



Rear view showing tail detail.

Building and Flying The Whitehead No. 21

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In recent months many stories have appeared in various publications about the claimed flight in 1901 by Gustave Whitehead in Connecticut before the Wrights flew. So it was a pleasant surprise to see the replica Whitehead No. 21 on display next to Steve Hay's Pioneer Engines Tent at Oshkosh '87.

I immediately contacted Andy Kosch, EAA member and builder/pilot of the replica, for an interview about his project. Presented here is the story as Andy told it to me and Owen Billman of Mayfield, NY.

Hardie — Why did you decide to build a Whitehead replica?

Kosch — About five or six years ago I saw an ad in the paper about a lecture on aviation history at the Fairfield Historical Society in Fairfield, CT. I attended that lecture . . . it was Bill O'Dwyer talking about Gustave Whitehead. I thought the story was very interesting, the pictures were great and at the end of the lecture I went up to him and said, "I think I could build that thing and fly it." The reason I said that was because I was a hang gliding instructor at the time and was running a hang gliding school in the Fairfield area. This looked like a fun thing to do. It looked

like an Otto Lillienthal hang glider to me.

Hardie — What is your line of work?

Kosch — I've been a high school biology teacher for the past 26 years.

Hardie — How old are you?

Kosch — I turned 48 four days ago.

Hardie — Now, let's get into the story. How did you begin? Where did you get the drawings? How did you start?

Kosch — Well, first of all I had to locate a sponsor. I talked to a friend of mine who is the Bridgeport Airport manager, Morgan Kaolian. In fact, he's the number two pilot for this plane when we fly it again. He put me in touch with a man by the name of Kaye Williams who runs Captain's Cove Seaport in Bridgeport. Kaye Williams built me a hangar and put up \$10,000 for me to use as I see fit for this project.

Hardie — That's quite an investment, and quite a backing for the project.

Kosch — It sure is.

Billman — What does he expect to get out of it?

Kosch — Really, he doesn't expect anything. He's just a nice guy and is interested in the history of the area and aviation.

Billman — So he became your benefactor.

Kosch — That's it. He really wasn't looking for anything. Who knew what was going to happen? We had no idea that it was going to be as successful and draw as much attention as it has. I could have started this thing

and just dropped it, for all he knew. He didn't hand over the \$10,000, but as I needed materials, I just charged it to his account. It didn't cost us that much to build the airplane. It's been mostly manhours — I must have well over 2,000 hours in the project. So does my partner, Bill Wargo.

Hardie — Before you could start, you had to do some research on materials that were used in the airplane, etc. How were the drawings prepared?

Kosch — Most of that information I got from Bill O'Dwyer, who has a wealth of information. He has photographs on Whitehead; he has blueprints drawn up 20 years ago by an engineer, Irving Burger, at Sikorsky Aircraft. Other people have since modified these — a man by the name of Herb Kelley. And another, Bjorn Karstrom's, were published in *Aircraft Modeler* magazine. I think he used the original Burger blueprints because the specs are about the same. There may be minor differences here and there, but that's what we used — photographs and blueprints and discussions and looking over the literature and the specs that were given in *Scientific American*, newspapers and journals of the day.

Hardie — When did you finally get to the point where you could start building?

Kosch — Well, it wasn't very long. I think we had the frame built in a couple of months from the time I started . . . on September 1, 1985, the first day we moved into the hangar.

Hardie — So, you've been at it for two years.

Kosch — That's right. The anniversary is coming up.

Hardie — You said you built the body first.

Kosch — We used Sitka spruce for that.

Billman — You might mention the crew that you got. You got some people who are really dedicated.

Kosch — We didn't have a crew at the beginning — I started out all by myself. I used to make model airplanes, and constructed hang gliders and put together ultralight airplane kits, but never really tackled anything as big as this. So I went to a local boat builder right at the seaport, a young fellow named Steve Hadik. He showed me how to loft out the frame. I showed him the blueprints, he came over to my house and we got a couple of 4x8 sheets of plywood and put them together as a platform. So we had a full scale drawing right on the plywood. We cut out the framework and then I assembled it.

When I put it together it looked like it was about to fly around the corner — I had things a little crooked. Right about that time a retired industrial arts teacher named Bill Wargo came by. He's also a model airplane builder and a member of EAA. He's a heck of a guy, 68 years old and a very experienced craftsman. He took a saw and made a couple of cuts and that frame was as straight as could be. He's been with me ever since. Bill is usually out there flying radio control models and gliders. He's been a wonderful helper — without him I couldn't have done this. He's also the number 3 pilot for the project. Bill's older brother, Jim, has also been very helpful as a "jack-of-all-trades". Another school teacher friend, Dick Lomborg, has done most of the rigging of the wires. Jeff Cronin, a motorcycle mechanic, has kept the engines humming. My brother, Harry, a hang glider pilot and ultralight enthusiast, has been helpful in tuning the wings. There are a dozen or so who have helped at various times. We really have quite a variety of backgrounds and talents involved in this project. Whitehead also had a variety of friends and neighbors who helped him.



Three-quarter front view of Replica No. 21 in front of the Antique/Classic Division's Headquarters, the Red Barn.

Hardie — So, what's next?

Kosch — That took care of the framework. As we continued building, people would stop in the hangar. We get lots of characters coming in there — guys who have flown, guys who knew Gustave Whitehead, people who just have an interest in aviation, engineers from Sikorsky Aircraft, etc.

Billman — Relate the reason for putting the hangar where it is.

Kosch — The hangar was placed there because it's only a quarter mile from where Whitehead's house was. In fact, his address was 241 Pine St. Right now there's a building there called West End Moving, a stone's throw from where I'm building this airplane.

Hardie — Let's get back to the historical background. Did much of this come from O'Dwyer?

Kosch — Yes. Most of the historical infor-

mation, photographs, documents.

Hardie — So he's actually a historical consultant on the project.

Kosch — Absolutely.

Hardie — Now that you had the fuselage done, what came next?

Kosch — Well, we had to work on the wings. We got the bamboo poles from a place in New Jersey. They claimed they sold bamboo to the Wright brothers back in those days. It was a place called Bamboo and Rattan Works in New Jersey.

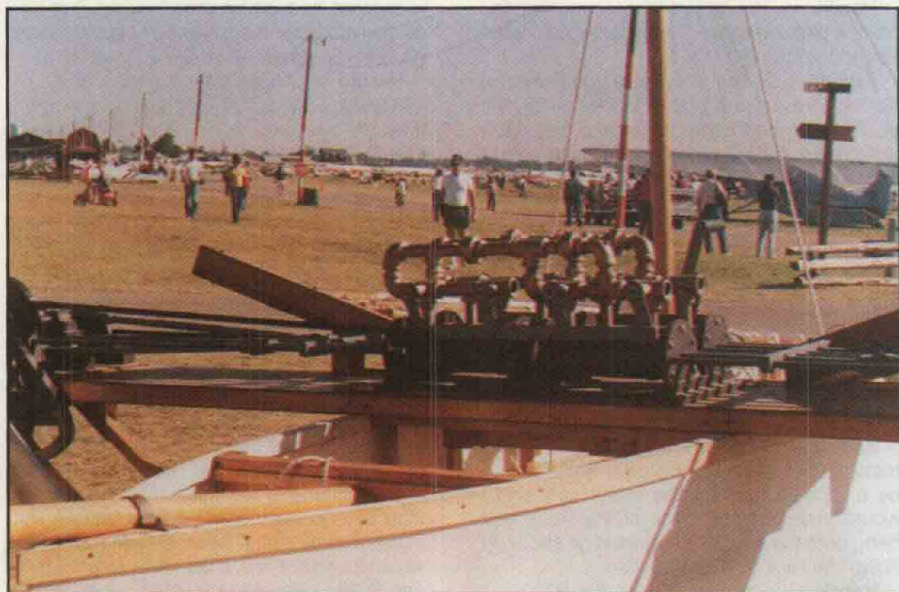
Hardie — I would dispute that, because I don't think the Wright brothers used bamboo in their airplanes. Curtiss did.

Kosch — That's what they claim. Who knows. I got that from O'Dwyer who went down there and picked up the bamboo. Supposedly Whitehead could have gotten his from that company indirectly through a local store in Bridgeport. They're one of the biggest importers of bamboo today in the country.

Hardie — Bamboo is rare stuff today — I know (Dale) Crites had a hard time getting it for his Curtiss.

Kosch — This place has warehouses full of bamboo, so this would be interesting for him to know. So that took care of the framework for the ribs, and then I contacted an old hang gliding buddy of mine named Gunnar Graubaum, a young fellow born in Germany. He and his father make hang glider sails and ultralight airplane sails — he's up in Windham, CT. I got together with him and he found a friend who donated some thin nylon to make a sail to fit on the wings. That's the sail we used for our early experiments. We didn't know where to get silk so we took the next best thing — nylon. We made the sail and put it on the wings and got some canvas from a local canvas company for the fuselage. Another retired engineer and model airplane buff, Bud Coffin, came along and built us some great wooden wheels with steel rims.

Hardie — That's what you have on the airplane now?



Close-up of wooden mock-up engines.

Kosch — Yes. He did that for us and helped with fabricating the metal parts. About that time I contacted you, George.

Hardie — I wrote to O'Dwyer and he said you were the pilot. I got your address from EAA and wrote to you asking if you needed any help.

Kosch — You sent me a bunch of information on Lilienthal, how he attached his wires to the bamboo. You were very helpful and I modified the information you gave me on Lilienthal and came up with a little device for attaching the wires to the bamboo ribs. Before long we had a covered frame and a set of wings which we pulled into the wind, just a bunch of guys running into the wind, and the darned thing flew as nice as could be. We have video tapes of all this stuff.

Hardie — What kind of weight did you have?

Kosch — Just empty weight at the time, about 350 lbs. We just wanted to fly it. Next we started investigating the engines. I had a couple of old Weedhopper ultralight airplane engines I thought I might try. They're a slow turning, two-cycle engine and I could change the timing on them to get counter rotating propellers.

Hardie — Before you get into the engine and propeller details, let's go back to the wings. According to what I've read about Gustave Whitehead, he had these bamboo wing ribs so they could be pulled together and more or less collapsed.

Kosch — Yes, folded up just like a fan.

Hardie — And they were braced from this center post?

Kosch — That's what is called a king post in hang gliding — looks like a mast on a sailboat.

Hardie — And he had this bowsprit out in front like a sailboat?

Kosch — That's correct — to hold the wings forward.

Hardie — And he had a system of pulleys like you have to pull the wings together . . . is that correct?

Kosch — The pulleys are not for folding the wings. To fold the wings all you do is disconnect it at the bowsprit. That pulls the wings backwards. The pulleys are attached to the landing wires and down below you have the flying wires.

Hardie — Is that a part of the warping system?

Kosch — It could be. You see, there are a lot of possibilities here. There are things we're not quite certain about and we're investigating all of them. I'm trying every possible method of control.

Hardie — You're making a "cut-and-try" approach to the whole thing?

Kosch — Right. We examine the photos and other documents and then try to work out how it affects the operation of the airplane.

Hardie — Getting back to the wheels . . . I notice the back ones are on an axle that swivels.

Kosch — That's right. He turned the plane with the back wheels which are steerable. On the front wheels he had a separate engine that could drive the airplane along. He would drive to wherever he was going to fly. When he was getting ready to take off, he would use the front wheels for power to get up speed.

Hardie — Then he would throw full power to the props?



Whitehead replica and Crites Curtiss Pusher in front of the Red Barn.

Kosch — How and when that switch was made, I'm not certain yet — but we're taking it one step at a time.

Hardie — Is this the way he controlled what you might call the warping of the wings?

Kosch — Again, he talked about a number of different ways of controlling this plane. He talked about weight shifting for one, like you do with a hang glider, so we're experimenting with weight shifting. He talked about slowing down and speeding up the propellers so he could kind of yaw around. If one prop is running faster than the other, you should be able to yaw around a turn.

Hardie — I notice he doesn't have a rudder.

Kosch — That's correct. It's claimed he did have a rudder later on but we don't see evidence of one in the 1901 picture that we have. So, we're trying it without a rudder. I've been able to fly it and I think it will do just fine.

Hardie — We talked about whether the flat tail plane warped. Can you explain what you thought about that?

Kosch — On the early tests that I've done so far, I've set the plane of the tail in one position, a good glide angle, and just left it right there. I do have it so it's moveable. I can adjust it, but I haven't made any attempts to control my pitch with it. I've been using weight shift for pitch control.

Hardie — What you're saying is that you are still investigating these things and at this stage of the game you're not positive on them, right?

Kosch — Of course, I'm not positive on anything with 100% certainty at this time.

Hardie — If I remember correctly, you had the plane on a trailer for your first tests?

Kosch — Yes. Previous to the motorized tests we set the plane up on a trailer towed by a pick-up truck in the early tests and I would stand on the back of the truck and hang onto the bowsprit and we'd go shooting down the runway into the wind.

Hardie — How fast did you travel?

Kosch — We started out slowly and gradually built up speed. The plane actually

lifted off at about 15 or 20 miles an hour. This was before we had it fully loaded up. I've forgotten what the weights were exactly — I could look back in my records and find out — but the thing floats like a hang glider. It doesn't take much to get it up in the air.

Hardie — What is the final weight you have arrived at so far before you go further?

Kosch — It's in the vicinity of 500 lbs. empty weight.

Billman — And your area is what?

Kosch — About 450 sq. ft. of sail area, including the tail. Actually I think it's about 360 square on the wing area and about 90 on the tail. Gross weight is about 700 lbs.

Billman — A very low wing loading.

Kosch — Less than two lbs. per square foot wing loading.

Hardie — How does that compare with hang gliders you have flown?

Kosch — There are many hang gliders that are right in that ball park. In the early days we had larger hang gliders with greater wing area and lighter wing loading, but now as you increase the efficiency of these hang gliders you have a heavier wing loading.

Hardie — What's the wingspan on it?

Kosch — About 35 feet. If you include the bowsprit and the tail, it's about 35 feet long. The fuselage is 16 feet.

Hardie — So you have it ready to go. What props did you use for the test?

Kosch — First we flew the plane empty on the trailer, and then I put some sand bags in it equivalent to my weight. Finally, I got courage enough to get in it and let someone else hold onto the bowsprit and control it. Then after awhile I could just float there and control it with weight shift. We weren't sure just how much we could turn, what the wing warping would do, etc. because we were tethered to the trailer. There was always some doubt as to what would happen if it yawed to one side, since the ropes would stop us. So we weren't sure if weight shift alone would bring it back, or if wing warping would be needed. We did many experiments and finally I decided I wanted to put motors on and go out and give it a try. I didn't believe that the trailer tests were conclusive enough.

As you know, Cliff Robertson came down as a guest test pilot. We had quite a crowd and got some good publicity when he was there making tethered tests.

Hardie — You might say these were training flights that you were doing.

Kosch — Oh, sure.

Hardie — In other words, this was a strange machine to you, considerably different to the hang gliders you were used to. Also, you were trying to arrive at the control methods used by Whitehead.

Kosch — And to see if everything was strong enough and if it was going to hold together.

Hardie — Emphasis should be made here that you were trying to keep everything authentic, and as close to what you could determine as to how the machine was built and flown, right?

Kosch — Yes. I've been trying to be as authentic as possible. There are cases where, just for convenience sake, we have used stainless steel cable instead of piano wire, or a couple of pieces I built up out of plywood because we just happened to have some scrap of the right size. We may have used some aircraft bolts instead of the hardware variety, but I'm working toward authenticity. Eventually I hope to have it as exact as I can make it. I've had a lot of people come in — engineers who tried to re-engineer Whitehead's plane and make it fly better, things of that sort — but I really don't want that at all. I want to do it the way Whitehead did. Anybody can, in hindsight, now improve on his airplane and make it fly better, but the fun of this to me is to see if I can do it the same way he did it. It certainly has been a thrill and I'm learning so much.

Hardie — This, in a way, can be compared to what Curtiss tried to do with the Langley.

Billman — Curtiss had to modify the Langley to get it off the water.

Kosch — I really don't like that comparison too much. I've been doing a little reading on Curtiss and Langley and what Curtiss did to get Langley's plane to fly. I don't really want to do that — I don't want to change things.

Hardie — What I'm saying, Andy, is that inevitably this comparison will be made and you are in a position to clarify this so there is a clear understanding.

Kosch — I hope it is clear that I don't intend to change Whitehead's plane around. I want this to be just like Whitehead's. As I said, I used Weedhopper engines just to get this thing flying but I'm not claiming that this is the way Whitehead did it. I'm going to go back to that. I just wanted to show that the design is capable of flight.

Hardie — You're trying to explore the aerodynamics and flight characteristics of this airplane, right?

Kosch — That's right. And we have made the propellers as you brought up a minute ago. Wes Gordeux, a retired engineer from Pratt & Whitney, and Don Richardson, a retired aeronautical engineer from Sikorsky Aircraft, have been on the Whitehead project for 26 years. Wes hand carved these propellers and tried to do everything just the way Gustave Whitehead did. He used horsehide glue and laminated spruce. Don did the machine work, mounting the props.

Hardie — Are the ones now on the airplane designed for your flight tests?

Kosch — They are solid at the hub. They

don't have the adjustment Whitehead had to control pitch. They're stronger than what Whitehead had, but we have a replica which shows the way Whitehead did it and we intend to do it that way eventually.

Hardie — I noticed you used regular pipe fittings on the sample propeller. Are you sure that's the way Whitehead did it?

Kosch — Wes Gordeux seems to be pretty sure that that is the way Whitehead did it. Looking at the drawings and the photos you can see what appears to be pipe. I don't think he had threaded pipe because that would be kind of weak. He probably either brazed or welded the pipe.

Hardie — Are these the shady areas where you're going to have to assume?

Kosch — Of course. If anybody wants to give us some suggestions, we can modify to make it more accurate. We're trying to be honest on this and not trying to pull any Curtiss-Langley deal. I'm not interested in that.

Hardie — It loses its meaning then, doesn't it?

Kosch — It really does.

Hardie — Now that you have the propellers made and mounted, what's next?

Kosch — Right now we have a reduction gear on it so we can swing the propellers at about 600 or 700 rpm, the way Whitehead did, using Weedhopper modern engines. Eventually we'll get an engine built like Whitehead's and we'll then fly with his propellers and his engine, we hope. One more thing I should mention. The propellers I used on the test flights with the Weedhopper engines were made by the Tennessee Propeller Co. I told them what I wanted, the speed I'd probably be flying and the rpm. They built me two propellers, left and right hand — we have counter-rotating props the way Whitehead did.

Hardie — Then these other propellers that are on there now you put on after you tested with the standard modern propellers?

Kosch — That's right, because we're getting ready for flight test now with the Whitehead propellers. We also have since constructed silk wings. A silk company in Japan donated the material — they gave us quite a bit of it.

Hardie — Do you have a value of it?

Kosch — I've been told it's about \$6000 worth of silk. It's really enough to make about five sets of wings. Whitehead used Japanese silk so we wanted to be authentic. O'Dwyer went to New York City and talked to the Chamber of Commerce and they put him in contact with the Kanabo Silk Co. which is one of the oldest silk companies in Japan. They in turn gave us 500 yards of silk and we were very happy to get it. In fact, we displayed the airplane at the Waldorf Astoria Hotel in New York City early in August as a gesture of thanks. It was their 100th anniversary. They wanted our wings to include with a showing of some of their products.

Hardie — It must have been great publicity for them.

Kosch — It was, and we just had a great time. We made a special fuselage we could get into the elevators. We had a folding fuselage — it was really only a 3/4 scale fuselage but the full scale wings. They illuminated it with lights underneath. It looked like a big Japanese lantern. Really quite beautiful. So we have a few things we're looking forward to. I've flown with the nylon wings so now I want to fly it with the silk wings. I want to test

the new propellers that we have, with the modern engines. We're in the process of having the engines built by a number of different people. O'Dwyer has a group in Germany looking at the engine and studying it. I have a fellow in upper New York State named Vincent Versage who is a retired machinist and a model maker. He's in Cuddebackville, NY and he's also working on the engine.

Hardie — When we're talking about engines, what do you mean?

Kosch — It appears to be a modified steam engine.

Hardie — You said it was not for steam but a kind of hot air engine?

Kosch — What the engineers and analysts are telling me is that it was a separate combustion chamber where he burned acetylene and liquid air and fed those exhaust gases into the steam engine, and this seems quite feasible to many of the steam engine experts here at Oshkosh. I've been talking to them about it. They're looking at my mock-up engine and suggesting where there might be some corrections.

Hardie — The engine you have mounted there now is just a dummy?

Kosch — It's a mock-up made to look like Whitehead's. I didn't want to come here with Weedhopper engines on it.

Hardie — What you're saying is that these dummy engines are models from which working engines can be constructed? You will develop working engines from these models?

Kosch — Correct. The dimensions are basically the same but there's still a question on the valve timing. That'll be worked out.

Billman — I'm curious about that liquid air. Was that a common product back in those days?

Kosch — It certainly was. I have a newspaper article that says "Liquid Air Available" in the Bridgeport Post and in the New Haven paper in the early 1900s. It was available right there — in fact, it said, "It can be used in aviation, in submarines and in refrigeration." It had all these various uses for it. I was quite surprised.

Billman — You know, builders talk about welding with gas and air. Do you suppose it could be gas compressed oxygen?

Kosch — It says air and it sounds like it's air and not oxygen.

Hardie — I think that's part of the confusion that arises out of these stories where they say Whitehead used acetylene. People can't understand exactly how the acetylene was used. I thought it was used as a fuel to fire a boiler.

Kosch — I'll show you some articles where he generated his own acetylene with water and calcium carbide, and that acetylene somehow burned in a separate combustion chamber. Maybe he used liquid air because it could be controlled better going into a combustion chamber and those exhaust gases could be fed into the modified steam engine, a double acting piston, etc.

Hardie — At this stage of the game you have a feel for the control of the airplane, so let's go to your experiences of flying it. You said it was flown on three different days.

Kosch — Well, the first day, December 7, was an accidental hop. I can't really call that flying. I left the ground and went through the air and shut the engine down right away and flew for quite a distance. It must have been

between 30 and 60 feet. That was really a surprise.

Hardie — Was that the only flight you made that day?

Kosch — I believe I may have attempted one other, but I'd have to look back at the video tapes. I remember that one very well — I have a picture of it. I might have tried one more, but I'm not certain. Three weeks later, on December 27, I was again prepared for it and we made a number of short hops, I think in the vicinity of 10 or 15, ranging from a couple inches off the ground to about 4 or 5 feet.

Hardie — This was with the Weedhopper engines?

Kosch — Yes. With the ultralight engines and under power. Then on December 29 we had a nice day and I was again ready, prepared to try to go a little further. We had a very successful day. We started off with a couple of short hops, probably 60 or 70 feet in length, and then I went over 100 feet very soon thereafter, and then over 200 feet. Finally the last flight of the day, around the 20th flight, I went over 330 feet, about 5-6 feet off the ground.

Hardie — You had a different rig under it than the wooden wheels you have here?

Kosch — That's correct. I realized that in learning to fly this plane it wouldn't take too much to send those wooden wheels up through the floor. So I took an old landing gear off one of my hang glider type airplanes — called a Jet Wing, a hang glider with a tricycle gear underneath. There's some suspension, bungee cord suspension on aluminum and rubber wheels, so we were using that for our flight test. Eventually I intend to fly it with the wooden wheels. I've had some soft landings like a feather, and I've had some hard ones. I don't want to have to rebuild every time I land it so I'll continue to use the suspension until I'm sure of what I'm doing.

Hardie — In order to control his airplane, I think Whitehead said he stood up in the body.

Kosch — That's right. I'm standing in the airplane — in fact, I'm using weight shift for pitch control at this stage. I'll get my speed up to somewhere in the vicinity of 25 or 30 miles an hour, then shift my weight backwards. I'm standing at the center of gravity so the nose will come up. As soon as I get airborne, I throw my weight forward and level off.

Hardie — Is there any way of controlling the warping of the wings while you're standing?

Kosch — There are a number of ways of doing it. We're trying all of them. You can pull upper cords, you can pull lower cords, you can put a separate pulley to a wire, pulling a collection of rings at the bottom that I showed you. I can point that out better on the airplane. In fact, I believe that the wings were warped without any pulling on the wires, just by shifting weight in one direction. One wing loads more than the other, something like a shifting-billow hang glider.

Hardie — As I understand it, this is the way Lillenthal's worked.

Kosch — His were smaller gliders, they didn't have all this weight.

Hardie — I can see that yours has a greater span — maybe 20 feet for his to your 35 feet.



Andy Kosch holds a replica of the original Whitehead propeller. The two Whitehead types on the airplane are for tests.

Kosch — He made a number of different gliders — some were large and some were small.

Hardie — I would hope that at this stage we're still trying to understand what Whitehead did. Isn't this why you are doing this experiment?

Kosch — I went into this for the fun of making and flying the airplane. It can be difficult at times because I'm being drawn into the controversy and I personally don't like controversy, but you can't seem to avoid it ... when you start talking about who flew what and when. I hope that I'm being honest and accurate in what I'm doing.

Hardie — Re-examining history is not easy. This is exactly what you are doing, with very sketchy data which is a part of the challenge and a part of the interest — right?

Kosch — And a part of the fun.

Hardie — What do you think will be the outcome of your experiment after you're all finished?

Kosch — I really don't know what the outcome will be. I'll probably do this for the rest of my life. I've spent every weekend for the past two years working on this project. I think that eventually I'll be able to duplicate Whitehead's first flight. I want to fly a half a mile down Fairfield beach the same way he did. I'd like to fly here at Oshkosh next year and go half a mile down the runway under control. I'd even like to do S-turns to show that it's under control.

Hardie — What about the flight that Whitehead is supposed to have made in 1902. Was it the same airplane?

Kosch — No, it wasn't. That was Model 22 and had a different engine. It had a kerosene engine and instead of bamboo ribs, he used steel tubing. He had aluminum covering on the fuselage. It's a different airplane — I really don't know much about No. 22. I'm concentrating on No. 21 — it's the one that I want to study. It's the

one that flew a half a mile and I want to fly a half a mile with this one, with the same powerplant and everything the same, as near as I can make it. I don't know how long it's going to take, but I hope I have the courage to stick with it.

Hardie — When did you arrive at the Convention?

Kosch — I've been here since last Wednesday. Art Morgan arranged for a beautiful spot alongside Steve Hay's Pioneer Engine tent. I couldn't ask for a better spot and I really appreciate it. The peculiar thing is that when Whitehead displayed his pictures at the Aero Club of America exhibit in 1906, they were right alongside the Wright engine, just like here.

Hardie — That's where the original crankshaft and flywheel of the 1903 engine got lost. Orville had loaned them for display and never got them back. That's why there's a dummy in the airplane. Incidentally, have you had contact with others who furnished information?

Kosch — A lot of historians have been real helpful and have been feeding me so much information it's unbelievable. I'm having a hard time digesting it all, but I'm learning an awful lot. Gene Husting gave me his opinions on a lot of things, including information on Augustus Herring, and information on Whitehead. Most of my information, though, came from Bill O'Dwyer. I even met Stella Randolph who wrote the original book, "Lost Flights of Gustave Whitehead", back in 1937. I went down to Wilmington, NC last month and met with her — a wonderful woman, 92 years old, as honest and lovely a lady as you can find. She's very pleased that we're doing this and hopes this will help get credit for Whitehead while she's still alive.

Hardie — Well, that about wraps it up. We'll certainly be watching and waiting to hear more about this project as you progress with your plan.