "So you see deaf people in areas where drop hammers would drive people crazy, you know, they're hearing this banging and crashing all day long. Blind people were given trays or boxes of material, and their job would be to, I'm assembling the hydraulics for a nose wheel of a P61. And when I get this one assembled, I go on to the next one. They would do that for hours and hours of their shift.

In addition, smaller people were excellent. Airplanes inherently are small, or at least there's not a lot of room to hang out inside of them. So you'll see situations where young women who are very skinny are coaxed into the wing box of a B24 to, to tighten the nuts down and things like that.

Recruiters would actually cruise Broadway shows and Hollywood to find little people. And they were employed because they could get into places like inside of a wing where other people couldn't, and they're cruising for tools, cleaning stuff up, and doing work in areas that normal stature people couldn't reach."

In addition to scouting for recruits, there was a huge, nationwide, government sponsored advertising push for war workers.

Today, if you go to the movies early, you see previews of upcoming movies. Americans who popped into the movies back then, might hear messages from short films urging them to work hard for the war effort

Video Audio: "Sunrise over Republic Steel. High noon at Willow Run. Sunfall on the Electric Bolt Company. Midnight at the Brooklyn Navy Yard. Dawn to dusk and back to dawn again. Three eight hour shifts. One day. So much can be done in a day if Americans will keep their sleeves rolled up.[2]"

Second Video Audio "Production mounts and new blood is added. Girls and Women take their place on the line along with the men of industry. New hands, new tools, new plants, working 24 hours a day 7 days a week.[3]"

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[2] https://archive.org/details/Conquerb1943
[3] https://archive.org/details/Victoryl1942

Third Video Audio "We know that victory is only won through the sweat of workers and the blood of soldiers. Out there there isn't one unimportant soldier. And back here there isn't a single unimportant worker.[4]"

Fourth Video Audio "There are 100 million of us, men and women of working and fighting age. To fight this war 10 million more people must go to work by the end of 1943.[5]" fades out

Factories needed so many workers, that jobs were filled by folks who came from all walks of life.

Jeremy: "There was a lot of opportunity in the aircraft production plants in which formerly farmers, rural workers, rural families, would move to the big cities, Southern California and Texas, even in the Northeast and the Midwest. And they were looking for opportunity and they learned on the line."

One worker who heeded the call, though not through a newsreel ad, was Erlinda Avila. She was just 15 or 16 at the time. Now, at 101, she still feels that time as though it was yesterday.

Erlinda: "My brother's name is Pete, and if I get a little bit emotional, excuse me, ok? Pete and I were very close. We were the two youngest kids and we always stuck together. And, uh, when Pete was drafted and he had to go I was very sad, but I was also very strong.

I said to myself, there must be something I can do. I really wanted to go with my brother. But since, um, at that time, uh, women were not allowed to join the Army, the Navy or anything else, you know, they were to stay home and take care of their husband and their children, but I wasn't about to do that.

I said to myself, there must be something I can do. So I, I, I don't know how I found out that, I could go to school and, and learn how to work in a defense plant, but somehow or other I found out and I went for it. I went to Phoenix Union Workshop to learn how to, how to be a riveter and a bucker."

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[4] https://archive.org/details/0020_All_Out_for_Victory_20_20_38_20
[5] https://archive.org/details/0007_Manpower_07_21_36_00

Erlinda wasn't allowed to enlist with her brother, but she wanted to contribute to the war effort while Pete was on the front lines. This was a common motivation for people working in the factories: contributing to the war that was very personal to so many.

But it wasn't the only reason people took these jobs.

Cory: "When it comes to motivations, there's many things going on. To be frank, one of them is revenge. You know, you have Chinese Americans who, or, or Polish Americans who are at the factory because they want to stick it to the Axis, or they've had a loved one who's died or been involved in the war. And they want to make the planes that are going to bomb the Japanese, et cetera."

Though this motivation is rooted in xenophobia, Americans with family ties to countries actively at war, had a particular bone to pick with the Axis Powers of Germany, Japan and Italy.

German Americans, Japanese Americans and Italian Americans were often just as eager to support the Allies. Americans were-for the most part- very invested in contributing to the war effort.

Cory: "There's a whole patriotic fervor. Everyone is behind, well, not everyone, but a vast majority of people are behind the effort. In World War II, you see the posters, you hear the radio shows, you want to be a part, you want to do your part for the war effort. Your son or your brother is overseas in the military in some form or another, and I can't do that, but I can help and everybody dove in and helped as much as they could.

The third factor, which needs to be considered, it's, it's not sexy or glamorous, is the idea that the Great Depression was right before World War II and people need to be pulled out and they need the money and it's a very well paying job, and they're very, very happy to have it."

Erlinda joined the hundreds of mostly women workers who bussed out to Goodyear, Arizona from Phoenix to make wing assemblies for the B-26 Marauder, a bomber critical to the war effort.

Since Erlinda was quite small, she was assigned the hot and grueling job of climbing inside the plane wings to buck the rivets.

Erlinda: "We had a, a men instructor and he told us, you know, since you and, uh, the other girl whose name was Amy, he said, are gonna work inside the wings because you're, you're little and you're skinny and you can crawl in the wings.

So we did that. Amy worked in the right wing and I worked in the left wing of the plane. And we were buckers inside the wing and our riveter was on the outside, which she was the one that drilled the holes and put the rivet through the hole, and then we would buck them in from the inside."

Erlinda would hold a bucking bar, essentially a flat, piece of thick metal, up against the inside end of a rivet so when a worker on the outside of the airplane wing drove the rivet in with a rivet gun the inner side of the rivet would flatten and seal into a functioning fastener, holding the parts of the wings together[6].

Each airplane had thousands of rivets that were all done one by one, by hand.

The wings Erlinda made at Goodyear would have been shipped to the Martin factory in either Baltimore or Omaha to be assembled into a fully functioning airplane.

And that's how a lot of war manufacturing worked. Big factories would assemble planes, but smaller factories around the country would have made parts. Wings from Arizona, radios from Iowa, engines made in Michigan.

All these factories had a lot in common, they would have felt familiar to workers from just about any other factory.

Cory: "One of the first things that strikes a lot of people that come into a factory setting that haven't been there before is the area is flooded with light. Of course, to do good work, you need light.

One of the other things that strikes people is its cacophonous noise, um, all day long, every day. You don't necessarily see that from the black and white photos you're used to seeing, but it's a, it's a, a sort of a, a hellish existence from a, from a noise point of view.

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[6] https://www.youtube.com/watch?v=DkchwUeqKYQ

In addition lots of workers will comment that tobacco use smoking in particular was not allowed in the factory for obvious reasons. So there is a smell of chewing tobacco spit, essentially, that that permeates a lot of these buildings"

Depending on what factory you were in at what time and what your job was your shift may have looked different, you may have worked an eight or ten or even twelve hour shift. Five, maybe six or even seven days a week. It depended on how in demand the thing you were building was.

Cory: "An average person who is doing an an average job has sort of a punch list that they're working from. And in the, in the early versions, you would sort of walk the line, you know, it's almost like these, these B24s, they just span off to the horizon and you pick the first one and you work your way down the line and you're doing certain things to all of them."

Some of the jobs, like Erlinda's inside the wings of B26s, were demanding and hot

Erlinda: "And being here in Phoenix at that time, there weren't any coolers. All they had was fans and they were hot, hot. But we had to come out of that wing every 15, 20 minutes to go out and drink water and take salt tablets, which were horrible. But we had to do what we had to do because when we walked out of that, that wing, our front shirts were white from the salt that came out of our, our body."

When they weren't in the factory, these workers were creating an entirely new economy and society

Jeremy: "Well, you know, we think about, you know, .95 cents an hour, $1.50, $2 not being a lot today, you know but that was a lot of money at, at the time. And as you receive that pay, you'd have to think about, well, do you have to pay your rent? Do you have to? But then, you know, the, the culture of World War II, we think about the dancing, we think about the cafes, we think about the restaurants. We think about going to the movies.

That all of those things would pay for a lifestyle in which that you could work hard, but you also could play hard. And that helped, uh, build that sense of, okay, I'm, I'm contributing the war effort, but I'm also, you know, taking care of myself or building a family."

Cory: "There's all sorts of off hour things, what we might consider pep rallies of patriotic rallies, competitions, softball teams, anything you can sort of imagine anything that you would imagine at an average high school was happening at Grumman or Bell or any of these other places as well. And, you know, places like Long Island, the, uh, the, the Grumman team would play the Republic softball team. You know, they were so close that there was certainly a lot of events that were happening within the factory and then some inter factory events as well."

But the country was at war and the workers were touched by that just as much as anyone else on the home front.

Erlinda: "We weren't happy, you know, we got real sad at times because some of, some of the girls that were working there, they had lost their husbands or their boyfriends, but they still went to work even though they were hurting, excuse me, if I break down, but but it's very hard for me to go back there, you know, because I lost friends. That never came back. My brother went and he never came back the same young men that left. That was a very, very hard time."

Erlinda's brother Pete did survive the war. He was fighting in Japan when he caught malaria. Erlinda and her family hadn't heard from him for several years when they went to the Red Cross and found out he was going to be shipped home to a hospital in Texas. The war was over for him. But as Erlinda says, he was never the same.

Throughout the war, society had revered the millions of real-life women represented by Rosie the Riveter.

Jeremy: "This is the first truly large-scale industrial war in human history. The United States wages it the best. It produces the most military equipment, the most weapons of war than any other nation. The United States produces 300,000 aircraft, which is just over double then the closest nation, the Great Britain.

And so to be a war worker, you were part of that war effort, you were celebrated in that way. And you would see that in Hollywood. You would see that on radio. You would see all of these expressions of what that meant to be contributing to this total war. Right? And it was a very different change, even though there was a precedent in World War I, which women went to work in war factories, but they as a, as a whole, many, you know, most, if not all, went back into their more traditional roles.

But with the size of the war and the overall global aspect of it and how it changed America so much in regards to getting outta the Great Depression, providing opportunity. That in many ways even if women didn't stay as front line, the idea of women in the workplace was there."

But even though the Rosies were respected during the war that doesn't mean they weren't ousted from their jobs and put back into society's idea of their place. The post-war job market was unwelcoming to the women who had just proved they could do all kinds of jobs they'd never been allowed to before.

Still, after an immediate post-war drop, the percentage of women in the workplace only grew. As with many aspects of American life, World War II had made a lasting cultural change, thanks to the Rosies.

The War also fundamentally changed the way we manufacture all sorts of things, and robust industrial-scale airplane manufacturing allowed for the coming "jet age" and aviation as we understand it today.

Music starts

For more information on how wartime flyers got their training, check out our first episode about the Civilian Pilot Training Program. For our next episode of Home Front we're bringing you the story of the Civil Air Patrol's U-Boat spotting missions.

Music up then under

Home Front is a production of AirSpace from the Smithsonian's National Air and Space Museum.

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Music up and out