
FREDERICK DOUGLAS OTTO

Frederick Douglas Otto was born in Hardisty, Alberta on December 1st, 1935 and attended secondary school in Mannville. He graduated from the University of Alberta with a BSc in chemical engineering (with distinction) in 1957 and MSc in 1959. He then went to the University of Michigan and obtained a PhD in chemical engineering in 1963. He was appointed to the academic staff at the University of Alberta in 1962. He was Chair of the Department of Chemical Engineering from 1970-72 and 1975-84, Dean of the Faculty of Engineering from 1985-94, and was appointed Professor Emeritus in 1996. Otto was President and CEO of DBR International (1998-2002), which was an Edmonton, and Houston-based group of companies serving national and international organizations in the petroleum and petrochemical industries. It had been established by Professor Donald B. Robinson of the Faculty of Engineering. Specific areas of business included laboratory and fluid sampling services for specialized hydrocarbon phase behavior and fluid property studies; design and manufacture of high pressure and high temperature laboratory equipment; and engineering software that was specialized in phase behavior, fluid property and sour gas sweetening process simulations. DBR was sold to Schlumberger in 2002. Dr. Otto is an author of more than 90 technical papers. A major area of research was the development of gas treating technology and computer software for the design and simulation of separation processes. In 1998 the Gas Processors Association gave him the Donald L. Katz Award in recognition of outstanding accomplishments in gas processing research and technology and for excellence in engineering education. APEGA has recognized his contributions to the profession by awarding him the L.C. Charlesworth Award (1990), the Centennial Award (1993) and Honorary Life Membership (1997). He is a fellow of the Canadian Academy of Engineering (1991), the Chemical Institute of Canada (1975), the Canadian Society for Senior Engineers (2008) and Engineers Canada (2009).

Date and place of birth: January 12, 1935 in Hardisty, Alberta

Date and place of interview: April 16, 2013 in Dr. Otto's residence.

Contact Information:

Frederick (Fred) Otto
12319 – 52nd Ave
Edmonton, AB T6H 0P5
Email fred.otto@ualberta.ca

Name of interviewer: Adriana A. Davies, CM, PhD

Name of videographer: Jimmy Bustos

Full names (spelled out) of all others present: N/A

Consent form signed: Yes



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Transcript reviewed by subject: Yes

Interview Duration: 1 hour and 51 minutes

Initials of Interviewer: AD

Last name of subject: OTTO

AD: Good afternoon, Fred. I am with Fredrick Douglas Otto, former Dean of Engineering at the University of Alberta, doing an interview for the Petroleum History Society Oil Sands Oral History Project. It is April the 16th, 2013 at 1:07pm and we are in Dr. Otto's home. Thank you so much for agreeing to be interviewed.

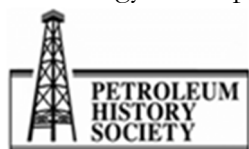
OTTO: Well, it's my pleasure to talk to you Adriana.

AD: Good, now I'd like to do a sort of potted 3-minute bio, beginning with when and where you were born and educational background, and then we will focus in on your career and oil sands-related material.

OTTO: I was born in the hospital in Hardisty, Alberta. My parents at that time lived in Hughenden; my dad was a grain buyer there, and that was in 1935 and shortly thereafter it was sort of recession time, so my parents decided to move to Marwayne which, at that time, was considered to be in the wilderness but my dad went there to operate the National Grain Elevator.

So, my first few years of schooling were in Marwayne. In 1946, we ended up in Mannville, which is on Highway 16, and I took the rest of my elementary and high school in Mannville. I graduated in 1953; I was fortunate to, at that time, win a very nice scholarship – a matriculation scholarship – to pay for my fees. My mother was a school teacher and she taught school in Mannville for many years, but she was certainly instrumental in making sure that I got a good education, and that I got to university. I decided to go into Engineering because I liked the sciences. So I studied Chemical Engineering at the University of Alberta and had some great teachers, Dr Govier and Dr. Donald Robinson who I admired. So, I graduated in 1957 with distinction and got the APEGGA gold medal [Association of Professional Engineers, Geologists and Geophysicists of Alberta], in Chemical Engineering; and decided to do a Masters with Don Robinson. So, we did research on hydrates. It was his first project on gas hydrates. They were of interest to the chemical industry at that time. He had spent some time in Sarnia, Ontario and they were having some problems with hydrates forming in the process lines; so we did some hydrate studies.

At the conclusion of my Master's degree, both Don and Dr. Govier had studied at the University of Michigan, so I decided to go there; and I went there for a PhD. While I was there, I married my wife Helen, who I had met as a summer student, while I was an undergraduate. I spent a couple summers at Chalk River and there we did some research on heavy water and I worked with Dr Howard Ray. At Michigan – my thesis was on stereo specific polymers. At that time, that was a big coming technology development - to develop polymers, that you could control the structure of more. So, I



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did a thesis on stereospecific polymerization of styrene. At the conclusion of my work at Michigan - I was almost finishing - Don Robinson offered me a job to come and teach at the University of Alberta. So, I ended up here in January 1962 and started my work as a professor in Chemical Engineering.

My early years in the 1960s, that was a time when computers were just starting to be used more effectively for industrial design and what not, but it was also a time in Alberta when the natural gas industry was developing. There was a lot of interest and work being done on the design of gas processing plants. So, I got involved in developing computer technology for designing some of the separation processes for gas processing.

I also went back to my time in Chalk River and did some work on heavy-water production because, at that time, the nuclear industry was thriving and there was a lot of interest in heavy water; one of the possibilities was recovering heavy water using deuterium from the hydrogen streams in fertilizer plants. So, we were doing fundamental work on technology for some heavy water processes that could be used to recover deuterium from hydrogen streams and fertilizer plants. So, that was in the 1960's and, as I mentioned, the gas processing industry was thriving, and their sour gas ... they needed to recover the hydrogen sulphide from these gases, and they didn't have all the data they needed. So, Andy Younger, who was President of the Canadian Gas Processors at the time, encouraged us to get involved in measuring solubility data for hydrogen sulphide and carbon dioxide in the treating solutions that could be used to recover these gases. So, that got me involved with Dr. Alan Mather; for many years we took fundamental data, solubility data for hydrogen sulphide and carbon dioxide and a number of solvents that have found use for recovery of both hydrogen sulphide and CO₂ from process streams.

I also got involved in some kinetic data so that this rate data could be used for the design of these processes. We did that for many years. We collected a lot of data that was useful to the gas processing industry. This work was done under contract with some of the companies involved in that industry as well as the Canadian Gas Processors Association.

In the 1970s, Syncrude was developing the technology to recover bitumen from the oil sands. They stated their efforts in 1964 and, by the time the 1970s were coming, there was getting to be more interest in the recovery of bitumen, and processing of heavy oils. There was an interest in the province even in recovering liquids from coal. So, there was heavy oil that was being produced in the province; there was the bitumen and there were coal liquids that people were interested in understanding and characterizing and getting fundamental data for so that they could develop appropriate processes for upgrading these resources.

AOSTRA [Alberta Oil Sands Technology and Research Authority] was started in 1978. An interesting issue was, in 1975, I had two students by the name of Neil Camarta and P. K. Mann and these two students did a project for me on the hydrotreating of waste oils. At that time, there was concern about where were all the used oils going in the province. There was a company called Turbo Refineries Ltd that was processing oils but they needed a better understanding of how to best do



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this, and what were the best catalysts to use, and what the best conditions for processing them were. So, Neil and PK did a report for me and I've got a copy of it here;

AD: It's a historic document. OK. So, "Hydrotreating of Vacuum Distilled Used Oil," and both of them have gone on to brilliant careers, as so many of your students have, but that's far down the road.

OTTO: Well, Neil is an exceptional individual; he was a very bright student but, as you know, he went to work for Shell and, then, Petro Canada, but he was involved in a major way in developing Shell's oil sands properties and, then, he worked for Petro Canada, and he was involved when Petro Canada was taken over by Suncor; and Neil was an executive with Suncor and so he has had an amazing career. And, also really interesting, though, since he retired from Suncor, he is now President and CEO of a company called Western Hydrogen, and they are working on developing a new process for developing hydrogen, or producing hydrogen which, of course, is needed for the upgrading of these heavy oils.

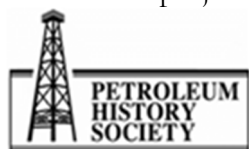
AD: So, you sowed this seed and that research project gave them the opportunity to begin studies in this area. Now, when we talked previously, you mentioned that, in terms of the ERCB [Energy Resources Conservation Board] hearings that Syncrude had to go through to get approval that you attended those; but not as an intervener. Do you want to tell me that story?

OTTO: I don't think so, no I was not involved.

AD: Sorry, that's one of my other researchers.

OTTO: But, Adriana, this was the initiation of important work that – at that time – well let me go back a little bit. In the early 1970's, Dr. Mather and I started to do some solubility studies on hydrogen sulphide and CO₂ and nitrogen in heavy oils, because people were asking for that kind of information, so, we started to do that. Then, for Neil and PK's project we set up a little reactor and that was the initiation of the setting up of a Hydrocarbon Research Lab in the Department of chemical engineering at the University of Alberta, and I worked with Dr Ivo Dalla Lana in doing that. And, at that time also, the Hydrocarbon Research [Centre] was set up. It was funded by both the provincial and federal governments, because they wanted to get a better understanding of the properties of bitumen and heavy oils, because it was important ... I feel it was important that, if we are going to develop the resources in the province, we should be developing the technology in our own province that was needed, specifically, for those resources. It's also a vehicle for training students and young people to get into this industry, such as Neil and PK. PK went to work with Petro Canada as well.

We set up a lab for hydroprocessing. It was a key thought at that time, to use hydrogen to upgrade the heavy oils and remove detrimental things like nitrogen and sulphur and oxygen compounds. So, we set up a lab that involved a couple of reactors, a batch reactor and a continuous flow reactor; we set up analytical methods for determining the sulphur and the product distributions, and what not. And we did projects for the Hydrocarbon Research Centre, we also did projects for AOSTRA



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[Alberta Oil Sands Technology and Research Authority] but a key project was one supported by Petro Canada; and Barry Pruden was the person that got us involved in that. So, we worked on that for a couple of years. We did that work in the late 1970s and it continued for me until 1985 when I went into the Dean's Office.

But I should mention another individual that worked with us who was a catalyst expert. That was Dr Seig. Wanke who was also a professor in the Department of Chemical Engineering. Seig was a student when I first started teaching, and he went on and got a PhD and joined our staff as well, and he was helpful in both the work we did for Atomic Energy of Canada and for this heavy oil work in determining catalyst properties, and using catalysts for upgrading purposes.

AD: So, the University really became a research powerhouse for petroleum, whether it was the conventional industry or heavy oil.

OTTO: I just want to show you a picture of our heavy oil laboratory.

AD: Oh wonderful; would you be willing to pass on some of these materials to the Glenbow Archives? The interview is going to reside [there], because of course they have extensive holdings to do with the conventional industry and through this project we want to help them to build resources around oil sands materials. Now, you said that at the recommendation of Dr Robinson that you went to the University of Michigan. Now, compare the University of Michigan with the U of A at the point where you were a student, and then three or four years later when you went back to teach. What was the relative size of the universities and the engineering faculties?

OTTO: Well, the University of Michigan was older and better established. One of the reasons people went to universities in the United States for PhDs [is] that we weren't really training PhDs in Canada. We started to, and when I came back on staff, we started to have more graduate students, more PhD students, people like Harvie Andre and Bill Svrcek and Raj Bishnoi and Gordon Moore. These were all PhD students that we turned out at the University of Alberta. But Michigan was well known for training people to go into the other universities as professors. The University of Minnesota was also well recognized for that kind of effort, but Michigan was particularly strong in that area.

The person that was at the University of Michigan that was really prominent was Dr. Donald Katz. And Dr. Donald Katz was very prominent in the natural gas processing and natural gas industry. He was well known; there were awards given to people under his name, and Don Robinson did his PhD under Donald Katz and that's why Donald Robinson got into doing work on hydrocarbon properties and phase behavior, and thermodynamics, because of Donald Katz. Al Mather also did his PhD with Donald Katz. So, in later years, Donald Robinson got the Katz Award and Dr. Mather and I got the Katz Award for our work that we did for the gas processing industry, which is interesting.

AD: So PhDs were not a common thing in the early 1960's in Engineering at the U of A?



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OTTO: No, we were just starting to train PhDs at that time. That's why people went away for their studies. A lot of the civil engineers went to the University of Illinois to get training in structural engineering.

AD: And you then began to build at the University of Alberta because, of course, it was **the university** [in Alberta]. There was a program at the U of C but it was not an independent institution until a few years later. There was a vision of the Faculty of Engineering collaborating with industry and the petroleum industry basically was it - and petrochemicals emerging - as the industries that the research establishment had to pay attention to. Is that correct?

OTTO: Oh yes; that is a very good interpretation. I think the faculty has been very strong in doing applied research and, certainly, I have supported that but I thought that – what excited me – was doing things that would help the Alberta and Canadian economy; that would contribute technology that we needed for our industries and our development. If you look at the work of the people of the University, you will see a lot of that, not only in the chemical engineering department.

The development of process control technology for industry was one of our strengths; as well as the work I talked about in catalysts and in the contributions to the technology needed for the gas processing industry, and for the oil sands industry.

I was fortunate to be able to hire some very dedicated and bright staff to contribute in that way. Some people that were very passionate about doing work that would contribute to the development of needed technology. A good example of that is Jacob Masliyah, who I was able to hire in 1977, and that was at the time that AOSTRA was forming and we were getting into understanding bitumen. Jacob took a real passionate interest in the process for recovering bitumen from the sand, the separation process. He wanted to understand the fundamentals of that. He had a marvelous career developing technology that optimized that process. Jacob's career, both as a teacher and as a researcher, was outstanding and he has been recognized. He held an NSERC [Natural Sciences and Engineering Research Council] Industrial Research Chair in oil sands and he is recognized as the world's leading expert in the separation technology for optimum recovery of bitumen from the sand.

AD: I'll go back just a little bit because, of course, the big riddle for oil sands research, which of course was begun through the Federal Government Mines and Minerals Branch, Geological Survey [of Canada] was Ells and, then, of course Karl Clark from about 1918 onwards. The focus was on the separation but it was actually working with the real materials and that was the era of research that then culminated in Bitumount and the Blair Report, and Premier Manning opening up the oil sands for development, post 1951. But, when you talk about Jacob Masliyah, I mean Jacob didn't work with the stuff; he was doing theoretical modeling on materials and their properties. So, this is a very different era of research in engineering.

OTTO: It was fundamental research that produced amazing results to help the industry and, I think, the industry has benefited greatly from the fundamental work that he did, because when he wanted



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to understand the process, he wanted to understand the surface phenomena, the interfacial phenomena. Getting a handle on that gave him leads to how best to optimize the process.

AD: Do you want to talk about your vision of Dean and how you helped establish the research priorities of the faculty and then the strategic hiring because you weren't just a paper shuffler. It's very clear.

OTTO: I became Chair of Chemical Engineering in 1975 and that was when this was all happening. I was fortunate to be able to find people like Jacob that really wanted to come to Alberta and, as I said, he was really passionate about it. It was one of the best hirings I ever made. Jacob had a lot of enthusiasm; it exuded not only when he was just teaching. He has received all sorts of teaching awards too as you know. But, at that time, I was also able to hire people like Sirish Shah who was in the process control area and he was working with Grant Fisher, who also studied at the University of Michigan but in the process control area, and people like Kumar Nandakumar who was interested in fluid flow and slurry pipelines, and that kind of thing.

That was early in my tenure as a chair but after we got into heavy oil upgrading, in 1983, I was able to hire Murray Gray and, as you know, Murray Gray has had a phenomenal career as well. Murray had had some experience at Shell and did his PhD in the United States. He got interested in the upgrading [of] the heavy oils and the bitumen. So, he was a natural to get involved with the initiative to do upgrading work in the department, and I went into the Dean's office in 1995; well, that took my time away from a lot of research but he continued to work and got really interested, immersed in the upgrading research and, as you know, he has served some time as the Chair of the Department and Dean of Graduate Studies. He became the Canada Research Chair in Heavy Oil Upgrading and NSERC [Natural Sciences and Engineering Research Council] Chair in Oil Sands and Director of the Centre of Innovation in Oil Sands Research [at the University of Alberta].

AD: So, you had an instinct for picking winners, wouldn't you say?

OTTO: Well, I lucked out, I guess; I can put it that way. I wanted – I have been fortunate to be able to hire some really bright and dedicated people and Jacob and Murray are examples of that.

Now, when I went into the Dean's Office, we had a broader picture of what was going on in the faculty, so we made some good hirings in Electrical Engineering and Civil Engineering and Mechanical Engineering as well. I can't really take credit for hiring Norbert Morgenstern; he was there, and people like Don Scott. They were there and they did practical research too, and Nordie is still doing consulting all over the world for geotechnical...

AD: And for Syncrude and other oil sands companies

OTTO: Yes, yes, yes.

AD: So, you were Dean from when to when?



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OTTO: I went into the Dean's Office in January 1985 and I was Dean until the summer of 1994.

AD: So, nine years.

OTTO: One of the things that relates to the oil sands happened in – well every year I was in the Dean's Office except one, we had to cut the budget because there were problems with finances and it just seems to be a bit of a continual thing.

So, first let me say, in 1998, we decided to have a fundraising campaign. It was a celebration of our 75th anniversary of our graduates from the Faculty of Engineering, and we initiated a fundraising campaign and that certainly helped maintain morale in the faculty, and the resources we needed to educate our students.

Ron Gray, who was a former Syncrude executive, agreed to come and help with the fundraising on a part-time basis and, Ron, did a superior job of working with our alumni and generating support and, I think, during his tenure in that position raised over 13 million dollars; and it was a lot of money at that time. We were able to establish some new things for our students that were important to the program. Management for Engineers - the Poole family supported a chair in Management for Engineers and our first recipient was ... the holder of that chair was John McDougall who is President of the National Research Council [NRC] and the former president of the Alberta Research Council [ARC]. John did a superb job initiating our program in management for engineers. So that was something we gave the undergraduate students.

We also – Bob Stollery, who is also a power in the province gave us money to establish an Executive-in-Residence program where we brought people from industry in for short stints to work with our students; and that's still going on and it's been a great help in a number of ways, in having people from industry come in and share their experience with our students, particularly for design courses, and what not.

We also managed to establish at that time – I'd thought that safety was an important [issue] and risk management was important to the industry and I was able to get Laird Wilson from Syncrude. He was another executive from Syncrude that retired, and he came to the University and he was a real missionary for promoting safety and loss management with our students. He helped establish a program that is still going on. Gord Winkel from Syncrude is now the person looking after the program and instructing students. We set up an advisory committee that helps contribute to the safety and loss management program. That was an important initiative for students working in all industries in the province to have that sort of background.

So, the fundraising was something that I am proud of because it put some new things into our faculty and showed the alumni that the University accepts money. As you know, Dave Lynch who I was also able to hire, and is also another very dedicated individual and now Dean of Engineering has done a great job of building up resources for the faculty.



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AD: You know this whole question of the relationship between the University and the companies and between the research establishments within the University and those in the company are very interesting. Do you want to talk a bit about that?

OTTO: Well, I can relate back to the Hydrocarbon Research Centre, which was set up to – was funded by government agencies – but it was set up because they wanted to understand the properties of bitumen and what we needed to do with them. That was set up with Otto Strausz in chemistry and myself, and Ivo Dalla Lana were also members; and they supported our research on upgrading – hydrotreating – and also our solubility work. Doug Montgomery was the program director for that institute. It played an important role, at that time, in initiating work and complementing what AOSTRA was doing, and working closely with AOSTRA. Doug was a great help; he had a lot of experience; he was a great help in our laboratory work.

Yes, a lot of our work has been supported by industry. It started early in my career with Atomic Energy of Canada supporting research. But, we did a lot of contract work with Petro Canada and a lot of people interested in gas processing supported Al Mather's and my work. So, yes, we have had a close tie with industry and – I'm talking mainly from a point of view of chemical engineering - but when I went into the Dean's office, it got broader.

Now this may get out of the realm of the oil sands a little bit but we set up the Telecommunications Research Centre when I was Dean of Engineering and the Micro-Electronics Centre and the Laser Institute, which were all set up with people like Bob James, Paul Goud and Gordon Kaplan. They were all people that contributed to – had the vision that we should do these kinds of things. So, the Laser Institute has evolved in - Elmer Brooker was Chairman of the Board for a while. He set up his own company [Laser Ray Inc.], which has contributed to the oil and gas industry in many ways, in manufacturing the tools that they need. Micro-Electronics Centre developed a lot of technology that people use in that little world and the Telecommunications Research Centre had a lot of industrial partners - Telus, Northern Telecom – which has disappeared now. They were a big supporter of that initiative and that was in the early days of developing the technology that we are all enjoying now – the wireless technology – is something we didn't have when I went into the Dean's Office. In fact, since I left the Dean's Office, the communication technology and the computer technology [area] has really evolved. But the Telecommunications Research Centre became TR Labs because it expanded to other provinces, in Saskatchewan and Manitoba. They were way ahead of their time in developing the communication technology and self healing networks for telecommunication systems. That was a lot of fun in working with those groups.

AD: So, your years at the University were really, in a sense, boom times, in terms of research. But I'm going to pick up on the whole issue of fundraising. Decreases in government revenues and you and [your] colleagues deciding you needed to do fundraising – not only with the industries in term of Chairs – Syncrude, of course, being involved with NSERC in the Oil Sands Chair but also alumni, who had done well and had positive feelings towards the alma mater, so that the Faculty of Engineering has really been a leader in terms of the fundraising to support programs when government funding shrank.



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OTTO: We were. I must confess, the Business Faculty was very strong in raising funds from their alumni as well. So, we took a lead from them in part to develop a Fundraising Advisory Board. But, at the time, people in the province assumed the government funded the universities, so they weren't donating money to the universities. So, I think we were leaders in convincing and telling alumni that, "Yes it's very helpful to have your support and, as alumni, you should want to see your school prosper. Reflect back to the times that you had there, and how nice scholarships and financial support would be." The response was good, and it's still good. Alumni and industry are providing funds for the university in the way of scholarships and funds for equipment, for special initiatives such as Chairs. We have done well in getting advisory boards, and what not, to help with that kind of initiative.

AD: Now, going back to Clem Bowman and AOSTRA, his vision was that research related to the oil sands would not just reside in Alberta but would occur in universities and agencies across the country. But, clearly, AOSTRA projects were key to some of the developments at the University of Alberta. Do you want to talk specifically about AOSTRA related projects?

OTTO: We had a fairly close relationship with AOSTRA; personally, I sat on the scholarship and awards committee that they had. When I first went on, people like – the person representing AOSTRA was Paul Gishler. That name probably means something to you; I worked for Paul when I finished my Masters, for about four months before I went to the University of Michigan, at Chemcell Research. Paul was the Director of the Laboratory then. Anyways, he was representing AOSTRA on this committee and, of course, we interacted with people that were on AOSTRA's board like Harry Gunning and Ernie Wiggins. AOSTRA was supportive of our work; we interacted with people like Ted Cyr, who was Program Director for AOSTRA. We provided some advice from time to time to Ted, and worked closely with him and, as I indicated earlier, they supported our hydroprocessing research efforts, our catalytic research. At that time, it was not only bitumen they were interested in developing, but also coal, so the Hydrocarbon Research Centre was actually looking at coal liquids as well as bitumen liquids.

Clem was really dedicated and he had a strong vision for development of the oil sands, and he certainly encouraged people at the University to get involved in research related to the oil sands, and I encouraged staff to apply their expertise to the problems related to the oil sands, and that's what happened. I think, as we indicated earlier, Jacob was really interested in interfacial phenomena and boy there was a real place to find some practical applications of that interest.

AD: Now, if anyone had this knowledge, it would be you, but do you have any idea how much the value – the dollar value – to the Faculty of Engineering at the University of Alberta of AOSTRA grants or, you know, however it was described, the funding mechanism?

OTTO: I can't say that I can give you those numbers; my memory doesn't relate to that specifically but AOSTRA money, a lot of it, went to industry for their efforts in developing the oil sands. Certainly, they provided some to the University but I wouldn't say it was a major area of donation.



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AD: Ok, but it fostered working [relationships between the] company and universities

OTTO: Working relationship, yes.

AD: Because that has to be a trigger for the development of all these centres of excellence to do with oil sands at the University of Alberta. I mean, the University and the industry really developed together, and what's intriguing is that, of course, in the 1970s and 1980s Suncor and Syncrude were not making great amounts of money, so that one has to talk about the vision of Peter Lougheed and the foresight in creating AOSTRA, and making those monies available.

OTTO: Yes, it was during Lougheed's time also that we were able to establish these other institutes that we talked about, TR Labs and the Laser Institute and Microelectronics Centre. These were all government supported initiatives but that was during Lougheed's time. Neil Crawford was, at that time, a minister in Lougheed's cabinet; Don Getty; all these people. They supported the establishment of these initiatives and that was much appreciated by the faculty. It certainly set a tone for the kind of things we were able to do, and the interest the staff had in helping out.

AD: So, if I understand correctly, it wasn't just oil sands and other petroleum-related research and innovation. Those other institutes you talked about were part of Peter Lougheed's personal vision and that of his key ministers; of the economic diversification of the province, telecommunications, lasers, etc.

OTTO: Yes, very definitely. They saw that they should diversify the economy, and Alberta, and they were very supportive of that.

AD: And that the University was viewed as an instrument for doing this?

OTTO: Yes, that's right. They worked closely with the University, particularly our faculty too, in the areas of technology development; in all these areas.

AD: Now, the "buzz" word that was in use in the early 1980s when I was the Science and Technology Editor of *The Canadian Encyclopedia* was "technology transfer," from university to industry, and the engineering faculties in the country were really the leaders in this.

OTTO: Yes

AD: Or no?

OTTO: Yes. I think in a lot of ways we were. Of course, a lot of the technology transfer that I observed was occurring in the medical area and the bio areas; some successful, some not. But there was quite a bit of technology related to that. But I was involved in a technology transfer initiative that was quite successful, and this was Don Robinson's. Don, in the 1970s, decided that he would like to spread his knowledge to industry and he initiated a company. That company became DB Robinson and Associates in about 1980. I was one of the associates. Don established this company,



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which transferred technology he developed in the laboratory for studying the properties of hydrocarbons. He had some special equipment that he had developed that you could visualize what was going on and, as you changed the temperature and pressure of hydrocarbon mixtures, you could observe the cell. He used some sapphire cells that were unique at that time, and some special pumps for using high pressure for moving fluids around. And he had a lot of expertise in phase behavior. So, he established a company that did laboratory studies for people in industry. They measured the properties of hydrocarbons; manufactured equipment so that people could set up their own labs; and developed software that could be used to predict properties of the hydrocarbons.

My own research and students had developed a program for designing gas-processing facilities, gas-treating facilities for processes to recover hydrogen sulphide and CO₂ from process streams. We had a program called AMSIM (amine simulator) that the company marketed - that program and programs to predict hydrate formation and programs to predict properties of hydrocarbons. And that company expanded into the Edmonton Research Park. We had over 65 employees. We also had a lab in Huston that did work for people in the Gulf of Mexico. In 1998, after I left the University in 1996, I became the CEO and President of DB Robinson and Associates. We became DBR International. We had a group of companies and then we sold the company to Schlumberger in 2002. And they are still operating in the Research Park. So that was a successful technology transfer from the faculty.

AD: Very successful. Now, what you brought up is the whole issue of consulting and so many of you did this. Of course, a number of the interviewees have mentioned the Dean of Engineering Robert Hardy and that, of course, in terms of the work with respect to GCOS [Great Canadian Oil Sands] - the Tar Island Dyke/Tailings pond - various bits of engineering work. Because with a major project like that, and various people have described it, in all sorts of ways – that Alberta didn't have that engineering capacity, that technical expertise that Bechtel and other companies became a part of that. But, then, the province played catch-up and there were entrepreneurs like Robert Hardy and Robinson and others who then created

OTTO: I have to mention Elmer Brooker.

AD: Elmer Brooker, of course.

OTTO: Elmer started EBA Engineering and he was on staff at the University and he left the University, and established that company that's done work on oil sands - geotechnical work - a lot of work in the North, and that's a spinoff from the University as well.

AD: Exactly. Incidentally, it was Elmer who told me this story about Syncrude – that the hearings, the ERCB hearings, were happening and that, I thought he was an intervener but he clarified it as an opportunity to learn and to then see if he could get work. So, it was research that really paid off, listening to the hearing.



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So that it isn't the "pure" research, even though it's pure/applied research at the University; it's the companies that, then, the "go-getter" individuals, who set up to service the industries in a variety of ways.

OTTO: Yes, people like Norbert Morgenstern have made great contributions to industry, and the province, and they have been consulting. But they are also recognized for the people they have trained and the teaching they have done at the University.

AD: So, a part of the technology transfer is really these entrepreneurs who are knowledgeable and then see a niche to either develop equipment, processes, consultancy services, all of those ways which is really important because other people that I have interviewed have looked at the whole supply side. And, so, we see a growth in university professors with this speciality, training graduate students; firms, new technology development; but also the construction companies, the Poole Company becomes PCL. We have seen that in a variety of ways, that the diversification of industry may not have included a whole range of manufacturing industries but, within the specialized area of oil sands mega projects, there is a huge amount of diversity, isn't there, and opportunity for Alberta individuals and companies?

Otto: There are opportunities for staff; they may not want to set up their own company but they certainly have been helpful to companies in a consultancy way to supporting the efforts that they are undertaking.

So, people like Jacob and Murray give short courses to people in the industry to bring them "up-to-speed" on the technology. Over the years, we have also sent staff up to Fort McMurray to teach courses that make it more – I think the people working in Fort McMurray appreciated the opportunity to continue their education, while they were there, and to get extra professional development. So, we made a contribution just to their well-being in Fort McMurray, which was kind of isolated at the time, and also helping them keep on top of things.

AD: Can you tell me when did that start and what kind of courses did you offer?

OTTO: I have forgotten exactly what the courses were but probably courses in the Geotechnical area and courses like Mass Transfer Operations or Mechanical Engineering Strength of Materials; stuff like this would be things we may have taught.

AD: And were they for credit or non-credit courses?

OTTO: Some of them were for credit, yes. I know I have some information on that but I don't know where I have put it.

AD: Have a look and I will introduce the next topic area that I want you to talk about. You know, the University of Alberta was the University **in Alberta** for many, many years, but in this period - late 1960s and 1970s - you had the University of Calgary developing. I'm wondering if you can



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address that in respect to the Faculty of Engineering, first of all, and the relationship but also, then, they sort of found their areas of specialization and strengths in respect to oil sands.

OTTO: Well, the faculty started in Calgary [and] it became a University in the 1960s.

AD: Late 1960s, yes.

OTTO: We had people like - on staff at the U of A, when I was there - Bob Ritter, who later became the Dean of Engineering at the University of Calgary. He was in the process control area; George Govier, when he went to the Energy and Resource Conservation Board, did part-time teaching at the University of Calgary to help them develop their programs. So, he had an influence, particularly in the Chemical Engineering area which I'm most familiar with.

We had a number of our students that contributed to the development of the faculty. One of my PhD students was Gordon Moore, who developed a strong research program in combustion technology for recovering of heavy oils. That technology is being used all over the world. I think Gordon has made quite a career out of developing that technology and promoting its use.

Bill Svrcek was one of our PhD students; he was in the process control area but also in the software development area. And he was quite an entrepreneur and started Hyprotech, which was a software company that did process engineering calculations. Raj Bishnoi was one of Don Robinson's students and he went to Calgary and did research on hydrates. And one of Jacob's students, Harvey Yarrington, also went on to the staff there and has a strong research program on asphaltenes and characterization of heavy oils. So he has been making a contribution to the oil sands technology.

They had a good faculty; their Civil Engineering has been strong at the University of Calgary in the transportation area and other areas. So, they have developed an Engineering school that is well respected in Calgary, and they have developed close working relationships with industry. They have had good support from industry in Calgary. So, in their own way, they have become a viable and successful university. We have made a small contribution, I guess, by the people we have sent down to work there.

AD: Supplying the graduates to lead the program. So, then, there is a correlation between the growth in oil sands research and, then, the building of a strong Faculty of Engineering at the University of Calgary?

OTTO: The chemical engineering program at the U of C also trains students in the area of petroleum engineering; it's a Chemical and Petroleum Engineering department. They have trained a lot of students that have gone into the industry. There are a lot of Calgary graduates, as well as U of A graduates, that are working in the province. We need more of them but the schools are full. They need more spaces; it's still a funding problem. But, both universities are needed, and the students are readily finding work in industry in the province.



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AD: Now, the University of Calgary is particularly associated with SAG-D technology. Do you want to talk a bit about that, and how that happened?

OTTO: Well Roger Butler is the person responsible for that – he came from Imperial Oil to Calgary. Other staff - another name that comes up is Eric Tollefson. He was working for Paul Gishler at the same time I was at Canadian Chemical. They both contributed to the Chemical Engineering Department at the University of Calgary but Roger Butler was probably the person that had the vision to develop the SAG-D technology which, with support from AOSTRA and others, has evolved into a major technology for in-situ recovery of the bitumen. That was a major contribution from that school and that's evolved from a close working relationship with industry.

AD: Yes, which is really important!

OTTO: There is another guy down there too, [James B.] Hyne, you remember, in the sulphur industry, and he had a close relationship with the University.

AD: Now has emerged ... the whole theme of the mining operations versus the SAG-D in situ operations and, I gather, that at one point, the mining area of your faculty was at risk; do you want to tell me that story?

OTTO: Yes. That is an important story. In early 1990-1991, again the university was faced with budget cuts and Paul Davenport was the President, and he was challenged with doing something to deal with the reduction in [government] funding. He decided to make selective cuts and identified some programs that had low enrollment and two of them happened to be Engineering Programs; one was Agricultural Engineering and the other was Mining Engineering. That became a wakeup call, because our mining program was low enrollment at that time but, obviously, it was the only program in Western Canada; and obviously the oil sands were evolving and mining was a key part of what they were doing, and they needed mining engineers. So, it just didn't make sense to cut the mining program as far as the university contributing to the economics of this province.

I and Jerry Whiting – he was the chair of the Mining program at that time - we enlisted people from industry and got their support, and we made the case to the university over and over again until, finally, they agreed that they shouldn't cut the program, and they rescinded their proposal to cut the mining program.

But it was a wakeup call. I was fortunate to be able to get Jim Carter, who had joined Syncrude just after they became an operating company, probably in 1979, something like that. He became the Chief Operating Officer; he was initially in charge of the mining operations. I enlisted Jim Carter to chair an advisory committee and we set up an industrial advisory committee, and Jim just did a superb job. And it was with his help and people from industry that the Mining program has now blossomed.

They helped provide summer jobs for students; they helped develop a relevant curriculum for the program. Jim was superb as Chair of that committee. He would look around the table at the



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representatives from industry and just say, “Joe you are going to do this for us, aren’t you?” and they would say ‘ “Yes sir.” It was just a pleasure to see him operate. Jim just deserves an immense credit for the leadership he provided to save that program, and to make it one of the best programs in the world. Right now we have a lot of students. They are hiring our students from all over. The program is over-subscribed, and it’s probably the largest program in the world, and probably the best program in the world right now. So, it’s a real success story and Jim, by the way, is still chairing the Advisory Committee, and that is 20 years plus.

AD: That is an amazing story, and it raises the issue of - going back to the relationship between the companies and the university – that there was a generation of leadership that valued that and saw the importance. But then you add the concept of corporate social responsibility so that you had people like Jim and Eric Newell who took the responsibility for ensuring that the programs were valuable to the industry and to the community-at-large because of the economic impact, and really furthered them. So that is a really significant issue as well, isn’t it?

OTTO: Eric was an outstanding leader of the Syncrude operation. He worked well with the community; he worked particularly well with the Aboriginals, and he is still contributing in chairing various committees. You know the carbon capture issue and what not, using the carbon tax for supporting relevant research. Eric is involved in all these areas. He had special qualities in working with the community and. I think, was one of the best CEOs that Syncrude ever had.

AD: And, of course, then the Chancellor of the University of Alberta, so that there is that belief that education....

OTTO: He was a strong supporter of the faculty and we had a good working relationship, and it was probably through Eric that we got involved in teaching courses at Fort McMurray. He saw the relevance with working closely with the university. It wasn’t difficult to get people from Syncrude to come and help out. And the Mining program makes use of the Executive-in-Residence program.

AD: Tell me more.

OTTO: People from industry come and spend time with the students and the Mining program has made use of that kind of contribution from people in industry. And, of course, Laird Wilson was excited about working with the students, it was probably the best part of his life working with young people, and telling them about safety and loss management; and Gord Winkel has picked up on it. It’s just great.

AD: I am reminded of the vision of Henry Marshall Tory, the first President of the University, the founder, who saw the University as really in service to Alberta, and the professional faculties had to be established, and that the Faculty of Engineering and key departments like Geology were important to the exploitation of the natural resources. So, the Research Council of Alberta was the first research council in Canada. Karl Clark was hired in 1919, away from the Mines branch and the Geological Survey, to focus on research on bituminous sand. The interest of the Province and interest of the University were seen as similar and intertwined.



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OTTO: Henry Marshall Tory was an amazing contributor. Yes, he had a vision for the development of the Province and the country. As you say, he established the Alberta Research Council but some of the first students at the University of Alberta were engineering students. The faculty, the first graduates, I guess, were probably – maybe 1913. That's when the faculty was established. Some of the first students were engineering students and he had engineering professors to teach them.

He went on to establish the National Research Council, which contributed to the Province as well too in many areas, and Carleton University. So, he not only had the Province in his mind but he had the country of Canada and, of course, this is what we need right now ... for Canadians to realize what we are developing in Alberta is good for everybody.

AD: Absolutely. And even in terms of the University, that you have talked about the vagaries of Government funding, the cutbacks, the Paul Davenport/Klein Era of cuts to education and, of course, we are in that process right now, and that governments seem to need to be reminded that without universities so much of what we enjoy in our lives, basic infrastructure, services, whether its professional faculties, whether its faculties of Arts and Science, that provide graduates that work in all types of industry. The governments seem to forget that.

OTTO: Well our future is the young people and we have to give them an opportunity to give them an education. They are the people that are going to be the future leaders, and the contributors to developing our economy and providing a lifestyle that we are used to.

The University is playing an immense part in that. Institutions like NAIT [Northern Alberta Institute of Technology] and SAIT [Southern Alberta Institute of Technology] are treasures in this province. They are a competitive advantage for Alberta and they need to be supported, and they need to stick to their role of training the technologists and technicians that we need in the province, because not everybody needs to be an engineer. You need builders and everybody else, too. So, yes, it's tough for them but I went through a lot of years – every year it seemed we had to cut back staff for some reason or another, and it's nice to be in an era when you have stable funding and you know you can build things.

That's why fundraising became important to kind of deal with that issue. No doubt the universities have to be responsive to using the money in a proper way to support teaching and research and, so, they need to be looking for efficiencies all the time. Like any business or any household, you have to look for efficiencies. It doesn't hurt to be prodded in that direction but serious budget cuts have to be done with care and consideration.

AD: Like a surgeon's scalpel rather than pinking shears.

OTTO: Well it's pretty brutal what they are experiencing right now. Now, they have had some good years so, hopefully, they will sort things out, and not do too much damage.

AD: You've mentioned something that I'd like you to pursue - the relationship with the technical colleges or schools - the NAITs and SAITs and what was the relationship between the university



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and the Northern Alberta Institute of Technology and the Southern Alberta Institute of Technology in your day?

OTTO: When I was in the Dean's Office, we had a transfer program. Students could transfer into second-year university with their NAIT diplomas, depending on how well they had done. But that had been set up, and we had a good working relationship with NAIT at the U of A as far as transfer students. I don't know how that is working now. I know it's more difficult because there are only so many places; they don't have the capacity to deal with transfer students the way they did in the past. So it's probably getting more difficult for transfer students to get into the system. I'm not right on top of that issue, but we did have a good working relationship; students in certain programs, if they did well, could transfer, and they were good students. If they decided at that time that they wanted to be engineers, they always did well because they knew why they were there.

AD: And, of course, all of the trades, then, are necessary to the work force of the plants.

OTTO: Well as I say, not everybody needs to be an engineer; we need technologists; we need technicians. These are very valuable people. I have been involved a lot with APEGA [Association of Professional Engineers and Geoscientists of Alberta] and working with ASET [Association of Science & Engineering Technology Professionals of Alberta] and APEGA to recognize the competency of technologists as well, so that they get proper recognition for what they are capable of doing.

AD: Now, you mentioned the professional association and it, like the Faculty of Engineering, was very positively impacted by the big oil sands projects – the mega projects - the diversity of work that became available. I know that you are connected with APEGA; do you want to talk a bit about that?

OTTO: Just not sure which direction you want me to go here.

AD: Any direction you choose; there is a fork in the road.

OTTO: Well, there is certainly a need for technologists and that is a growing need. I know we have fabrication plants in Alberta and we are building pipelines. We need welders; we need fabricators; we need all sorts of computer technologists and what not. These are important. APEGA has played a – as I was leading up to – played a role in giving technologists that develop certain competencies to be able to do their own regulation; to take responsibility for their work in a defined scope of practice.

We have gone through some rough edges to get to that point, because they are not engineers and engineers have a right to take responsibility for their practice and the technologists, and it wasn't as clear. They aren't engineers and why should they have that right? But they do have the right now and, if they can demonstrate certain competencies - and generally it's a limited scope of practice in their area of competency - they can take responsibility for that work and sign off on it. They can work closely with the engineers in doing that. I have had personal experience in that in my tenure with DB Robinson and Associates. We had technologists that were excellent and deserved to be recognized. They were more competent in certain areas, than perhaps some of our engineers were.



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AD: So it's the whole professionalization, certification...?

OTTO: Yes, they are recognized as technology professionals and they have that name in their title now in ASET.

AD: Now, APEGA would not be the powerhouse that it is had we not had the oil sands projects because it is the whole range of engineering, geology, all of these disciplines right?

OTTO: Well the number of engineers coming into the province is incredible. I chaired the Board of Examiners for a number of years and they are dealing with three times as many applicants now than we used to deal with, and a lot of them are coming in from outside the province. They are coming from foreign universities; they are coming from other provinces, so it's quite a mix that we have. There is a great diversity in the nationalities, in the people that are working in the engineering profession in this province right now because they have come from all over the world to partake in the industrial development that we have here. It's the largest profession in the province.

AD: I was going to ask you what is the membership in APEGA?

OTTO: It's over 60,000 in the association.

AD: Wow, as an individual group?

OTTO: Now that includes students, members and honorary life members and what not; but the total is over 60,000 at this time.

AD: I am now going to ask you several questions to do with the contemporary representation of the industry in the media, and the whole environmental attack on the oil sands. Now, someone - Thomas Mulcair, the new leader of the NDP party - among his first remarks were, "that oil sands development was bad for the country."

OTTO: Had "Dutch Disease," yes

AD: Yes, so do you want to comment on that?

OTTO: Well, I don't want to be a politician but Thomas Mulcair needed to do a little more research before he spoke. He is off base.

AD: I mean, even in terms of engineers, that McGill, the University of Toronto, the other engineering faculties in the country. I mean, those engineers come to Alberta for jobs, don't they?

OTTO: Oh sure, and a lot of the suppliers for the oil sands industry are from Ontario and from the east. One time they said Fort McMurray was the second-largest city in Newfoundland. It has provided work for those people that have benefited their provinces because the money goes back to those provinces, and they probably even get the taxes from it. It's a great benefit to the whole



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economy and the concern about the environmental impact is – it's legitimate to have a concern about the environmental impact of any industry but, I think, you have to put things in perspective.

Certainly the oil sands are doing less damage than the coal industry, power plants in the United States, so people need to be responsible in their interpretation of what is actually going on, and it's too bad that it gets politicized the way it does with the environmental groups putting so much pressure on the decisions that are made.

I think they need to put things in perspective. There is a lot of effort being put, and certainly some of that has come from pressure, but there is a lot of effort being put into looking after the environment in the oil sands area. The reclamation work that's being done ... you know, Eric Newell is probably a leader in getting the reclamation started, and Suncor has done great work. There is a lot of research being done on how to minimize the environmental impact. Any industry will have smoke stacks but a lot of that is water vapour, sometimes. So, you can't have an open pit mining operation without it not looking nice.

AD: That's the big issue - that the aerial photographs of the Athabasca region and, as you know, with these projects, until the mining ceases, they will not get their reclamation certificate. So they are dealing with huge, huge tracks of land.

OTTO: But they are not as big as some people make them out to be. Some people talk about them being the size of the state of Florida and all that. Well you know that is nonsense. The person that talks well about this is the Dean of Engineering, Dave Lynch. He has a got very good presentation to put things in perspective about the size of the impact of the oil sands and just what the real situation is.

AD: Do you think that the companies waited too late to tell their stories?

OTTO: Well, yes. I think they didn't realize that the impact that the environmentalists would have in developments. You have the problem with the people in British Columbia, and the Natives. They are very inward looking, but they have been that way for a long time, so it's nothing new. If you wanted to build an industrial plant in BC, as long as I can remember, it's not easy to get the permission to do it, or the acceptance of it. They are very jealous about their environment and their terrain. Industry has to learn to deal with that.

AD: Within the Faculty of Engineering, do you have an Environmental Engineering type of course or program that happens within the faculty?

OTTO: Yes, I didn't mention that earlier but, in 1973, I personally thought that our Chemical Engineering students should have some background in environmental issues, and what was closely related was the control of the air pollution. So, I developed a course, that I taught for many years, 'Design for Air Pollution Control', and we talked about the pollutants and the effect of pollutants, and the technology that could be used to minimize pollution in the air, particulates, gases, what not.



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So, that was a contribution that our Chemical Engineering Department made. The faculty - we had people in Mechanical Engineering - Dave Wilson taught courses in air pollution control as well. And, in Civil Engineering, there was a very strong environmental content related to water, and people like Dan Smith and Steve Hruday developed course content there, and research programs that dealt with the control of water pollution, and ways to remediate it. It's been a strong thread throughout the faculty.

AD: I think that, in terms of criticism around those areas, I mean – because engineers, certainly mining engineers and even civil engineers, are viewed as enabling the raping and pillaging of the environment. I know that is sensationalistic but that is the environment view, right?

OTTO: Well it is interesting. I am a public member for the Alberta Institute for Agrology and agrologists, their work – a lot of it - is directed at environmental issues and reclamation of the soil, and what not. So they kind of tease me that they are cleaning up the mess that the engineers have made. But, it's a growing profession and the Faculty of Agriculture is involved in training people in this area. The University is certainly making a contribution not only in the U of A but also institutions such as Olds College are training people in these areas. Soil remediation and proper use of the land and what not is all in their programs. They are dealing with that. You would just be amazed at how many young men and women are interested in that profession.

AD: The timing of the introduction of that course that you developed, of course, coincides with the establishment of the Ministry of the Environment, the Act, the Provincial Ministry of the Environment and developments in that area.

OTTO: Bill Yurko, yes. Bill Yurko was a Chemical Engineer.

AD: All of the relationships, in doing these interviews, it's fascinating because one hears the same names repeated in a variety of contexts, and people were moving from academe into the civil service and some of them, several, became MLAs and the research establishments and industry. There is a fluidity in terms of the workforce at that upper level.

OTTO: Clem Bowman is still very active in promoting energy policy for Canada. He has done work for the Canadian Academy of Engineering in developing energy priorities and suggestions for the government. He has helped them prepare a major report in that area. Clem is still thinking of, and is very committed to Canada and the development of this country.

AD: There is one thing that I would like to raise - its patents; in terms of people basically profiting from their research. I'm not saying it's good or bad or anything, it's just a neutral question but, clearly, some people were able to take out patents in respect to some of the research that they did. Is there any policy in terms of that?

OTTO: Yes, I think a lot of that has been developed since I left the University, but I think the University does share in the technology that is developed at the University. They have a right to share in it, but people that have benefited from their time at the University and what not, have given



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back to the University as well in major ways. So, I think, they have been thankful for the opportunity that was created for them being educated – their time at the University. People like Don Robinson have contributed money back to the university to support the department and the programs, and I'm sure there are others that have certainly done the same.

AD: Now, putting on your thinking cap, and becoming a bit of a futurist, where do you see the Engineering Faculty and its relationship to oil sands and industry 20-30 years from now?

OTTO: Well, we will still be training engineers; it's going to be different people that are going to be leading the effort. Dave Lynch has done a great job in providing a plan for buildings and what not and resources for the faculty. But Dave won't be there forever. There is going to be new leaders, but I think there is a good foundation. I think the university and the faculty have a great reputation. I think our programs are widely recognized. We have some people that, like Jacob and Norbert Morgenstern are known worldwide for their contributions; so, that reputation will stay there for a long time. The faculty is going to continue to play an important role.

AD: Do you see even more emphasis on environmental engineering? Norbert mentioned that the University of Saskatchewan, I believe, that they are looking at the whole reconstruction of landscape and – after major mega projects - and to get it back to an even better quality than before the extraction of the resource or whatever. Do you see that as being potentially more of a focus in response to “wise use” of the environment and natural resources?

OTTO: I think so. The faculty has to keep changing with what's going on in society. There is quite a difference in the emphasis of the research now than when I was going through the University. Computer technology has changed the whole realm of things. You can work from home, you can do so much more with computer technology, and looking at alternatives and the technology for interpreting what's going on, and the instrumentation and what not has become much more sophisticated. But it's not only that. There are new areas - nanotechnology - that wasn't there when I left the University but now we have an NCR Institute at the University, and we have programs in many engineering faculties that give focus to nanotechnology, and it's an evolving area.

The application of the technology is evolving. Just where it's going, I don't know but the faculty has to be there to work with it. There was a big emphasis for a while on the bio area and I supposed that will still continue, but it isn't as prominent as it maybe was at one time.

An area that the faculty has given more emphasis to lately is materials, for instance. The nanotechnology, of course, contributes to that area but the ability to tailor-make materials to meet certain criteria has grown, and so we now have a strong materials program at the university and it's a big emphasis to that. It will keep changing; there will be new things all the time, and new challenges for the students and the staff.

AD: Someone that I interviewed talked about the whole supply chain and that, if Canadian businesses do not build their capacity to compete – not only regionally but nationally and internationally - that work is going to be done elsewhere, and the Chinese Government purchase of



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an oil sands company could be the thin edge of the wedge. If they choose to; for example, build their modules and ship them rather than having a PCL construct them in Leduc?

OTTO: Yes, this is a challenge for our society. It's a major challenge for the engineering profession - continuing to attract competent people into the profession. The other challenge is the fact that engineering can be done all over the world. It can be outsourced and, how you regulate that, how you deal with it, how you maintain opportunities for our own people, they are all challenges.

AD: And the role of the University in doing that; that if you diminish the capacity of the – say specifically - the Faculty of Engineering and NAIT and SAIT, who provide the technology and trades component, then, how can we remain competitive.

OTTO: Yes, well it's a challenge. This past year I have been chairing the APEGA Education Foundation. Our role is to raise money from our members to support what I call the future of our profession. And that is to support outreach programs that attract outstanding people into Science and Engineering and to give them some support, and give the faculty some support. Give them some scholarship money so that they can attract good students as well. That's a challenge. The profession needs to realize - is probably one of their biggest challenges - to keep getting good people into the profession. I think, if we get the proper leadership, we will manage alright but it's a challenge. They are producing a lot more engineers in India and China than they are in Canada and the United States.

AD: Think back to the 1960s and the hiring, the “Patels” from the Indian Subcontinent. The Engineering Faculty hired from not just Canada and the US and the UK, they hired from abroad.

OTTO: If you look at the faculty at the University of Alberta, you will see there is a lot of people that have come from other countries and are teaching in our faculty.

AD: And, so it reflects that...

OTTO: The international...

AD: Scholarship.

OTTO: Yes, there are lots of challenges in this world.

AD: It's a very different world that someone graduating with a BSc in Chemical Engineering today faces than when you graduated.

OTTO: Yes, but we still live in a country that you can do anything that you want to do, if you put your mind to it.

AD: That sounds surprisingly like a summative remark. Is there anything that I haven't asked you about, any concluding remarks on your career?



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OTTO: Well, it's been nice talking to you and it's been nice to prod me into thinking about what has gone on in my career since I entered the University, and the leadership role I guess I played in making some things happen that have been beneficial to the province. I think people that I have had the opportunity to work with have contributed a lot, and it's been nice to know that I have been involved in getting them involved.

AD: And, I'll just – when you handed me this – there it is “Engineering Newsletter of the University of Alberta,” Volume Five, Number Two, June, 1982, Hydro Processing Mini Reactor System and the lead article is “Upgrading Heavy Crudes.” It's a time capsule isn't it? That that people forget the boom that has been experienced, since 1995, has to do with all of this research. It just didn't happen by the waving of a magic wand, or “abracadabra” or clicking fingers, that there is lots of unsexy research that then...

OTTO: It started with people like what Neil [Camarta] and PK Mann did.

AD: So, yes, if you have extra copies of this, I think that they would be very interesting and, of course, you mentioned heavy water research. Canada, as the Science and Technology Editor at that time [of *The Canadian Encyclopedia*], as you know, Canada was competing head on in terms of the heavy water [in nuclear power], which was the safer way of proceeding but it didn't evolve.

OTTO: I spent time consulting with Sherritt Gordon looking at the possibilities of putting a heavy water recovery process into their plant. Of course, it never happened but there was some potential there had the industry just evolved the way people thought it might.

AD: And people and events, they mentioned [in the Newsletter] S.M Farouq Ali, Professor of Petroleum and Engineering and J.G McGregor, N.R Morgenstern and R.M Hardy. It's that and, I guess, this project has allowed us the scope to look at not just the history of the industry from the CEO down to the person walking along the draglines to make sure everything is ok, but also the whole academic establishment, political establishment, the civil servants. You name it, which is a very exciting from the research perspective in creating those primary resources so that people, down the road, when they want to research on this [can do so].

OTTO: The days of Hardy and George Ford, and Sinclair and Walker, these are all early people in the faculty that made major contributions to seeing the faculty evolve the way it has. I will tell you a little story about Bob Hardy. He was an amazing individual; he would do a lot of consulting; he would come in and run the faculty on the weekends, I think, but he was a really competent and nice individual. When I was a student, I shouldn't record this, but when I was a student there was a little pot of money to support students, so I applied for some of the money and, of course, I had to go in and see Bob Hardy and give him my budget. And he looked at my budget, and I had listed the things that I would spend the money on. I had a line – “miscellaneous” – and he crossed out the miscellaneous and gave me the rest of the money. I have never forgotten that. He was very pleasant and I had the opportunity, when I was Acting Chair and he was the Dean, and it was a pleasure to work with him. The early years of our Board of Examiners at the University, Bob was involved with



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and I had the opportunity to work with him a little bit there too and, I think, a lot of people, like Elmer Brooker, would remember Bob Hardy as being a real champion of the university and a strong contributor to its development.

AD: Good, well thank you so much

OTTO: You are welcome, it's been nice.

[INTERVIEW ENDS]



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