ASHRAE Leadership Recall (formerly Leadership Recalled)
Transcription

Interview of: Irving Pflug

Date of Interview: June 2001

Interviewed by: William Murray

William Murray
Well Professor Pflug first I'd like to congratulate you as a recipient distinguished 50 year member award yesterday.

Irving Pflug
Thank you.

W.M.
Your appearances defy you, the fact that you got the 50 year award. You don't look to be that old a gentleman. You must have started off pretty young. Would you care to give us a brief biographical sketch of your life, your family's birthplace, you parents.

I.P.
Well I started out in southern Indiana near Evansville. And I was, my father was a farmer and a mechanic and a carpenter and I went to school in southern Indiana. And then decided I wanted to be an engineer and went to Purdue. Found it was quite different and after a couple years why, I had a excursion to Europe courtesy of Uncle Sam, World War II. And then after the war, well during the war I studied civil engineering at Ohio State University. And then after the war I came back to Purdue and got a degree in agricultural engineering and also in general agriculture. And later got a job teaching at the University of Massachusetts and worked and got a master's and PhD at the University of Massachusetts.

W.M.
When did you, have you married and had a family?

I.P.
Yes. I was married while I was at Purdue and I have four living children and I think it's 11 grandchildren. One of the children, Anne, is a civil engineer doing construction management in the twin cities.

W.M.
They're all in the twin city area?

I.P.
No. She's the only one. I have a daughter in Hastings, Michigan, a son in Grand Rapids, Michigan, a daughter in Steubenville, Ohio.

W.M.
Had it always been your goal to be in the teaching field or had you other aspirations when you first started in your ?

I.P

Well I think that my mother was a great one for education. Back in the year when she grew up, there were limited opportunities but she was always pushing for education and one of her favorite cousins taught at Indiana University and I think that probably subliminally she was always pushing us toward education but I didn't start out in that direction and arrived there sort of happenstance.

W.M.

What was the industry like at the time you started teaching as compared to say today? What challenges did you have?

I.P.

Well my first job was with Professor Barr at Purdue in heating ventilating agricultural buildings for storages and that was in its infancy after the second World War. And then when I went to the University in Massachusetts I got involved in apple storage research and assistance to some of the growers. And the typical refrigerating machine at that time was a reciprocating ammonia machine of about what, 300 RPM or something like that. And so the industry was quite different. In the food storage industry they had used floor mounted diffusers and in the period probably from 50 to 60 there was a big change toward using ceiling mounted diffusers with propeller fans rather than centrifugal fans. And some of that has continued and of course the use of Freon was the main refrigerant.

W.M.

Was most of your control in temperature control or did you have to include the humidity? Did you have to have a strict humidity control?

I.P.

Very strict humidity control but that in general we got by sort of insisting that they have a lot of coil surface. Because you can't have low, you can't have high humidity with not very much coil surface because then your delta T has to be so great that you just drop the moisture out in the coil. So one of the things we were preaching to the growers and we worked, when I got the Michigan State, we worked with the Udell Refrigeration Company a lot. They were in Grand Rapids, Michigan. I think what we did was we tried to encourage the growers to put in a lot of coil in a smaller machine. That maybe sounds funny. But if you put in a lot of coil and a smaller machine you'll have a high humidity. If you put your money in the machine, have a big machine and a small coil you won't have any humidity.

W.M.

What was your goal for your standard designing relative humidity to try to maintain that?

I.P.

Well 95 plus.

W.M.

Saturated almost.

I.P.

Yes.

W.M.

And your temperature?

I.P.

We were run about 33 degrees.

W.M.

Is this partially to control the ripening of the vegetables and the fruit? Was that the main goal?

I.P.

Well starting when I was at that University of Massachusetts, I got involved in controlled atmosphere storage. We call it CA storage now. In which you put the fruit in a sealed room. We would line the rooms with metal so that the diffusion rate through the walls was very small. We brought in things like a breather bag so that the fluctuations in pressure wouldn't cause breathing of the room. And so you put the fruit in this room, the fruit is picked at the optimum maturity. And during storage, the fruit is alive, you know, fruit breathes. It breathes in oxygen and it breathes out carbon dioxide. So that the fruit naturally will develop a low oxygen high carbon dioxide atmosphere. You have to scrub out the carbon dioxide so that we had scrubbing systems for removing the carbon dioxide so that during the storage season we would have about a three percent oxygen five percent carbon dioxide in these rooms with about 95 percent or 96 percent humidity. And if you go into the supermarket today you will get CA apples. Apples that come out of these control atmosphere storages. They may be from the pacific northwest or they may be from Michigan or local. But it's something that's now just done very widely.

W.M.

Well how long of a period would you be able to maintain it, the fruit or the vegetables while it's in a controlled atmosphere?

I.P.

Well we work with primarily apples and pears. They do some other fruit now. But with apples you would fill a storage in October and hope to sell the apples in June and July or August of course when apples are in short supply.

W.M.

That's a long period of time.

I.P.

That's right. And every day you have to have a method for measuring the oxygen and carbon dioxide to be sure that these levels are maintained because if the oxygen gets too low then the fruit sort of dies and gets all flavors. The same as with the carbon dioxide if it gets too high.

W.M.

When did you begin your role as a Professor at, what years were those?

I.P.

Well I started teaching, I was an assistant professor at the University of Massachusetts in 1948 teaching strength of materials and also at that time I was assigned the job of teaching a course in refrigeration to food technology students. And that's when I got involved with, well it wasn't ASHRAE then. It was ASRE. The people in the Connecticut valley area were very helpful in educating me on refrigeration so I could teach it because I think I got just a smattering of refrigeration in at Purdue in thermal, in our thermodynamics course and mechanical engineering. But to teach the students I had to know how the thing worked and so Fred Reedle and some others in the Connecticut valley made a refrigeration mechanic out of me so that I could put my own system together and then be able to explain it to the students. And we had a two semester course. First semester was on principles of refrigeration. And the second one was application freezing and psychometry, dehydration, and the affect of packaging materials on moisture loss and things like that. And then I went from there to Michigan State and then I was there for 13 years and then to Minnesota.

W.M.

Getting back into God's country.

I.P.

Yes.

W.M.

In Minnesota it's a matter of maintaining warmer temperatures most of the year.

I.P.

Yes that's right. When I came to Minnesota I was involved with NASA quite a lot in the space program because part of the, I've been in refrigeration, heat transfer and microbial control. Sterilization and that took me into some work with NASA.

W.M.

You talk about microbial control. Is that really to, did you get into that with the fruits and the vegetables to keep them from spoiling. Or that wouldn't apply?

I.P.

Well it would. I got into that. That was a project I worked on and if you're going to, let's say, take a can of food and preserve it you need to heat it. We heat it. Heat preserve. And this involves heat transfer and basically I've been involved in the refrigeration and in heating and cooling heat transfer as well as in instrumentation because you have to be able to measure the temperature. This sort of gets to a point with ASHRAE. In the whole ASHRAE area basically, the basic science you're dealing with is heating and cooling. It's really heat transfer. The whole thing is a heat transfer program problem with machinery to do it. And so the basic science is heat transfer and the application is all these wonderful devices that do it for us.

W.M.

You're in a rather different field than the majority of mechanical engineers. They're thinking more of a human environmental control and you're talking about a completely different field then what most of us.

I.P.

Well yes. That's right. But I think the, one of the interesting things is that you have in the ASHRAE area, you have the machinery and the engineering. But the great bulk of the applications are biology. And so somewhere you have to have biologists involved with engineers. And this is an interesting area because biologists do not think the same way as engineers think. And vice versa. It's hard to teach an engineer to think like a biologist and it's equally hard to teach a biologist to think like an engineer. And see, I came up in agriculture in one sense in that I grew up in agriculture but basically I'm an engineer and many people don't, many people in the microbial control area don't look at me as an engineer. They look at me as a microbiologist and I think that being on both sides of this I can see some of the problems that are involved. And maybe opportunities also. And I think it's important that ASHRAE work to keep biologists involved. I know they're hard to live with sometimes, you know, there was a time when I preferred to drive a tractor to driving mules. But there are times when the mules, you have to have them. And it's sort of that way with the biologist. I think that biologists are different than engineers but you need that input because the biological organism is infinitely variable. If you make a refrigerating machine, when I remember going through a Westinghouse plant, and this was before machining was perhaps as precise as it is today, but they honed the cylinders on these small compressors and then they ground the pistons and they classified them. They didn't say I'm going to make the pistons all this size and the cylinders all this size. They realized that they couldn't do that. So what they did is they fitted pistons uniquely to cylinders. And in that way they were able to accomplish what they wanted. But I think most engineers think that if they make a machine all of their machines are going to be the same. When you're dealing with biology there are five of us here. We're five different animals. And so you have to deal with the variability in biology. And that's one thing that's very hard often for engineers to recognize this variability.

W.M.

You noticed any, over the years, any changes in how our equipment has advanced as far as refrigerating machines. That's a big question. Kind of widespread.

I.P.

Well the obvious major change has been the bringing in of the digital controls and I think higher speed machines that are supposedly more efficient and then there's all this change in the refrigerants. We were, I work mainly with R12 and R22 which no longer exists. You've got new refrigerants that are used now.

W.M.

Well with the new refrigerants did you adapt them to your field to replace the R12 and 22 or would that be an insurmountable project for you?

I.P.

Well you know it can be done. If it has to be done it can be done. I think that's

W.M.

If the money is there.

I.P.

That's right. That's very, very true. That's very true. I think this getting, since I straddle this line between biology and engineering some points that I might make on that is that the areas that these two groups work in are different. I think that the engineers are most all working for companies and if you have engineers in your company and you want them to go to the ASHRAE meeting you pay their way and pay all the expenses. If you're working for academia we don't have quite that same privilege because the funds come in a different way and we have to worry more about how we get to meetings and I think that ASHRAE in dealing with the biologist which are outside, they aren't employees of companies. They may be working for the government or academia. They need to find, ASHRAE needs to find a way to encourage these people to come to the meetings and get involved and I don't have the answer to that but I think it's an important problem that needs to be resolved, that needs to be solved for the benefit of the organization.

W.M.

You think there's a problem as far as some of the fees that are charged? Like say the ASHRAE conventions and things like that. Would they be out of the range of an average biologist or teacher, professor?

I.P.

There are, I think that the difference is that people working in your company, if they go to the meeting you'll pay the registration fee, you'll pay their hotel bill, you provide him with an airline ticket. I might have to do all that myself. And so it makes it, I have to want worse than.

W.M.

I know what you're saying. Being retired I don't have a company …

I.P.

That's exactly right. But the younger people, if you think about a young scientist who has a young family and is interested in the area and wants to go it, if he goes it's really a financial hardship. And sometimes the funds just aren't available in academia for this travel. Not that, I don't mean to say that academia is poor because there's always money for what needs to be done but sometimes it's a new building rather than going to a meeting.

W.M.

Of course that's dependent upon the economy and also…and so forth.

I.P.

That's right. That's right.

W.M.

You're talking about microbiology. Quite a tongue twister there. You were involved in clean room design, you mentioned there?

I.P.

Yes I deal in clean rooms. A clean room, it's almost a misnomer in that clean is relative. But in general what we mean by clean rooms are the idea is that you have these ceiling HEPA filters, high efficiency particulate filters. And you're recycling the air and humidifying it. Maintaining let's say 50 percent humidity and supposedly in a well operating clean room the velocity from the face of the filters is about 100 feet. And the idea is that these, you will get streamlined flow and this will carry the microorganisms out of the room and back and they will be caught in the filters. If I am a worker in this clean area beside a machine that is filling capsules or a solution there is this air barrier between me and the product and that protects the product. And we're doing more things to try to get the person farther away from the filling line. Starting in the early 90's I had a project with TL systems, you may know them. And Dispatch Industries in building a literally a clean room in a box where the people are on the outside. That's a tunnel and it's an advance in being able to manufacture sterile products. In microbial control you can package the product, you can put the product in the package and then subject the package to some kind of a sterilization treatment. Or you can sterilize the product first and then put it in the package. And when you sterilize the product first and where we say aseptically package it, that's where the clean room comes in because you have to do this packaging in an atmosphere where it's not contaminated with microorganisms.

W.M.

Is it possible, I would think that they could package the product mechanically, I mean using robots and tools and something like that? That way you don't have a human close to the product.

I.P.

Yes. But if you're running at 700 vials per minute, it jams once in awhile. And when it jams you have to have human intervention and in our tunnels we put gloves in them so that, like a glove box within the hospital or other in environmental area so that the individual can intervene with a tweezer on the end of the glove or something to clear the jam.

W.M.

So the human wouldn't be in the so-called sterile area.

I.P.

Exactly right.

W.M.

What about the high velocity, I mean I would think with this vertical laminar flow you wouldn't be aspirating any of the room error.

I.P.

Well in the tunnel it's contained. And if you're in a room, such if you were to say that this was a clean room the whole ceiling, the air would be coming down from the whole ceiling.

W.M.

Like a piston pushing it.

I.P.

Yes. And you might even have a flexible curtain next to the line so that the individual is standing on the outside line. The individual is really a machine operator and he only needs to intervene if there's a problem. But these machines are complex and intervention is necessary.

W.M.

Can you think of any people who stand out that influenced you in your profession or early years?

I.P.

Well my first introduction to heating and ventilating was a gentleman named Bill Miller, Professor Bill Miller at Purdue. And he taught a very interesting heating and ventilating course. And then I went to work for Professor Barr in agricultural engineering. And I learned psychometrics from Dr. Barr. He was, I think quite ahead of his time as far as using psychometrics and things. And then there was the group in Connecticut. Mr. Reidle and others who helped educate me. Told me how to make joints. You talk about humorous events, I was building, I built my own walk in cooler. And my boss gave me an auto mechanic to help me do the copper piping on this box and when we had it done and we put compressed air in it, it just leaked like a sieve. And he said to me "but it'll hold gasoline". And of course that's when I learned how to make flare fittings and make them tight and so that they didn't leak. I had to go back over and make all the flare fittings over and we had a good system after that.

W.M.

You're, like we've said before, you're in a rather unique field in mechanical engineering or in our field, heating and refrigeration. What advice would you give a young person just getting into the profession? To follow your guidelines, your approach into the industry? I suppose it would be whatever he feels comfortable in or enjoy.

I.P.

When I was at Michigan State I had a young man come in to work for me, Ron Fischer. And Ron was really an energetic young man and he came in just a technician, hadn't gone to college or anything. And we working in the lab thought that he really had promise so we encouraged him to learn refrigeration. And he went to school and nights and so forth. And we had a number of environmental chambers then at that time which he was taking care of and I think about four years later he went to work for Meijers Supermarkets and later was in charge of all the refrigeration at Meijers Supermarket. I think that there's a wonderful future for people in refrigeration. I have yet to see a refrigerating machine that didn't require service very often and it's an interesting it's, I think it's a challenging area. And whether they go, Ron Fischer, he went as a technician and a technologist in being able to troubleshoot and solve the problems. Or whether the individual goes and gets a degree and goes into the area. I think it's a good area. I think it's a challenging area and I've had a lot of fun. I think I enjoy doing the refrigeration part, the hands on more than the writing. I've done a lot of writing. I have to do a lot of writing. But it's a lot of fun to put together a refrigerating machine and see the thing works you know. It's a fascinating area.

W.M.

Are you still active in giving courses at the university?

I.P.

Yes we've been giving a three day course for a number of years and we'll give one in St. Paul in September. It's an interesting course. I haven't seen it used too much. It's a lecture problem course and I think it comes from my engineering background. We have a problem book and this is microbiology you might say. We call it microbiology and engineering. But we lecture an hour and the students have to work a problem. A simple problem. You might think it's equivalent to finding some values on psychometric chart. But they have to take, they have to pick up a pencil and they have to get some values. And then we give them an answer sheet. And then we lecture a little longer and we do this for three days and it to me it's been the most effective way of teaching.

W.M.

Sounds like a very interesting course.

I.P.

We had a lot of success with it.

Do you have any other comments that you care to talk about?

I.P.

Well I think that my experience with ASHRAE has been very good. I haven't been active as I should have been the last 10, 15 years. You know there's only so much that you can do. I continue to read the literature and I may build my own little apple storage this summer. If I can find a, I suppose you'd say a packaged air conditioner or a little box that will get down to a 35 degrees that I can build this little insulated box and put this in and have a refrigerator storage. So I'm still interested. I think it's just an interesting area. And I think there's an opportunity for anybody, you know, at all levels at ASHRAE and I think that's one of the good things. The individual can participate at many different levels.

W.M.

Well I'd like to extend a personal invitation to you to attend one of our Minnesota chapter meetings if you see a topic schedule that's of interest to you. I mean we certainly like to have you there.

I.P.

Well thank you. It's been quite a while since I've been to one. You know as time goes on you don't get to as many meetings as you'd like to.

W.M.

No that's true. You see some young, very brilliant engineers nowadays in the ASHRAE field. It's been a pleasure interviewing you Dr., Professor.

I.P.

It's been a pleasure talking to you about ASHRAE and the things that I've done. Thank you.