

Museum of History and Industry
Historical Society of Seattle and King County

Transcript

Howard Hurst and Michael Pavone - taped interview
March 26, 1985

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This is an interview with Howard Hurst and Michael Pavone on March 26, 1985. The interviewer is Lorraine McConaghy for the Museum of History and Industry.

Q. Mr. Hurst, how did you come to Boeing and when did you come?

Mr. Hurst I came in 1927. I was a journeyman mechanic sheetmetal worker in Seattle contract sheetmetal shops, and always during the winter and the cold weather, there weren't too many jobs. While Boeing was generally steadier than the work we could get uptown although the work was poorer [paying].

There was a lady by the name of Leah Parks, and she was hiring the employees. I stood and waited, and there were two fellas ahead of me, and they were asking for sheetmetal jobs also. She told them, "No, there were no sheetmetal jobs available at this time."

So I started to walk out the door and she said, "Just a minute, can I help you?"

I said, "You already helped me. You just turned down two fellas ahead of me for the job that I want."

And she said, "Well, that doesn't mean it's you."

She talked to me for a few minutes, and then she called Mr. Wallach, who was the head of the sheetmetal shop and a grand guy, a real grand guy. He came out and asked me my experience, and then he said, "Can you go to work now?"

I said, "No, I'm working in a shop uptown, and I'll have to go quit tonight."

"Well," he said, "Can you get here the first thing in the morning?"

And I said, "Yeah. But how much are you going to pay me?"

He said, "What do you think you're worth?"

I knew what they were paying, between \$.35 an hour and \$.65 an hour, and so I said, "\$.70 an hour, and in six months I want a \$.05 an hour raise."

He gave it to me! So I came in the next morning and went to work for Mr. Wallach.

Employment at Boeing at that time went for six months, and then you'd be laid off for a few days, and then you'd come back, and work another two months, and then you'd be laid off again. It was an off and on kind of thing. None of my employment there ever lasted longer than six or eight months without a lay-off up until about 1931 or 1932.

Q. And then it got steady?

Mr. Hurst Yes, then it became steady. After we started the B-17's, then it became steady for me, at least.

Q. How, did you come to Boeing, Mr. Pavone?

Mr. Pavone I heard that Boeing was hiring people so I went down to Plant I, in the employment office, and I asked the girl if they were doing any hiring. She said, "No, but do you want to fill out an application?"

So I filled out an application and she said, "When we're hiring, we'll give you a ring."

So I kept going down there once a week, or once every two weeks, and she said, "We're not hiring yet," but I kept going down there all the time.

In the meantime, there was a gentleman going through the office to the staff meeting every morning around 7:30 or quarter to eight, and he saw me there. I kept asking her and she kept saying, "We're not hiring," and I'd thank her and I'd leave. This gentleman would see me there, and I'd nod my head and he'd nod back, and finally when I went down there this particular day, it was raining and I was just about drenched.

I don't know what happened, but she turned around and said, "We are not hiring today! When we're hiring, I'll give you a ring!"

This Mr. Polcock happened to hear every word that she said, and he stopped long enough to tell her, "I'll hire that boy."

And that's how I got hired.

Q. When was that?

Mr. Pavone It was March 15, 1920. The next day I went down there and went to work.

Q. Jumping ahead a long way, what were some of the predecessors of the B-17?

Mr. Hurst Do you mean forerunners to the B-17?

Q. Yes.

Mr. Hurst No, it was alone. There weren't any.

Q. Could you describe its capabilities? What could it do?

Mr. Pavone Well, the B-17, or the "299," had the capability of carrying a large bombload, and placement for a lot of machine guns. We had a large bomb bay door that opened up, to carry a full load of bombs.

That was the type of airplane it was meant to be.

Q. What was its range?

Mr. Pavone The range was about 2200 or 2500 miles.

Q. And its speed?

Mr. Pavone Was around 200 or 225 mph.

Q. Now how did the B-29 compare with that? What could the B-29 do?

Mr. Pavone Well, the B-29, that was a longer range bomber. It carried more fuel than the B-17, and it was meant to supersede it. It was an airplane meant to penetrate Japan in long-range flight. It had machine guns, and a large bomb bay.

Q. So the B-29 was not meant to be used alongside the B-17, but to replace it.

Mr. Pavone More or less, for a different mission.

Mr. Hurst And a different area.

Q. What were you doing when the B-17 began going into experimental production? What were your jobs, and when was that?

Mr. Hurst After the "299," there was not a great deal of time before we started building units for the first thirteen airplanes.

Q. Who ordered that thirteen?

Mr. Hurst The government ordered them. My understanding was that if they ordered them in groups of thirteen, they didn't have to put it out for competitive bid. I think that was the reason we got groups of thirteen.

My job was to work in the sheetmetal shops through these thirteen airplanes. After the thirteen airplanes were completed, we started building commercials - the "307" was a commercial airplane - and we build seven of those. They were the first pressurized commercial airplane.

During that period of time, it took us long enough that we came to the beginning of the first production airplanes. And also, at the end of the first thirteen airplanes, we took the static test airplane, and modified it into a more productive and more airworthy bomber by putting superchargers on it.

Q. Could you explain what superchargers are?

Mr. Hurst A supercharger takes the exhaust from the airplane exhaust pipe, and has a turbine in it, and pressurized air is taken up to the carburetor for better fuel consumption.

Mr. Pavone Yes, you'd get better performance from the engine. It would be like a blower on modern cars, that are supercharged.

Mr. Hurst You could get much higher altitude.

Mr. Pavone You had the pressure there to put right through the valves into the cylinder, without having to suck it in.

Q. Did the B-17s have the Norden bombsights?

Mr. Hurst Yes, the "blue ox."

Mr. Pavone It was highly secret.

Q. What were you doing when the experimental B-17's were coming in? (to Mr. Pavone)

Mr. Pavone The first thirteen were brought over to the field for test and delivery. We were there running engines and getting them all ready for flight test and shakedown when they were accepted by the Air Force. And then the pilots would come in and fly them away.

Q. Those first thirteen airplanes were - I use the word "tailor-made" - you used a different word -

Mr. Pavone "Hand-made."

Q. Yes, "hand-made." What changes had to be made in the plant and in the way people built in order to begin multiple production?

Mr. Hurst We moved to a completely new plant, and set up large fabrication shops. We needed a lot of sophisticated machinery. We set up areas where we had multiple tooling to built each of the sections, and the airplane was broken down into a number of sections.

 We established assembly lines. I think we ended up with four assembly lines for the B-17's, and they were no longer hand-made jobs. This was high production from the fabrication on through to final assembly.

Q. What were some of the techniques that you used to speed up production?

Mr. Hurst We used time-and-method studies on all jobs. From that, from the time and method studies, we were able to set up an efficient plan for repetitive operations to produce airplanes cheaper, quicker, and faster.

Q. Were there any actions taken as a result of the time and motion studies? Did they hire some more people, or let some people go?

Mr. Hurst As a result of the study, it always - and I mean always - showed that we had to have a horrendous reduction in people. Actually, the people that we had "to surplus," as we called it, were moved to different areas or different buildings.

 To give you an example, in one shop, we

had approximately 3000 people, and the day we started the plan devised from the time and methods program, we had to cut down to 1000 people. And we went from a rate of a rough 7 [airplanes] a day to a steady 8 a day! And we still cut out those 2000 people.

Q. So the production rates you were aiming for were pretty high. Were they increasing all the time?

Mr. Hurst Yes. The way to increase the rate would be to reduce the time of the "cycle," as we called it, or the amount of time an individual needed to do his job. Now, in other words, if you were doing an hour cycle, you were getting eight airplanes in eight hours, so if you wanted to get more airplanes, you would reduce it to, say, fifty minute cycles, so you could get nine or ten airplanes out.

But once you got to the peak, of fourteen airplanes a day, in order to reduce the cost and hours that went into that airplane, you reduced people.

When we went into the method study plan, we went to 1000 people and eight airplanes a day; we eventually got down to 350 in that one shop and produced fourteen a day by that method.

I would say that time-and-method was the greatest thing there ever was for the war effort, without any doubt. And some of the blue-collar workers despised those people! They just couldn't understand why a white-collar guy could come in there and tell them how to run a plant. But they did.

Q. Were they industrial engineers?

Mr. Hurst Yes, and one of the greatest we had was from the silk mills.

Q. It would seem like the organization and planning you would need as a consequence of these studies would just be incredible - there must have been unbelievable amounts of paperwork.

Mr. Hurst Not really. The biggest problem was to get the supervisor to respect the time and methods study and to agree that he was going to take that program on.

I'll give you an example. In the wing shop, I had a supervisor in there that didn't want to try it, so I had to replace him. I had other supervisors that didn't want to try, either, so I had to replace them.

They just didn't see how we could do this, with that amount of reduced people, in that period of time, and get our job done.

The biggest job was convincing the supervisor that he had to do the work.

Q. Did these new methods change your job at all, Mr. Pavone?

Mr. Pavone The job that I had out on the flight line was to, for example, after the engines were installed and the propellers, we'd get them out there in front and run the

engines, and might find that we had a little difficulty. On starting one engine, the instruments would read over on number two. So we had to go back into the factory again and we got carts made that we hooked up to number one engine to make sure it read on number one, and when you put all the instruments on number two engine, that it would read in the cockpit on number two. And then when we got them outside to run the engines, we had no difficulties because everything was done previously just like putting on parts of the airplane, when you put the airplane together. All these instruments would read, when we ran the engines, and we didn't have any difficulties.

Mr. Hurst We did time and method study on the airplane clear through to pre-flight, and we set out the same kind of plans as we did in the structure shops. We drew up job instructions, telling the people exactly what to do clear through to the point where we delivered them.

 And they had a plan over there (in flight test), too, though not as detailed as our plan, but we had a plan right to the door.

Q. Now with the best intentions in the world, the planes must have arrived to you (Mr. Pavone) sometimes with people still screwing things in, and with travellers on them...

Mr. Pavone That was stopped pretty quick. When the airplane came out of the factory, it had a lot of travellers with it, expecting the people out there who were supposed to be running airplanes and getting them ready to do all those travellers. So I went to my immediate supervisor, who was Buck Weaver, and told him that if these travellers were going to come out with the airplanes, we weren't going to get them in the air.

 "We want a clean airplane when it comes out; we don't want any travellers."

 So he went up to P.G. Johnson and told him about it, that he didn't want any travellers coming out. Buck Weaver was in charge of flight test. Then P.G. Johnson got his people like Oliver West, and down the line, and told them that there was to be no airplane leaving the airplane with travellers.

Q. But there was a way of making that work, wasn't there, [if a plane was essentially complete, but there were a few little jobs remaining]?

Mr. Hurst Oh, sure. The travellers that we sent out that Mike is talking about were worked back into the factory. We set up an auditing of those specific problems, but it was also pumped into our methods study plan to be sure we didn't allow this in the future.

 What he was getting was airplanes that didn't have the advantage of going through our plan yet. It hadn't worked that far forward - we started with the engine itself, and then we worked through the body sections, back up into the final assembly, and up into functional test. We had a functional test paper just the same as we had a job

assignment paper for the employees.

The airplane when it went out the door had to have a blue ticket on it, that said, "ACCEPTED - Okay to Move to the Field." That meant that everything was done; that the paperwork assigned to the airplane had been accomplished. They were clean airplanes.

Q. The start-up of this system sounds like it was relatively flawless...

Mr. Hurst We had problems, but the problems weren't as great as problems I had on the B-47's and the B-52's - not nearly as tough as the problems we had later.

And we had all men working then, too.

Q. Do you think that people tried harder because it was wartime?

Mr. Hurst Some of the people did; some of the people were there because they were going to make money. That was all they were interested in - money. But some of them were patriotic, damn patriotic.

Q. Did you find yourselves working very long work weeks during the war?

Mr. Hurst and Mr. Pavone laugh and shake their heads.

Mr. Hurst I spend many three shift [days] down there, and hardly ever less than a shift and a half. Mostly two shifts. Really, that's a fact. And yet it was enjoyable.

Mr. Pavone I'd work maybe two shifts. I'd go down there in the morning and my job was to see, when the airplanes came out of the factory, that we fueled them, oiled them, hydrauliced them, ran the engines - and I was teaching people how to run, and I'd be there all night. In the morning, I would go home.

One particular morning when I went home, Mr. Van Dyke was coming to the front end, and he saw me, and said, "Where are you going, with your lunch bucket?"

I said, "Well, I worked all night. I'm just getting out."

He said, "You worked the day shift, and you're just going home?!"

I said, "Yeah."

He said, "What were you doing?"

I said, "I was running engines, and teaching other people how to run engines. We haven't got enough engine-run people."

And he said, "We're gonna change that pretty quick!"

And that's when I wrote those two books on engine running, so that new people we got in there could take these books home and read them right down to the last paragraph. Then we started teaching more people.

Q. If a plane got rejected in flight test, what were the usual problems?

Mr. Pavone Well, an airplane would actually be rejected in flight test. After the airplane came down, they had what they called "flight squawks," and then we would take care of those squawks while we were doing other work.

Q. These would have been problems that the crews would have identified?

Mr. Pavone Yes, things they'd find when they were flying the airplane.

There weren't too many of them and they were minor stuff we could remedy right away. Sometimes it would take a second flight, but very seldom. We got through with them in a hurry so that we could deliver them quickly.

Q. Inside the factory itself, how did the subassemblies and sections get moved around? What was the process that the airplane went through as it was being assembled?

Mr. Hurst Each assembly had several units per shop, or maybe we had two assemblies in a shop. That area was run by a general foreman, and it was called his shop; his responsibility was to build those sections and get them ready to move to a central area where they would be joined.

When his section was complete and it was time for him to move, he'd put in advance notice to call a crane to carry it over to the assembly area.

We'd bring in the bodies first, and put them on jacks, then bring in the wings by crane, and pin them together, getting ready for ream, and they would all be on jacks. Then bring in the tail surface, and attach it and get it ready to ream. Then bring in the stabilizer, attach it and get it ready to ream. After that was accomplished, we would bring in the reaming crews, and ream all of these attach points and pin them together, and then we would install the landing gear, drop the airplane on the landing gear by the lowering of the jacks.

The equipment and assemblies were moved by a fifteen ton crane inside the factory.

Q. How long was the cycle?

Mr. Hurst Forty-nine minutes at each position at peak rate, including inspection of all completed jobs. Forty-minutes. We reamed all of those points in forty-nine minute cycles. And I had seen as much as eight hours spent on one terminal! And we had dozens of terminals. As much as eight hours! They were using ten sized reamers. (in gradually decreasing diameters) But when we got into peak production, we would rough a hole out, put a final finish into it, and drive the pin home, pull it out and see if it had 85% bearing, give it to the inspector, he'd put a stamp on it, and we'd drive it back in again.

Q. It sounds like your quality control people must have had

some problems with some of these new methods.

Mr. Hurst The problem was that they wanted to have too fine a job done. Since we were building a combat airplane that was expected to be used no more than 500 hours, we were trying to build that kind of airplane. And they were trying to inspect an airplane designed to fly for 10,000 hours. Too cautious, way too cautious.

Q. What was the difference in performance and production between the kind of planes that you guys were building, and the planes at Willow Run?

Mr. Hurst At Willow Run, they had 29's, and they had a single line. Their factory was a mile long. The government built three factories: one at Willow Run, one at Tulsa, and one at Dallas. Those airplanes all were built in a line.

Now Ford had a little different concept, he wanted to run the Willow Run factory like you'd run an automobile factory. If he didn't have a part, the airplanes didn't move.

If we didn't have a part in our assembly, we wouldn't hold up the whole line. We would travel the work, and bring in people from the "cabbage patch" where we had people assigned to other airplanes or sections of airplanes - actually building an airplane over on the side. We called in those people and had them take care of the travellers so we wouldn't stop our production.

They didn't do that on the B-29's at Willow Run. And Willow Run was the only one I knew about because I was sent there to look at it.

Q. Did you ever have a chance to look at the planes that came off their production line at Willow Run? (to Mr. Pavone)

Mr. Pavone No, I was here in Seattle the whole time.

Q. I wondered how they compared, whether they were better in performance or not as good.

Mr. Pavone Well, our B-29's had the inboard wing and the outboard. Now Wichita [Boeing] built a through-wing, plus the outboard panel. Our's had an inboard wing and and outboard wing, and they were all reamed and taper-pinned.

Mr. Hurst And they would open up the body, actually spring it open, and drop it down and attach it to the wing. We would do different than that. We would build the stub as part of the body itself, and then we would bring the wing and attach it to that.

Q. What did you think of the Willow Run set-up?

Mr. Hurst They had a gorgeous place - unlimited expense. The government went all out. Air-conditioned, no windows - a beautiful place.

We had none of that. We had no

air-conditioning. We had a very austere plant, and very small compared to Willow Run.

Q. Could you tell anything about employee morale? Things like turnover and absenteeism that were problems here?

Mr. Hurst No, I couldn't. I couldn't speak to that.

Q. When the B-29 was entering production here in Seattle, did you move into a new plant for that?

Mr. Hurst Yes, the Navy secured from us a single airplane, called the Sea Ranger, and it was an airplane that was going to be built at Renton. They built this factory for the Sea Ranger which was not acceptable at that time because of a different strategy in the war effort. (The Sea Ranger was a seaplane)

So they decided that they would turn the Navy plant over to Boeing to build the B-29's there. We laid out the B-29 plant similar to the B-17's with multiple lines and sub-assemblies about the same.

After the B-17's phased out, we built and put the installations in the B-29 body sections in the Seattle area where the B-17's had been built, and then shipped them by truck over to Renton. We had special roads built in order to ship out sections to Renton, straight over the hill to the Renton plant from Plant 2.

Q. Was there any security problem in trucking these things across town?

Mr. Hurst No security problem, but we had so many security people around that it was well taken care of.

Mr. Pavone That road was what they called the "Boeing Cutoff." We had to build a new highway, right at the end of Boeing Field. They built a new highway which went over the railroad tracks, right up Renton Avenue, and into Renton plant.

Q. Were you ever concerned about sabotage or espionage?

Mr. Pavone No, we didn't have too much of that. There was one deal that we thought was sabotage when we were running the B-17 engines out in the flight line. We found that we didn't have oil pressure on one engine, and we did everything. Now when you lose oil pressure, there's an adjustment you can screw in so you can get more pressure.

We screwed the fitting in to get more pressure, and we screwed the fitting all the way in there, but no pressure.

We took out the oil strainer and we found a bunch of [rubber shreds. A flexible rubber cap was supposed to be left on the tube during shipping and storage so that no dirt would get in. The mechanic was supposed to remove that rubber cap during assembly, but he didn't and the

cap was sucked into the tube, causing the pressure problems we were having.]

Side B

(due to the interviewer's mechanical ineptitude, a few minutes of conversation were unrecorded)

Mr. Pavone [In test flight], you don't know what's going to happen - whether the airplane is going to be nose-heavy or tail-heavy, or wing-heavy, or how the control is going to react to your feel of the airplane. But everything went pretty smooth, because engineering had calculated the CG (center of gravity) and knew pretty much how it should fly.

When you took off, if it was a little bit heavy, you would trim the stabilizer so it would fly level and straight. If it was a little bit wing heavy you would trim the trim tab to bring the wing up or down.

On the first flight, there wasn't very much that to do. You could fly it, as they say, with hands off practically.

Q. In gearing up for the B-29, that production didn't really get underway until 1943 in a really large way?

Mr. Hurst I think we have to recognize that there were two Boeing plants building the B-29s. We also had a plant in Wichita as well as Seattle that was building them. My recollection is that we were going pretty good in '44, because I went to Denver and prepared the mod center there to modify B-29's with the latest changes that the military desired that we couldn't incorporate in the factory.

Q. Did Boeing grow right along, or did it grow in spurts, in war production here in Seattle?

Mr. Hurst No, in war production, we were steady. A constant increase all the time.

In fact, we would have liked to have taken production up from fourteen to sixteen a day on B-17's but we couldn't get our suppliers and subcontractors to perform to give us sixteen units a day.

Not only did we build our sections of the airplane in the plant, we had branch plants all over the state that built sections, some bodies, some wings, some parts - in Chehalis, Aberdeen, Everett, Tacoma, and later we had a B-29 branch plant in Vancouver, BC.

So we had everybody in the state building a part of the airplane for us, and it all came together at Plant 2. That's where we put all of those assemblies together to make an airplane.

We got to the rate of fourteen a day with the B-17's; the B-29's got to six a day in Renton. And I think Wichita was up a little higher than that.

We were putting out a lot of airplanes.

Mr. Pavone Didn't Martin-Marietta build some B-29's, too?

Mr. Hurst

Yes, Mike, at Marietta, Georgia.

Q. In February of 1943 (see Vision, Harold Mansfield, p. 210), Eddie Allen crashed into the Frye Packing Plant here in Seattle. I think he was your friend...

Mr. Pavone Yes, he was a personal friend of mine. I was his flight engineer, but I didn't fly anymore after the Clippers.

He was a personal friend of mine, and I was down on the field at Boeing when he took off on that flight. He took off going south, and when he went south and made that left turn over Lake Washington, he was climbing all the time, and that's when the airplane caught fire.

Being a test pilot - why all test pilots want to bring the airplane back to the field, so he made the turn over Seattle. As he was coming in, the cockpit and everything just got filled with smoke, and they couldn't see where they were going and hit the Frye Packing Plant.

Q. What was wrong? What had happened?

Mr. Pavone Well, the engine caught fire and the fire was so intense, that it got back into the cockpit.

Q. Who was manufacturing the engines for Boeing?

Mr. Pavone These were 3350's, built by Wright Company.

Q. Were there any changes that were possible in the flight test routine, that were made because of his death, or was it just one of those things?

Mr. Pavone Well, we had had trouble with the engine over-heating and catching fire, so K. B. Wolfe left and went back east. When Boeing knew that the engine wasn't feasible the way it was built with that [flammable] magnesium case, Boeing was building an engine mount to take the R2800 Pratt and Whitney engine. But we would have lost horsepower, so when K.B. Wolfe went back east, and got all these engine manufacturers together, he told them, "Now somebody has the answer, so we can save that engine." That's when they put fuel-injection in, and that saved the engine.

If we had fuel-injection to start with, that (the crash of the XB-29) would have never happened.

Q. What was your perspective on that tragedy, Mr. Hurst? Did you know the people involved?

Mr. Hurst Oh, yes. I knew them all, too, the same as Mike did. Of course, not as well as Mike. What Mike said about the engine is all we ever knew. They got the fumes and heat into the cockpit. They tried to put the airplane into the garbage dump, and they just couldn't quite make it and they hit Frye Packing Plant. They tried to make it and they just couldn't - it was just a little further away.

Q. Did the people who worked on that plane feel pain or guilt until they realized it was not their fault?

Mr. Hurst I think we all were disturbed. I had just given that plane to my alternate, just a short time before that. And we all felt bad, but we didn't know of any problems because we had run it through all the functional tests but it couldn't have happened until you fired up the engines for quite a while.

 Of course, at first, we didn't know what had happened. Not until the investigation was over. But everytime there's a crash, you feel bad about it.

 We had another crash similar to that on the "307" that was between the B-17 programs. Another friend of Mike's and mine, and a brother of Oliver West, died in that one. And we felt real bad about that, because he used to fish with us.

 You always feel bad. It's really tough, real tough.

Mr. Pavone That was the Stratoliner?

Mr. Hurst Yes.

Q. During the war, when did women begin to come into the factory?

Mr. Hurst We were just really getting started on the production airplanes, and the men were gradually going into the service so we were having a tough time hiring people.

 The only answer was to hire females. We got a few in at a time, and it's amazing that the first group of women we got in were schoolteachers. The first bunch we got were from the Seattle area or the Spokane area and real good people. Before the recruiters started.

 But women did a really fantastic job. Their chores they were assigned to do were simple and repetitive. It would take them maybe a half a day to learn their job, and they were super - absolutely super.

 We got to be about 79% females in the plant, and our [annual] turnover, because of the females I think, would equal in one shop seven times the personnel in that shop. In other words, it would be the equivalent of seven people to handle one job in one year.

 Absenteeism and terminations were real high.

 We'd interview these people and try to find their cause and the problems, and try to correct it for them, but they just wanted to move around. Mostly recruits, from the east or the south.

Q. They were homesick or just footloose?

Mr. Hurst Footloose. Generally the ones brought out here from the east were more interested in coming out here to see the country, make a few bucks, and move around

from Boeing to the shipyards, the shipyards to Boeing, back and forth. They just wanted to move around.

Q. But wasn't there a freeze on labor?

Mr. Hurst Not for women, at least to my knowledge. There was for men, and after a while, there was a freeze on women, but it didn't amount to much.

Q. What were the issues that came to your attention as being problems that caused absenteeism?

Mr. Hurst Well, what we'd do on absenteeism, is review anybody who was absent seven days or over a month. And you'd bring them in to the office, and talk to them, and they had all kinds of stories. Their children were sick. Their husband was on leave from the service. They were staying in bed for six or seven days, and couldn't get to work. Generally that was the excuse. Their excuse was they just didn't want to come to work, period.

Q. The recruiters that went out all over the country - who were they?

Mr. Hurst We were assigned certain areas, and would assign two people to each area, and along with us, we had a military or a government recruiter. We had to interview every person that appeared for a job.

The only way you could refuse that person a job was to convince him that he didn't want to come out to this cold and rainy country and work for Boeing. That was the only reason. Because the government was there, and they'd say to you that you must hire that person unless he declined.

So you had to take everyone, and I mean everyone.

Mr. Pavone As long as they were warm.

Mr. Hurst And some of them weren't that, Mike.

Q. You're talking about marginal labor. How do you define that? The people were unskilled... Were they coming off farms?

Mr. Hurst Most of them from the South were coming off farms. The ones from the East were coming out of industries of some sort.

Everybody that came to work was unskilled in the airplane business, but that part of it wasn't a problem. It didn't take us long to train them.

We didn't send them through any training program either. We generally assigned them as an extra person on the job.

And within a day or so, with the repetitive work and a small amount of it, they didn't have to learn much. The problem of teaching these people, I didn't think, was too great.

Q. You were teaching them a task, breaking down the craft into a set of tasks.

Mr. Hurst We had [people] supposed to be electricians, doing a certain electrical job; plumbers, cable people, and they were all broke down into special jobs, and given so many minutes of work to do.

 We'd give them a piece of paper that told them what to do, what tools to use, what prints, if any, to use, what parts to use - everything was laid out for them. They didn't even have to think.

 We showed them the area [drawing], and if it was a strange thing, we would make a production illustration - we called it a p.i. - and they wouldn't have to read the drawing. We'd give them the p.i. and they could look at it like a picture, as good as a photo. It told them exactly what to do.

Q. You don't mention the union at all...

Mr. Hurst The union was really not a problem. Sincerely, it was not.

 We were unionized, and each shop had a shop steward. If we had a problem or a grievance, as we called it, the grievance was first brought to the supervisor of the shop. If he couldn't take care of it, it was brought to us up on a higher level.

 I had very, very few go to arbitration. In fact, hardly any. Our labor problems were minor.

 We had the Urban League in there to take care of the blacks. The blacks didn't belong to the union - they had a permit. They paid a penalty for working there to the union but they didn't really become union members. So I dealt mostly with the Urban League with the blacks. Their complaints were so petty, and we had a very understanding woman who was head of the Urban League in the plant, and there were no problems.

Q. Did most of the blacks who worked for Boeing at that time come from Seattle, or from down South?

Mr. Hurst I would say most of them from Detroit, Chicago, Pittsburgh - the big industrial cities of the East. Got them by the hundreds.

Q. As the war went on, how did your job change, Mr. Pavone? What were you doing out there in 1944?

Mr. Pavone Out on the flight line, like Mr. Hurst said, we had recruits and I hired a hundred people out on the flight test line. Now the people that I hired, a lot of them were auto mechanics because we were short of people that knew how to run engines.

 I wrote two books on engine runs for the B-17 and the DB's (Douglas bombers), and they were twelve page deal that you read.

 We would tell new-hires, "Now you can be

out here on the flight line, working on the airplane, getting it ready for flight."

And we'd give each one of them a book, and it was his.

I'd say, "Now you can take it home, and read each line of it. The guy that's going to do the running is going to be responsible and you people are going to help."

Now there were ten to twelve people on the crew of the airplane. It was their jobs to run the engines and get them all set and synchronized and they went through a series of operations. This book told you just how to go about it.

We had ten, fifteen, twenty crews, and we had engines running day and night for twenty-four hours a day. Continually! Getting them all ready for flight, and everything went pretty smooth.

Q. So people were trained on the job. There were no schools as such.

Mr. Pavone That's right.

Mr. Hurst Much later, when our production was a little lower, and we were working on the 29 - at least, I'm talking Plant 2 now - we had a training area set up. But, really, when we got the new recruits in, we put them right on the job.

And we had no problem.

Q. Can you remember any anecdotes or stories that stand out in your mind about either the difficulties or the successes of working in this enormously changed industry? In the years you had been there, it must have seemed like night and day.

Mr. Hurst It was! (laughing)
In the days before that, you worked around men all the time, and your language was rough and you were rough. It took a while, at least for me, to change my ways and my attitudes in working around females. It was real hard.

I grew up working in mines and in men-type shops. I had an entirely different attitude than I did working with women.

Q. I must say that I have heard about a lot of women who could have probably held their own in terms of rough language...

Mr. Hurst Yes, there were a few of them. There weren't too many like that, but there were a few of them. Rosie the Riveter could be rough, but most of them were pretty decent.

Q. Does anything stand out in your memory, Mr. Pavone, about that tremendous change?

Mr. Pavone Well, a lot of times you'd walk into an office, and there'd be a lot of men there, and there'd be a

woman there way back in the corner where you wouldn't see her. You wouldn't know she was in there, and in talking to the men right there, one fella was running an engine and he couldn't get any fuel pressure, and the engine wouldn't even run.

So they took out the fuel screen, and somebody somehow someplace had put it in backward, and when they put it in there and tightened it up, why they just squeezed that strainer, and it was in backwards and the fuel couldn't get through, except for only idling. When the men would try to open it, it would die. So they brought it into the office, and said, "Mike, look what I found."

Well, you can imagine what language went on! I didn't know that she was back there. Stuff like that.

Mr. Hurst It was hard, for us rough people.

 I had one gal we called Kelly. Oh, I made some awful blunders with her. I'd go up into the cockpit, and find people loafing up there, and really read the riot act to them.

 I'll tell you one of our big problems. When we got the women in there, everything was set and planned and organized for men. Then we got the women in such great amounts that things changed. Toilets changed. You'd go down to a toilet today in a men's area, and come back - maybe even the second shift! - and go in that toilet, and there's a bunch of women in there. And the sign on the door says "WOMEN." So the men ended up with one out of ten, maybe, or one out of six toilets. That was a problem.

Q. I had not realized it was 79% women.

Mr. Hurst Well, that was in my area. Mike had a different ratio out there. I had fabrication, sub-assembly, final assembly - jobs that women could do, but he didn't have that conditon.

Q. Shortage of manpower - how about shortage of other materials? There was a shortage of machine tools - did that ever slow you down?

Mr. Hurst No, I tell you, I think Oliver West did a terrific job in setting up the plant for equipment - really I do. He was acquainted really well with General Hap Arnold, who was head of the War Production Board, and it seemed like anything we wanted or needed, he would get it immediately. It was fantastic. We had a plant that was second to none in machine tools.

Q. You never had any bottlenecks with materials. You were always well supplied.

Mr. Hurst I don't know of any. As I say, we were over-abundant with material.

 General Hap Arnold used to visit our plant about once a month. We had an airplane called the drone - a B-17 which Mike maintained - and we would fly that back and forth to the East coast and P.G. Johnson and Oliver

West and General Arnold used it, and Oliver would bring in General Arnold.

And at times, Oliver West would give me a call, and he had a little Fiat - he was quite crippled with arthritis - and he would run around in this little car through the factory. He would call me, and I would get a scooter with a place on it for two people to sit in the front, and he would ask me to take General Arnold around the plant and show him any of the problems I had.

As an example, I showed him one of the problems I had with these women deburring the edges of fabricated parts. He said, "Stop it immediately!"

And he took care of it the next day. He contacted Colonel Corkhill, and said "That stops!"

Q. I'm sorry - "Burning the edges?"

Mr. Hurst Deburring.

Q. Oh, "deburring."

Mr. Hurst Deburring and sanding the edges. He stopped it immediately.

Or I'd take him to a new piece of machinery that he had ordered, and sent in there, and I'd show him how it was being used because he always followed up on everything he did. Both Oliver West and General Hap Arnold were terrific people.

Parts were unlimited. Standards we had all over the plant in parts bins, and you could just get them with no accountability.

And we took pretty good care of them. We watched tool boxes so that people didn't carry them out of the plant.

It's amazing how well things went.

Q. You were working very closely with the military, too, Mr. Pavone. How did you feel about them? Were they good people?

Mr. Pavone Out on the field over there, we had no difficulty whatsoever. Charlie Creswell, he was our number one man. He was the first Air Force inspector at Boeing, when Boeing started, and we got along just perfect with the Air Force - no difficulty whatsoever.

Anytime we found some difficulty, we'd get Mr. Creswell, or Mr. Bob Cartch, which was his assistant, and we could tell him what we had. They'd either say eliminate it or bypass it, and let's get the job done.

Q. What is your strongest wartime memory of Boeing?

Mr. Pavone Well, it was the building of the B-17 and the B-29. I think that everybody in general, the women and the men, did a fantastic job.

Mr. Hurst My memories are real heavy for production. But I have to think of the outside things too -

the camouflaging of the whole area, the protection that the government gave us, bringing soldiers in there, blocking off the streets so nobody could come near us, having smudge pots lit up every morning and every night because of an air raid alert to black out the complete area, balloons going up in the morning to keep anybody from bombing us.

We always had notice of an air raid alert. We had air raid shelters - hundreds of air raid shelters - so if we did have an alert, we would send the people to the air raid shelters. We had practice runs. The ones closest to the door went to the farthest place, but it never happened that way! (laughing)

Q. It must have been a Chinese fire drill!

Mr. Hurst Exactly! They always went to the closest place, and the last one out went to the farthest place!

We had bunkers for our airplanes - we'd bring our "live" airplanes into the bunkers where they wouldn't be shot up.

We had a plan. If so many people came to work, you did a certain amount of work, and the priority always went to the field - to deliver the hot airplanes, the ones that could fly. And the rest of the people were put on the airplanes that were nearest to flying, and we pro-rated them right back into the factory depending on the number of people.

We also had another flight center at Pendleton, Oregon. If we had an alert, and we had to get the airplanes off the field and out of here, we would send them to Pendleton, Oregon. And they were either brought back or delivered from there. Generally, they were brought back.