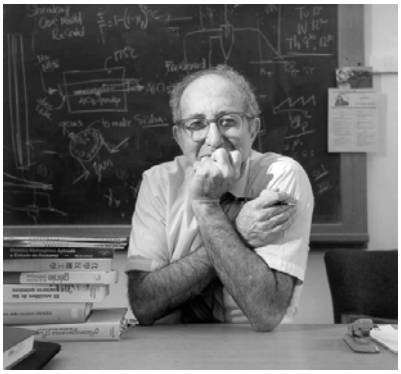

Professor Octave Levenspiel

INTERVIEW WITH PROFESSOR OCTAVE LEVENSPIEL

Two years ago Dr Marko Šaban was a participant of the AIChE Meeting held in Los Angeles. He made interview with Professor Octave Levenspiel and by courtesy of our dear friends and colleagues, the Chemical Industry JL. has prepared authorised version of their discassion and talk.

***Octave Leveuspiel**: Chemical Engineering was born in the early years of XX century. The concept of the heat and mass transfer coefficient was introduced in 1920's, development of the unit operation and of stoichiometry started in 1930's and creation of chemical reaction engineering, of transport phenomena and of process control in 1950's, while by the 1960's all of these principles were in place and progressivelly are being applied in more and more areas.*

The Book That Bought a Summer House

MS: Professor Levenspiel, you are widely known for your book Chemical Reaction Engineering, CRE. In Belgrade I studied from the Serbo–Croatian translation of this book. Has it been translated into any other language?

OL: First of all, please call me Octave, OK?

MS: OK

OL: Now to answer your question – Yes, many.

MS: Which ones?

OL: Besides Serbo–Croatian; Chech, Chines, Romanian, Spanish, Portuguese, Russian, Korean, Iranian, and Italian.

MS: I would guess that it is the most widely translated book in chemical engineering?

OL: It could be, I really don't know.

MS: Can you tell me the story of this book, what prompted you to write it?

OL: It's long story. Do you really want to hear it?

MS: Yes, please.

OL: Well, as a young teacher, in 1952, I was asked to teach a course on chemical engineering kinetics. The only book available on that subject at that time was by Hougen&Watson, and I found it to be terribly difficult. But, I thought I'd never have to teach it again. How wrong was I! I was stuck with that course year after year because no one else on the faculty wanted to touch the subject. After six years of suffering I discovered my savior. It was the proceedings of the First European Symposium on Chemical Reaction Engineering (CRE). This jewel presented papers by Denbigh, Danckwerts, Van Krevelens, Klinkenberg, Heertjes, and the other greats.

This symposium was a revelation and it changed my life. I threw away my old notes which represented the American tradition, and I embraced what I now call the European tradition. The result was my book four years later.

MS: Aha! You adopted the name of the symposium.

OL: Correct. CRE seemed to be the proper name for the subject. And that book met amazing success. As an illustration, Professor Milorad Duduković, an expatriate of yours, made a survey for AIChE, and reported that the year before my book appeared on 18% of departments in the US taught any course on the subject, but that two years after the number jumped from 18% to 53%. Finally today just about every department in the country teaches such a course, using one of over 40 textbooks available.

MS: It was like a revolution, wasn't it?

OL: I think you are right.

The US Educational System

MS: Do you have any thoughts about the developments of the educational systems here in the US?

OL: Yes, I have noticed a number of important changes in the last 40–50 years. When I started teaching in 1952 we teachers were encouraged and were expected to be competent in many areas of chemical engineering. Actually, that is how I got involved in CRE. Let me explain.

At the start of my first teaching term the department Head who was arranging the teaching schedule asked me what I liked to teach. I said X, Y, Z..., but I said I didn't want to teach chemical engineering kinetics because I had never taken a course in that subject. That did it...

Prof. Levenspiel's short biography can be found at http://www.che.orst.edu/faculty/ol/bio.htm

"Octave, wouldn't it be good for you to learn something about that subject? Why not try it?"

What could I say to the big boss, and there started my adventure with the CRE.

To return to the subject: today I see the US educational system, under pressure of getting research money, encouraging specialization. Sad to say, a specialist in some specific area with little interest elsewhere is highly sought by today's departments. Why? Because he can bring in oodles of noodles, in other words, lots of research money.

We are becoming research institutions at the expense of educational centres. So the specialist teacher teaches his specialist courses, and on graduation his students get posts at his institution. This represents inbreeding.

In the past a student getting his BSc degree had to go elsewhere for graduate studies, and if he then wanted a teaching position after getting his PhD, he had to go elsewhere.

This was an unwritten rule, and it led to a healthy educational system – people learning from others and spreading knowledge. However, one top school violated this rule, felt that its graduates were the best in the country, and so kept them. Before long they became inbred, and ended up as just another department, not the very best.

MS: Can you tell me the name of that school?

OL: I'd rather not. And to finish this taught let me say that this trend towards specialization reminds me of the German, and some other European education systems, where each professor is a professor of a specific field of study; of heat transfer, of reaction engineering, of polymer processing, and so on.

MS: I suppose that each professor had his own stable of students?

OL: Yes – and naturally these students had a rather narrow outlook.

Consilting with Industry

MS: Do you do any consulting or collaboration with industry?

OL: Occasionally, not in any particular area, but all over the place. You see, I'm not a specialist.

MS: Can you give me some examples?

OL: OK. In the last few years I consulted on the following projects:

- The US Los Cost Solar Silicon Aray Project, as a chief consultant to Area 1 problems.
- In Chile, for the world's largest producer of iodine, to try to improve their process which was then about 50 years old.
- In Texas, to help design a rather large (16 m ID) fluidized reactor for the catalytic decomposition of hexane.
- In England, for Unilever Company in their patent arguments about a new detergent concept.
- In New Jarsey, for Lever Bros, on another patent problem dealing with the manufacture of a non–digestible fat.
- In Virginia, on reducing dioxin formation in paper making.
- In Washington, on expanding a synthetic vanilla plant, the only such plant in the Americas.
- At INTEL, to rid their process air of organics.

Look at the wide variety of problems. These are all food for the generalist chemical engineer.

Lecturing

MS: I know that you gave an invited lecture at the AIChE meeting, and you also lectured here at our company. Do you like to go places and give lectures?

OL: For sure. I enjoy it and I go whenever I'm asked for a lecture.

MS: Where have you been recently?

OL: In the last four months I've spoken*:

- at the AIChE meeting in Miami, an invited lecture
- as an invited plenary lecturer at the Canadian National Meeting at London, Ontario
- at ETH Zürich, and ETH Lausanne, Switzerland
- at two universities in Quito, Ecuador
- at the University of Michigan
- at the Technical University, Endhoven, Netherlands

Yes, I have my bags packed, and I'm ready to go.

On Computers

MS: Octave, as I remember, ten years ago you gave a seminar on gas–solid reactions and reactors at the Faculty of Technology and Metallurgy, University of Belgrade. I recall you said then that you didn't use computers. Do you use them now?

OL: For e–mail, yes – but not for technical calculations.

MS: Why not?

OL: Why not? Because for most of my work I have no need for the computer. In the rare event in the last few years when I needed to use it, I learned on my sharp Yugoslavian student, Zoran Jovanović. He thinks that he is a 5'11'' Michael Jordan, but I tell you he is better at computers than at basketball. Sad to say, Zoran is now gone to greater things, so I may be in trouble.

Overall Marko, I feel that there are dangers in the use of computers.

MS: You surprise me. Can you explain?

OL: I see two dangers: First of all I see it in the use of someone else's program, one that someone else has spent months developing. You can't check what he's done, and you don't know what his assumptions are. You just have his answers. Sure it makes it really simple to use, but can you trust his answers? I have a couple of glaring examples, and I've event prepared a talk on this

*The interview was initiated in January 1998 and finalized in November 1998.

subject. Secondly, the computer tempts you to create more complicated models than the data justify, e.g., to use a 7th order polynomial to fit eight data points, when a straight line would reasonably fit the data. We should remember Albert Einstein's wise saying. "Use the simplest explanation that fits, but not simpler."

Look Marko, I'm not against the use of the computer, but just against its misuse. Actually I'm tempted to have one put in my office... some day. Let's leave the subject. What else would you want me to talk about?

Yugoslavian Education

MS: OK. I know that you have visited Yugoslavia a number of times. What do you think of chemical engineering education there?

OL: I can't talk about the structure of your educational programs, however I do have impressions about your people. I've had and still have good relations with some of your faculty – not those just in Serbia, but also those in Croatia and Slovenia. I'm thinking – how to describe them. Maybe the appropriate words are "alive, active, and interested". I've also had a number of Yugoslavian students come to study here and I find them to be among the best – alive, interested, and ready to argue best describes them. One of them still argues with me... he has joined our faculty – Goran Jovanovic.

Book Publishing

MS: Dr. Levenspiel, sorry, Octave, from your Web page I see that you have written many books. Which is your favourite?

OL: Marko, do you have children? How would you answer if you were asked which is your favourite? No, I like them all. They are my children.

MS: What about the competition?

OL: Regarding CRE: We have a whole cafeteria of over 40 texts on the subject. Some teachers favor a more mathematical and abstract approach, other prefer a more industrial flavor, and still others want a simple treatment. No one approach suits all teachers.

MS: And your CRE?

OL: It is probably the simplest straight forward presentation.

MS: And what about Fogler's book?

OL: Scott Fogler told me that his is the most popular book today. This may be so in the US, but it may not be so worldwide. His book covers much material, but may not be too easy to learn from.

MS: And your other books?

OL: My three other books, even my baby Thermo book are distinctly different from all others. I don't see any competing books covering the subjects at the same level. You may not like them, but I had fun writing them.

The Future of Chemical Engineering

MS: Do you have any thoughts as to where chemical engineering has been and where it is going?

OL: Of course. Our field was born in the early years of this century. The following – very briefly – are its high points.

- 1920's saw the invention – and I mean invention – of the concept of the heat and the mass transfer coefficient. These concepts opened the door to design methods for process equipment. (Imagine trying to determine the size of a heat exchanger without the use of *h*?)
- 1930's saw the development of the unit operations and of stoichiometry
- 1950's saw the creation of chemical reaction engineering, of transport phenomena, and of process control.

By the 1960's these principles were in place and progressively are being applied in more and more areas.

Chemical engineering is now a mature, well developed field. In the years to come it will be more widely used and its practitioners will retain their position as the generalists of the technological world.

What a great and exciting field to be part of. I'm thankful that the French university that I attended did not allow me to major in astronomy because of my poor mathematical preparation.

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