Preflight Interview: **Peter Wisoff**

The STS-92 Crew Interviews with Peter Wisoff, Mission Specialist.

Q: Talking with Jeff Wisoff, Mission Specialist on STS-92. First off, if you would, why did you want to be an astronaut? Were there any particular events or persons that inspired you to be where you are right now?

A: I was growing up in Virginia when the men walked on the Moon for the first time. And I remember watching that live on TV and being very excited about it and always thinking that would be a great thing to do. It wasn't really until the shuttle program came along that it, there was enough seats going into space on each space ride to have an opportunity for someone with my background-which is science, laser technology in particular-to participate because I'm not a pilot. So, that got me interested in the shuttle program, and [I] applied, and got lucky enough to get in and have really enjoyed it ever since.

Now, if you would, give me an overview of your education and career. How did you get to be where you are?

Well, I went to college at the University of Virginia and majored in physics there. And then I went on to Stanford University and did my degrees in applied physics and laser and laser construction technology. And then I went to Rice University, where I was a faculty member there before being selected to NASA. So, I've always been interested in science and technology and space technology. And now I've had an opportunity to participate in the shuttle program, and it's been a real…privilege and a very fun experience.

Let's talk a little bit about this flight in particular. You're beginning a series of missions that involve some of the largest and most critical hardware for the International Space Station. If you would, discuss this flight's pivotal role in the assembly sequence. Why is this flight so important for the flights coming up down the road?

Well, building space station's a lot like building a house. You kind of have to do it in sequence. You can't put the roof on until the walls are there, things of that sort. So, we're really one in a stage of build flights to build station. And we obviously need to put our hardware there before the hardware that goes on top of ours can be put there. So, in that sense, it's critical because each piece of hardware builds on the next. We are taking up what's called the Z1 Truss, which…looks like a big cube and it goes on top of the Node, and it has some of the subsystems that are needed for thermal management and for electrical power generation as well as attitude control of the station. We're also taking up what's called a docking port that we put on the station that allows the next flight after us to dock to that docking port in order to be in the correct position to put its hardware on top of the Z1 Truss, which is going to be the solar arrays that they're going to put up there. So, in that sense, it's critical because we have to put the place there for the next shuttle to dock to, and we put the substructure that the solar arrays [go] on top of.

Now, what have been the biggest challenges for you and your crewmates as you train for this flight?

Well, it's a very complex flight. We're really going to be breathing hard all the way up to the last day because it's, you know, thing after thing on the flight that we have to do. And so, I think it's really just the whole script of the flight, to keep the pace going, keep the concentration going, and learning how all the pieces are related and what the constraints are. Because, until we get the hardware out of the shuttle bay and on to station, there are certain thermal constraints we have to worry [about], getting too hot or too cold. And getting a handle on all those and how to orchestrate it, I think, is probably the most complex part.

You mentioned earlier the Z1 Truss segment. Describe the Z1 Truss in some detail, if you would. How big is it? And what does it do for the ISS now and then in the future as well?

Well, it looks like a big cube-probably somewhere on the order of about 15-foot a side-and it sits in our payload bay as we go up in the shuttle. And Koichi will, as our arm operator, will lift it out of the payload bay and stick it on top of the Node. And on the Z1 Truss is a number of pieces of hardware. There are some antennas that'll be used later to give the station a larger amount of communication capability than it currently has. And, during our EVAs, we actually move those antennas around so that they can be positioned correctly later and actually be put to use. It also has on it Control Moment Gyros, which are basically like big spinning tops that help maintain the attitude of the station. Keeps the pointing in the right direction without burning fuel, you know, liquid fuel that we have on board the station. It also has what are called ammonia accumulators on it, which is part of the thermal system. It helps cool the station once it's all put together. And then it has some various other little pieces of hardware on it that are related to the electrical power system as well.

Very good. Now, what are some of the difficulties and complexities you've trained for in the installation process of the Z1 Truss? I mean, that's the most important thing. What have you had to think about?

Well, Koichi Wakata, our arm operator, has the hardest part there because he's got to lift it out of the payload bay and stick it on to the Node, and that's a very difficult operation. He has a vision system that he uses to help him do that. My part in it is more as in the EVA end of it. And on the first EVA, I will be inside acting as the, what's called the IVA or the intravehicular activity person. And that means that I hold the checklist and I'm talking to Leroy and Bill, who are outside doing the EVAs, and reading them the steps in the checklist as they go through their choreography of how to connect up the electrical umbilicals that give heater power to the Z1 to keep all the components on and alive. And they also go out and move around the antennas during EVA 1 to position them for future flights. So, a large part of my role in the very early part of the Z1 is integration, is going to be the checklist manager for the EVAs.

During the second EVA, you're adding a Pressurized Mating Adapter that you mentioned earlier. Now, what does PMA-3 do and where is it located?

Okay. Well, for the uphill ride in the shuttle, it's located in the payload bay and it's tied down, bolted down, on to a SPACEHAB pallet, which is basically a frame. The front of the frame looks like a circle with the PMA circular adapter attaches to that. And on the first, on the second EVA, Mike and I go outside and work our way around that clock face-that circular face-unbolting the PMA from the SPACEHAB pallet. And then, Koichi Wakata takes the arm and grabs this thing and lifts it up over the nose of the Orbiter and sticks it on the nadir docking port of the Node. And while he's doing that, Mike and I will be watching that operation, giving Koichi voice indications of how well the alignment is, if necessary. Again, he will be using a vision system to help him do that. But if there's any problems with it, since we're already out EVA, we'll be there to be able to give him voice indications of how to help him dock it. And once it's docked, Mike will climb all around on the PMA and undo the launch restraints for the umbilicals. I will set up the robotic arm with a foot restraint and get in the foot restraint and be flown over to where the PMA is. And then I will connect up the umbilicals, which provide power and data for this docking system. And, as I said, the next flight-4A-will use that docking system to come to and dock the Orbiter.

What are your thoughts as a veteran space walker? Is it something you look forward to or is it just part of the job?

Oh, very much look forward to it! It's an incredible opportunity, an incredible experience. You're kind of in your own little spaceship in the space suit. And you can't beat that view of the Earth while you're working. It's an incredible sight.

Now, on your second space walk of the flight, you'll be working again with the Z1 Truss. Tell me what you and Mike will be doing during that EVA.

Okay. A large part of that EVA is really preparing for the next flight. As I mentioned earlier, the next flight will bring up the structure that holds the solar arrays and put it on top of Z1. So, you need to make sure that that surface of Z1 is clear of all objects that would get in the way. And some of the hardware that we take up has been packaged up there just for flight uphill and needs to be moved prior to P6 arriving that goes on top. So, what we're going to do is go out and basically prep Z1 for the next flight. Some of the things that we do is: we move a grapple fixture that was used to move Z1 out of the way, so it's no longer in the way for the next flight who has to put their structure on top. We also deploy a tray that has a bunch of electrical umbilicals that are later connected to the US Lab, and that tray folds down and…we basically undo a bunch of launch locks on it so it'll be ready for the 5A flight that comes along a couple of flights later. In addition to that, we also cycle some of the capture devices that are on Z1 that are used to hold later components in order to make sure that nothing's happened to them during the ascent and that they work and that the later flights can depend on them to work. So, we do some cycles of those capture devices. Then at the end of the EVA, if there's time, our plan is to do a SAFER DTO. SAFER stands for Simplified Aid for EVA Rescue, and it's a little jet pack that we wear, so that if you become disconnected from your tether by some accident, you have an ability to fly yourself back to structure because it's much harder for the shuttle to come and get you, since it's attached to the station. It would have to detach, and that takes some time to come fly over and get you. So, you can rescue yourself. And our plan for that is to activate the SAFER unit that's on our back and fly down towards the B camera, which is in the back part of the shuttle, so that they can aim the camera at us and see what our flight path looks like as we fly down towards this camera. And that's basically the task you have to do as an astronaut if you fell off the station. You have to pick up point, and then you have to fly to that point to get back to it. And so, we want to test that end-to-end operation that we can do that successfully with SAFER.

Now, if you would, discuss the Common Berthing Mechanism. And, if you could, compare its differences with other docking mechanisms we're familiar with.

Well, it's very similar in the sense that the two pieces of the docking mechanism, as you bring two vehicles together, they have guides on them that interlace as you bring them together and allows, you know, basically takes out the tolerances for misalignment as you bring them together. We will be the first flight that actually uses it to connect two devices together. We have cycled the devices on previous flights and so obviously a big part of the success of our flight would be to have this mechanism work successfully. And we have prepared a bunch of contingency operations in case something, you know, various parts of it don't work. So, we feel pretty prepared and pretty confident that it's going to work okay and that we'll successfully get the objects docked together.

During the flight, the crew will be ingressing into the International Space Station. What are you going to be doing inside the ISS?

A number of things. Me, personally, I will be, once we've got Z1 docked on top, Pam Melroy and I will go inside the Node and open the hatch that leads up into a little vestibule area for where the Z1 attaches on to the Node. And there's a number of electrical connectors that have to be configured in there. There's also some grounding straps that have to be placed in there. And, we will also actually be scavenging some of the equipment from the docking system so that we can use it on other parts of space station. Because Z1 will always stay where it is, there's no reason, need to ever undock it. So, there's no reason not to reuse its parts. So, we're going to take out some pieces and reuse them in another part of the station. It helps save money. In addition to that, Mike and Brian will go further into the station to do some configuration in the FGB in terms of transferring things that the ISS crews will need when they come on board. You know, the first crew that'll stay on board station's going to come shortly after our mission, so we need to do the final preparations for them in terms of putting supplies on board. And that's what we'll be doing.

Okay. Very good. Now, on STS-81 in 1997, you were part of the fifth shuttle crew to dock with the Russian Mir space station. And now you're visiting the ISS. What are your thoughts on the opportunity to visit two space stations and how space has become a place for international cooperation?

I think it's been a great opportunity. I feel much more comfortable that I know kind of what it's going to be like to go to space station, having been to Mir. I think the Mir program was great in terms of preparing our two countries-Russia and the United States-to work together on the space station. It's really easy to have, you know, 6 to 10 astronauts work together on orbit because we have similar backgrounds in the way we do business. It's much harder to get the ground structures integrated together, because you've got to run data lines between them. You've got to learn how to work within each other's processes of how you build your hierarchies and your separate mission controls and things of that sort. And I think our cooperation in the Mir program really helped create that communication that allows us to work together on ISS along with our other partners. And it was a really good training ground to get ready to do ISS.

Give me some thoughts, more specific thoughts, about similarities and differences between visiting the Mir and then this flight here. What do you think about when you think about the differences between the two?

Well, obviously, this is a newer space station that we're building, and it's not completed yet. Their, the Russian, contribution to space station-the Service Module-is very similar to the base block module that I visited in Mir in the way it's laid out. This space station is going to be a lot bigger. It's going to take a while to build because we've got a lot of parts to put up there. It's a very big challenge. Obviously, having gone and participated in the Mir program, we're better prepared than we were if we had just started out cold to go do this. The command and control schemes are a little different because we're now partners together in this program. Before, this was, you know, the Mir program, it was a Russian space station, and we were basically guests visiting them as part of our joint cooperation program with them. So, there are differences. But the essential challenges of operating a space station in such an environment-which is a very harsh environment-are still there. And we've learned a lot from the Mir program, and look forward to, you know, meeting the challenges for ISS.

Now, our Russian partners have shown a lot of perseverance in getting us to this point in the assembly. Now, what do you think about their contributions so far? And what does our partnership entail from this point on?

Well, the Service Module is a very essential part of the space station. It's going to provide the living quarters for the early crew. So, it was very important to get that there. And I think everybody's breathing a sigh of relief now that it's there because we know we can continue forward and put people on board and really start…utilizing the space station for what it was meant to be utilized for, which is to do science and to…help maintain the station by having people there to respond to any contingencies. I think that the continuing contributions of the Russians, obviously besides providing crew and their crew time to help maintain the station, is they provide Progress vehicles, which are the little automated space vehicles that come up and provide fuel as well as supplies for the crews that are living on board, which is, you know, a much better way of having a robust…traffic model for maintaining the station than depending on just shuttle to deliver everything. This way, you have more than one vehicle going up there, delivering supplies. They also supply the Soyuz spacecraft, which can take people up and down and will also act as the lifeboat for the station early in the program so that we'll always have a vehicle attached to the station so that if there's a, you know, emergency and the crew has to get off the station, there's a way to get home without waiting for a shuttle to arrive. So, those are very important contributions.

If you would, give me an overview of the role of this flight in preparing the International Space Station for the arrival of Expedition-1 crew, which is really what this is all about.

Well, this, our crew is delivering components that are going to be necessary to eventually put the solar arrays on in 4A, which will provide more power to the crew that's on board. Shep and his crew will arrive prior to 4A putting the solar arrays on. But we will have all the supplies on board, like the food and the water. There's also exercise equipment going up on the very next flight for them so that all the kind of, the needs that you have to maintain your physical well-being will be there. And all the tools and equipment to continue outfitting the inside of the space station will be there. And so, I guess we look on ourselves as kind of delivery boys. Making sure everything's there for them and then Shep and his crew will be well trained to, you know, maintain the station and continue on with outfitting it on the interior, awaiting for the next shuttle crew to bring the next big component.

What is the importance of establishing the space station and what do you believe it will lead to in the years to come?

I think that the space station really provides a couple of things. One is, you know, its basic plan is to be a science platform in space that we can conduct space operations from and science operations, provide a long-term environment to do microgravity experiments. I kind of look at microgravity as one of the knobs you can tweak to discover new things. If you look back at the history of science, you know, we learned how to control pressure of materials, vulcanize rubber, things of that sort. Each time you learn to control a physical parameter, it leads to new discoveries because it allows you to tweak and understand the physical processes that go on. Space station will allow us to be in an environment where we can control the amount of gravity that [an] experiment sees. And, we do that by putting…a centrifuge into orbit along with our ability to feel microgravity just by being inside the space station. And by spinning up the centrifuge, you can control the amount of gravity an experiment sees because it's…simulated gravity when you're in a centrifuge, just like when you go around a car in a fast bend, you feel yourself being pulled to the side. That's what a centrifuge does. And so, by having that control over that parameter, you can conduct all kinds of materials experiments and life sciences experiments to understand the effect that gravity has on basic processes. And I think that can't help but lead to important discoveries. Building the space station itself also provides an opportunity in that we learn how to do space operations. It's a very complex project, and it will give us the basis for going on and doing, you know, even more challenging things like going to Mars eventually and building colonies there and whatever goes beyond that. So, I think, you know, when you do hard things, you learn things that can't help but have a payoff. And the challenge itself is, I think, a big motivator for kids to get into science and technology, because kids are very excited about space exploration. And so, I think it has multiple payoffs in that sense.

Now, yours is also the 100th shuttle flight. And, if you would, discuss the significance of the space shuttle in human space flight history. Just talk about its uniqueness a little bit, what it's accomplished, and then its role in the future as well.

Yeah. I think the 100th shuttle flight is an opportunity just to reflect back on what a great vehicle the shuttle is. And also the fantastic job that the shuttle team does in preparing the vehicle for the crews to go use. Because it's just, it's amazing to go watch a launch and just think about how complex this machine is and how well it works. The shuttle has proven itself to be a great workhorse for getting large pieces of payloads to orbit and have an opportunity to work on them for 10 to 14 days. And in this case, it's going to be our taxi to take stuff to space station and help build the space station and deliver crews back and forth along with the Soyuz vehicle. So, it's just an amazing achievement. It's probably the most complicated machine ever built that I can think of. And yet it works almost flawlessly every time we launch it. So…the significance of the 100th shuttle flight is just an opportunity to reflect on how lucky we are to have the opportunity to fly on it and to use this vehicle to build a project like ISS.

Greetings

Click on the image to hear Mission Specialist Peter Wisoff's greeting.

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