

Interview with Allen Rosenstein, Ph.D.
Professor Emeritus
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Interview conducted by Professor William Van Vorst

Van Vorst: Allen, I wonder if we could begin with a little resume of your earlier education, in Arizona I believe, and your background.

Rosenstein: I was born August of 1920, Baltimore, Maryland. When I was about 13, our family moved to Arizona where I attended high school. I graduated from high school at 15, and went to the University of Arizona, which at that time was the state university with 3,000 students. While enrolled in the College of Engineering, I worked my way through college with a major in electrical engineering.

Going back just a little, at the age of about seven, while still living in Baltimore, I had a set of electric trains and remember, very distinctly at that time, "I like this. I'm going to become an electrical engineer," and did. I never regretted it, enjoyed it and would do it all over again. However, if I really had to do it over again, the only major thing I would change is that I wouldn't have waited three years to ask the young lady I married to marry me. That was a waste of time. [laughter]

Van Vorst: Incidentally, I understand that the University of Arizona has honored you recently as a distinguished alumnus and I congratulate you. I wonder when and how you decided to come to UCLA?

Rosenstein: I graduated (with high distinction) from Arizona in 1940. It was the end of a deep, grinding, economic depression. There were no engineering jobs in Tucson that I could find. My family had already moved to Los Angeles, so I joined them and started looking for work. It wasn't easy. The job market was pretty lean. Finally, I saw an advertisement for Consolidated Aircraft in San Diego. They were building flying boats and the B-24. I joined their Facilities Engineering Department, which built and maintained the buildings and manufacturing equipment. It was a little company when I began and in two years it built hundreds of thousands of square feet of buildings. The corporation grew to probably about 30,000 employees and was well into the War effort.

In 1942, I accepted an offer in electrical engineering at Lockheed. I spent a year there and went to a place called Utility Appliance, which was converting to military work, and again as their Chief Facility Engineer.

Van Vorst: How did you happen to come to UCLA? And, when?

Rosenstein: That was the original question, let's get back to that. I went into the service in 1942, and became a part of what was called the Navy Radio and Radar program. This was a select group of students who scored very highly on the "Eddy" test for engineering and electrical engineering proficiency. These young men received intense training program in electronics, including Radar and Radio. The program began at Great Lakes [Illinois] and then continued at Carmel, California. This was a great place we finished our training at Treasure Island in San Francisco. This is an island in the Pacific and, as you can imagine, was tough duty. The traffic into San Francisco every night was really dreadful. [laughter] You had to fight your way through.

I was fortunate with respect to my graduating class, in that most of the fellows went out to serve in the fleet and I was asked to join the teaching staff. I taught there for about a year and that was really a turning point in my life. I recognized how antiquated and inadequate my undergraduate education had been. It was conventional, and although I graduated with high distinction, I began to see that the "specialties," (as they were defined at that time) were really very restricted. They didn't recognize the commonality of the mathematics, the physics, the sciences and the methodology underlying all of engineering and, in fact, all of the profession. As a result of that teaching experience, I decided that I would like to teach.

Not knowing any better, I decided to teach at a university and came to Los Angeles, where my parents were living, and went out to UCLA to see what it had to offer. They directed me to a room where the new Dean of Engineering, Dean [L. M. K.] Boelter, was talking to students who wanted to enter engineering. These, of course, were the days of the GI Bill. Here were these bright, young people who had spent anywhere from one to four years fighting a War. Their education had been terminated at some point, they had the GI Bill, and they wanted to study engineering. They all recognized the role technology had played in the War.

My first sight of Dean Boelter and most vivid memory was that of this distinguished man, backed up against the end of a rather large room – it was a hot summer day – sweating, talking to young men who wanted to know how they could enroll in the new School of Engineering at UCLA. I waited until most of them had left, then went up and met the dean. I had received some excellent letters of recommendation for my teaching in the Navy. I said, "By the way, could you use an engineering teacher?" He read the letters and replied, without hesitation, "Yes, come in tomorrow and sign up for the teaching staff."

I signed up for engineering and started my career at UCLA, teaching the Unified Curriculum. It was a wonderful experience. It was exactly what I had instinctively been looking for. The typical engineering undergraduate education that most of us had received was quite obsolete. There was a realization that many of the advances in technology that occurred in the War, were not made by engineers. This bothered me somewhat. True, engineers made major contributions – radio, radar, sonar. But, in looking at what was required, it turned out that the mathematics that most of us

had received as undergraduates ended with ordinary linear differential equations. Few engineering undergraduates had learned partial differential equations, which would enable us to analyze a distributed parameter systems. It was a major flaw, of course. If you're dealing with the transmission of energy through media – the models you draw upon are distributed parameter models using largely partial differential equations. So, I loved it. Boelter was a brilliant man, with a clear vision of the future. Thus began what became my second education. To teach a different form of engineering, I had to learn it and teach myself many of the courses that were being proposed. It also made sense to take a master's and a Ph.D. at UCLA. Progress throughout the professional ranks followed. I was appointed an associate professor and later to full professor – to join the so-called privileged ranks, including the privilege of paying for your own parking. [laughs]

Van Vorst: A real reward! Tell me a little more about your impressions of Boelter as you got to know him.

Rosenstein: First of all, people either loved him or hated him. I have seldom found anyone who was not committed one way or the other. You never ended up knowing Boelter without having a really strong opinion of the man. I thought he was a visionary, I thought he did marvelous things for engineering education. He was years ahead of his time. His idea of a unified curriculum was a basic change in engineering education, which other schools have adapted to their advantage. UCLA, unfortunately, reverted back to the conventional model after he died. I enjoyed him and thought he was a master politician, but more than that, he was a fair and a good man. One of the highlights of my career was knowing that man.

Van Vorst: I know what you mean by either liking or disliking him, and I can't resist commenting that I've come up against a few people who were on the dislike side and when I pursued why they disliked him, it seemed to be based on entirely erroneous rumors. And, I think the two I contacted ended up liking him when they found out the real Boelter. Do you remember your first impression of UCLA as an environment to work in?

Rosenstein: Of course it was quite a contrast to the Navy! It was entirely different. There was a certain amount of freedom. You could teach what you wanted within the description of the course. You had the opportunity to innovate. There was a lot of support. Some of the faculty became some of my best, long-lasting friends, including Bill Van Vorst, Myron Tribus and Daniel Rosenthal, just to name a few.

Van Vorst: I am wondering also – you've answered this in part – but, the impression the early faculty might have made on you and how you recall the atmosphere for research in those early days.

Rosenstein: Well, when it comes to the "religion" of research über alles, I guess I'm an agnostic. Some of my very best and dearest friends are scientists. I like them and respect them for what they are, but I would never want to be one of them. There is

a difference that society seldom recognizes between the scientist and the professional. The National Science Foundation has done a magnificent job of promoting and funding science. In order to survive in the new research university, professional schools were forced to adopt the mantra of science, and concentrate upon research to justify their existence. This, of course, is ridiculous.

Van Vorst: Well, I'll have to go on a little sideline. I am an alumnus of MIT and they bring out outstanding professors to talk, one of them was [Amar G.] Bose of the current Bose amplification system. You'll be interested to know he said almost the same sort of thing. That there's been an overboard adoption of science on the side of engineering and he was pretty disturbed about it, but I guess the way the grants go we have a lot of opposition to reinforce engineering. Would you comment a little more?

Rosenstein: Well, it's sad. If you examine the composition of the university there are three major foci. There is the science for science's sake, which is the pursuit of knowledge of the universe – the natural science, if you will. There are the arts and the humanities, which deal with the cultures and value systems of our society. Then there is this large group of colleges with very large enrollments, which are the Professional schools.

When you look at the difference between science, which is the pursuit of knowledge and justifiably so, and the pursuit of a professional activity, they use some common methodologies, although the professional method of “decision-making” is much more sophisticated than the so-called “scientific method.” The professions, when you examine them closely and study what they do, you begin to realize that if a society didn't have the professions, it would have to invent them. In fact the professions are collectively for what responsible could be called the nations quality of life. You are there to care for the needs of a society. These needs are so complex and resources are so valuable and scarce, a successful professional requires a high degree of education and experience. They are going to make the decisions, which allocate the resources that determine the future of your society.

For example, I think one of the things that made this Country great, a unique aspect of world history – and I'm going to mourn its demise – was that in the early colonies we started out with education for all. If you think about it, the greatest single resource that a society could have are educated minds. If we don't put money into bringing that resource into flower, we foreclose a great deal of the future that that society could realize. Suppose societal resources wouldn't be directed to, say education. Instead, they might be directed to reduce the taxes for people who probably don't need it – [laughs] the wealthy people. The resource allocation issue has not been recognized. For example, even in the universities examine the graduate population, reveals the overwhelming percentage – probably well over 50 percent – is devoted to the professional schools – and for good reason. These again are society's decision-makers whose education, intelligence, determination, form the nature of future society.

Van Vorst: That's an excellent discourse. I wonder if I could just break here and say, is there anything that you would like to say about those early days in engineering at UCLA?

Rosenstein: What I've just described to you was not something that came in an early morning revelation while on a mountaintop. It came as a natural consequence of some of the educational programs we had at UCLA in which I was fortunate enough to be involved. If you wish, I can go back and give you sort of a genealogy.

Van Vorst: Please!

Rosenstein: Boelter was a man who always asked questions. One day he said, "Everyone talks about the need for modern physics in education. What is the role of basic modern physics in the engineering curriculum?" He appointed a Committee that worked on it very diligently for about a year. Tribus, Rosenthal, and I were members of that group. At the end of the year, we gave him a Report containing a great deal of detail.

First of all, it was found at that time all of the engineering courses in the engineering curriculum before and after the courses in basic science, used very little new physics. None of the engineering upper division courses were built upon what was called modern physics – which was atomic physics in the early part of the century. It was only reasonable to recommend that it would be useful to introduce and utilize some modern physics in the curriculum. But the data we had gathered, actually provided very little foundation for such a conclusion. To make modern physics become part of the engineering programs, would require a detailed study of the existing courses to determine how the courses had to be recast to introduce and utilize the desired physics. It was a good report, a long report that concluded that the report was, in essence, worthless!

Van Vorst: [laughs] Well that's the way things go.

Rosenstein: Boelter took that as a challenge. He said that the Committee must look at the total undergraduate curriculum – rather than examining it piecemeal. He had a good point. Boelter's unified curriculum had built upon traditional, entry-level courses, but they were still traditional courses. They had very little to do with modern physics.

The next two or three years was spent analyzing the existing program. We set clear goals, and sought answers to fundamental questions such as, "What is the purpose of engineering education?" The obvious conclusion was that education for the professional should be built upon a version of the future, unless you are a historian. Education, particularly in the professions, must be at the forefront of the problems of a growing, changing modern society. The challenge was to build a dynamic self-adjusting platform from which engineers would be prepared anticipate and cope with new societal problems.

Other observations reinforced this conclusion. We found that Lockheed was sending engineers back for retraining, upgrading – whatever you want to call it. We asked how long had these engineers been out of college. The average was four years. In other words, Lockheed was responding to early obsolescence of the very bright young people we were graduating. Their education required something more. Lockheed was kind enough to say that we hadn't failed; they simply needed more.

A study at the University of Pennsylvania examined the half-life of an engineering curriculum. At that time, the average half-life of an undergraduate curriculum was approaching four years. This meant in about four years half of what was learned was obsolete. The half-life was continuing to go down. Projected out far enough, professional engineering education would become an educational black hole. Society's needs would change faster than the curriculum. By the time the students graduated, practically everything they learned would now be obsolete.

If the curriculum was destined an “educational black hole” – could that fate be avoided? Before attempting to change anything, an intense effort was mounted to understand the essence of every course in every program. That took a lot of time but it was fun and educational. We started out with the question of what are the fundamental principals on which the education is built – not just the facts, but the relations that are ultimately accepted as so fundamental they cannot be derived but must be accepted. These relations change very slowly over time, if at all like the conservation of energy – mass.

We discovered that all of engineering education was built on only 10 or 12 principals. Yet, there were never taught in an organized fashion. In other words, there is this educational big pyramid resting on a tiny foundation of 10 or 12 principals that were seldom critically examined. This was a challenge in itself.

A curriculum dictionary was developed around laws, models, precepts, concepts, applications, needs, etc.

We now had a complete dictionary. Each curriculum was analyzed, each course could be characterized by the vocabulary we had developed. The curriculum data was put on a computer. Of course, that's when we found we only had around 10 or 12 principals. We now had a vast well-ordered information library containing the essence of our educational program.

We found some real anomalies. One in particular was Hooke's Law, which is a linearized version of the mechanical stress-strain relationship. Hooke's Law found to be taught in the curriculum seven times, each time as though it had never been taught before. In other words, the efficiency of the educational process was very, very low. But, with insight into the elements of an educational program, a curriculum design tool was now available to greatly improve the efficiency of the

educational delivery system. A four-year traditional program could be readily reduced to a more effective three years.

We then began to consider the engineers' societal responsibilities. Of course, they are societal decision-makers, dealing with limited resources to cope with important societal needs. Recognition of the engineer as a decision-maker spurred the need to formulate and teach a rational effective decision process. About that time, our attention was being directed to a rational process for creating and maintaining the essential items of a modern professional curricula. UCLA made a major contribution to the formalization of the design discipline that is now taught in many engineering schools. People talked about engineers "doing design," but design was never taught as one of the essential stems throughout the curriculum.

The method, which engineers called "design" was found to be common to all the professions and somewhat more sophisticated than the scientific method.

Van Vorst: Some of what you said reminds me of my earlier days in which I had the pleasure of being associated in the research and development of a gas turbine engine for flight with [W.] Duncan Rannie at Cal Tech who in turn was a protégé of [Theodore] von Karman's.

Rosenstein: von Karman was an engineer, too.

Van Vorst: Well, the interesting thing is that when I was introduced to him, he said, "Ah, one of those people who reproduced the mistakes of their predecessors." [laughs] Some of your comments on the curriculum fit in with that pretty well.

Rosenstein: Too often "curriculum" is a fine example of a necessary, but not very effective evil.

Van Vorst: Allen, in addition to your distinction on the faculty, you have formed, owned, and run a company with quite some success. I wonder with this background, would you comment on your feelings about the unified curriculum that we tried so desperately to develop in the early days.

Rosenstein: Let me fill in a little more history, if you don't mind. It was obvious that our curriculum study had moved into new territory to undertake a very large task. We decided that we wanted to design, not accidentally build, a curriculum that would be dynamic enough to continuously address the changing needs of a society. We developed a methodology of separating curriculum content into basic stems. We found that there was a *decision process*, which we called *design*. There was a *modeling process* and that was supported by a very limited set of mathematical models. These models and their supporting mathematics were identified for all professions. The mathematics and models were the same, only the applications differed for each field.

Finally professional schools needed something called “Applied Humanities.” Engineers are responsible for designing systems, which are required to satisfy society’s needs. To address this issue, the Engineer (Professional) must be capable of creating a system to describe and model the society in which the problem is embedded. I could give you an example if you are interested. . .

Van Vorst: Yes, please.

Rosenstein: A beautiful example is the Embarcadero Freeway, which you’re still old enough to know. This was a freeway proposed for San Francisco, which would have spanned the distance between the Golden Gate Bridge and the Oakland Bay Bridge. Every day in the morning, the wealthy people in Marin County would go over the Golden Gate Bridge and the Bay Bridge to Oakland, where they had their factories. Gardeners, maintenance people, and housekeepers in Oakland would travel in the other direction to Marin County. I’m exaggerating a bit, but it’s true. In the evening, there was the same traffic, in reverse. Traffic from the bridges spilled into downtown San Francisco, producing monumental traffic jams in the narrow strip of land between the two sets of bridges.

After extended debate and study, the decision was made to build the Embarcadero Freeway. It would traverse some of the most valuable property in San Francisco. The California Transportation Department is a good organization. It is well manned, its work is done well, there’s only a moderate amount of graft, [laughs], they built the freeway system for the State. Generally, they know what they’re doing, they hold hearings, and they attempted to get the public’s opinion. This was going to be a multi-million dollar freeway with land was so scarce and expensive it had to be a two-layer elevated freeway. Construction started at the Bay Bridge, progressing through most of the Embarcadero, which were the wharves, and finally reached Fisherman’s Wharf.

Suddenly, one day the people of San Francisco realized that when this freeway was completed, their view of their beloved Bay was going to be through a smelly, multi-layered freeway. The citizens of San Francisco rose up and stopped the freeway dead in its tracks. It was the darndest thing you ever saw. You could drive along the elevated freeway and then it came to a dead end just before it got to Fisherman’s Wharf. It must have been that way for 20 or 30 years. Finally, it was torn down. But, you ask yourself, what went wrong? The economics were right, the engineering was excellent, the construction was right, the feasibility studies were reasonable. There was only one value that the department didn’t consider – aesthetics, which ended up as the one dominant value that overrode all other values.

The Embarcadero Freeway story had a corollary. UCLA’s Educational Development program had caught the eye of rapidly expanding universities in the countries. As a result, we had the privilege of consulting and lecturing at a number of engineering schools including some in Latin America.

We did some educational partnering in Venezuela, where they had rapidly growing engineering schools that worked to take advantage of UCLA's experience. The new formalization of the design process and the role of a unique value system were frequently examined. The Embarcadero Freeway was used as an example in Maracaibo why they faced a somewhat similar situation. The City of Maracaibo and the University of Maracaibo are on one side of the Maracaibo Bay. On the other side of the bay there is an enormous oil field. A great deal of traffic circles the big bay in both directions. There was much discussion about building a bridge along the bay. When I described how [in San Francisco] the economics were defeated and aesthetics ruled the vote, the class always went blank. They could not conceive of how you could divert resources from building a needed structure to satisfy aesthetics and destroying something in which you had invested a lot of money, just because of aesthetics. In a subsistence marginal economy which is fighting to survive, the thought of the extravagance of an aesthetics value had no meaning whatsoever – they couldn't relate it to their own particular reality.

This brought us to the concept of the applied humanities. No engineer received – in fact, no professional received as a coherent well-organized applied humanities stem to prepare for professional practice. It's one of the major changes that I still hope professional schools will adopt.

The UCLA Educational Development Program led to a generous Ford Foundation Grant of about a million and a quarter dollars with a quarter million dollars from others. Consequently, we spent around a million and a half dollars over about six or seven years on the intensive study and the creation of methodology to design professional curriculum.

Van Vorst: You remind me again of incidents – this one relative to our Indonesia project. When Boelter came over to see us at that time he was recovering from a heart attack, so he couldn't be terribly active except mentally and he tried to prepare people for the inevitability of change. Now, where we were in Jakarta was a very conservative area and when he mentioned the importance of change and needing to deal with it, although my Indonesian was pretty limited, I heard people in the back saying it will never change in Jakarta. I didn't tell him this, perhaps I should have. But, I just wanted to say that after living there for four years, when we went back to visit in the middle '80s, we couldn't find our way around – everything had changed. [laughs] Again, the Boelter wisdom at work.

Rosenstein: We found a similar example when we studied the evolution of engineering education in the United States. Early engineering schools were always built around civil engineering. This made good sense. There was a wilderness to conquer. Resources were allocated for the basics, water, and food. The foundation of a new society demands buildings, roads housing, water, etc.

The next engineering phase came with the inception of steam power to replace human labor and animal power. The nation needed and wanted mechanisms like

automobiles and assembly lines. Mechanical engineering dominated the engineering school.

Shortly after that electrical power, and electrical engineering became a major fact in improving the national life quality almost simultaneously. Communication networks spread across the country to transmit information. By the latter half of the 20th century, the electronic computer had become an incredible tool for storing and processing information.

When we first went to Venezuela, we were somewhat surprised to find 60 percent or more of the faculty were civil engineers in their early '30s and '40s. But, most of the students were enrolled in mechanical engineering. The engineering schools were staffed to meet the initial demand, civil engineering. However, in Venezuela development, time was compressed. They had already moved into the mechanical engineering phase, and required more mechanical than civil engineering staff.

Van Vorst: I just want to double back. My question to you about the value of the unified curriculum led you to some very interesting comments. I think I'd like to ask the question again, with the thought that you would tell me whether you think the demise, I guess, of the unified curriculum, at UCLA anyway, fits in with the best in education or the worst.

Rosenstein: I don't think it's the worst, but it has the power to be part of the best. There is little doubt that at some point there's a need for specialized knowledge to penetrate a field in depth. However, there's a question of an efficient foundation that can prepare an 18 or 19-year-old university freshman who will confront the "black hole" professional education syndrome before and after graduation.. Unless the student is exceptional, one who had a set of electric trains or today's latest portable computer, the youngsters probably don't know what society will require of them. Bioengineering, for example, was practically unheard of only a few decades ago. Now, bioengineering probably is one of fastest growing studies on campus.

With the unified curriculum, you lay a foundation, really a great foundation for any field of engineering. You provide design experience and they understand how to make rational decisions and justify them. You look at the value systems, which provide a need for the humanities and social sciences. A modern unified curriculum can but prepare the student for a professional life of the continuous changes required to maintain the type of society in which you and I would want to live in. Every one of the unified stems lays a superior foundation for coping with a great variety of problems. In one class, one can give students a better foundation, including a greater appreciation of the mathematics necessary to handle each of the few general models. The students who go through this kind of education are undaunted by new experiences. They know how to do experimentation, they know how to extract models, and they know the mathematics that they can use for analyzing their models.

Now, at some point, if the graduates are going to, say, design specialized semiconductors, the unified foundation prepares them to rapidly learn the language and tools of the specialty.

Van Vorst: I always fell back on answering a student's question about why they had to take some subject not at all related to what they felt they wanted to specialize in. In my field of heat transfer, particularly the electronics people would say, "Why do we have to take this when we'll never use it?" I would say, "You don't know you'll never use it." A couple of them had the decency and I guess the honesty to come back and tell me, "You know, we work for Hughes in electronics. You know what our first job was?" "No," I said. They said, "Heat transfer trying to cool the units." So, my thought was always that you never know the fundamentals are the only thing you can really depend on as not changing.

Well, we've come a long way and it's kind of hard in view of your experiences to stay with just those early days, but on the other hand, we are talking about the history of engineering at UCLA and the early days. I wondered if you would think a little bit more and tell me if there are some lasting impressions about the environment for research. Did that early experience, did the early faculty have a pretty definite influence on your career?

Rosenstein: We knew we should publish, but in those days "research über alles" had not become like catsup that you poured over everything. You did have a greater sense of being in a professional school. We were encouraged to develop and direct our intellectual talents to the essential purpose of the professional in a great university. Unfortunately, the research restriction became more repressive with time. I can remember when I was on a promotion committee for one of my fellow engineering professors. As you know, the promotion committees are drawn from across the campus. This young man had done some great work in hydrogen engines. I started explaining the meaning and intellectual contribution of the engineering candidate. "We considered everything, the international conventions, the influence that he had," that came from his insights and work in hydrogen engines. At this point the professor from economics looked at me and asked, "But, is that research?"

In another experience I was on the promotion committee for a medical school Anesthesiologist. This was very interesting. The medical school committee members said he was among the greatest, no one disliked him, but looking at his publications, though . . . Anesthesiology is always done in groups. If you don't have a good team you see too many patients can become vegetables because of poor anesthesiology. The committee continued the resume examination. It was pretty obvious that he wasn't going to make it. Finally, I asked one of the committee members, an outstanding brain surgeon, "How would you feel if the candidate is passed over. The surgeon responded that the candidate was particularly great as a brain surgery anesthesiologist. "What would happen if we reject this man?" He said, "Well, he'll leave UCLA, he's world famous, he can get a job anywhere." I said, "So, what difference does it make?" He thought for a while and said slowly,

“I don’t think I would ever undertake a brain operation at UCLA if this man weren’t here.” At that point, the committee unanimously approved the promotion. After all, one of us might need brain surgery at some time. This is not an isolated incident. Basic research as the sole criteria, has really corrupted and inadvertently compromised the purpose of the professional school.

Van Vorst: That’s a very valid point, there shouldn’t be anything über alles. So, I’m inferring that those early days were a time of some pleasure for you, as well as a challenge.

Rosenstein: I might go a little further if you wish. When the curriculum study was complete, we had done everything we wanted and had introduced a large number of unified courses into the curriculum. We were very pleased with the results. However, there are times when unexpected changes came together. Boelter was incapacitated. There was a new movement growing within the faculty which we had not recognized. UCLA consistently sought young professors from the best schools. These were very bright capable engineers. But, Boelter also had been careful to select the type of people that he wanted. He would not appoint candidates unless they had interest in at least two areas. He didn’t want the restricted disciplinarians, to direct the faculty. But, about this time, with Boelter incapacitated, the young Turks began to dominate the faculty. Suddenly to our dismay, we found that they didn’t like the unified curriculum – at least that was said, but closer examination showed this wasn’t the issue at all. The young staff wanted to be so associated with the classical departments. Why would they want to be associated? Because, if they were in a unified school, they couldn’t get recognition from classical engineering disciplines such as mechanical engineering or in mechanical engineering journals. So, it was much easier to be recognized, to achieve fame, a promotion, by having a classical department. The unified curriculum pretty much died at that time or began to die. The deans that followed Boelter were not of his persuasion. They were not about to fight for what he had wanted. They did the best they could. They probably couldn’t have done anything anyway. But as a result, the school recast itself into classical departments. In the end, the unified curriculum now lives in other schools, like Harvey Mudd . . .

Van Vorst: Yes, that point is overwhelming, the fact that people want to be comfortable in their own little environment.

Rosenstein: Well, they’re in a saber tooth environment. You have to “publish or perish.” It’s easier to publish if you are identified in a classical stream.

Van Vorst: Absolutely.

Rosenstein: It can be done – many of us survived, but as you well know, it ain’t the easiest way to go.

Van Vorst: That's right; we proved that one way or another. [laughter] Well, I think we've covered those early days and I thank you. If you have any general conclusions, I'd welcome them at this point.

Rosenstein: Well, if I had to do it over again, I would certainly do it over again. I would have been a lot smarter and sensitive enough to recognize the counter trends that had been developing. These were not bad people, they didn't know what they were doing, and they certainly were fighting for their own survival, so they can't be faulted. If the top leadership of the department had been there to lean in a more congenial direction – I believe that the unified curriculum could have survived very well. There were so many advances that the unified school made possible. Bioengineering was thriving 30 to 40 years ahead of the time. Bioengineering as part of advanced engineering education. We had an environment where these things came naturally to us. The computer came very naturally and early into our program.

Van Vorst: The old differential analyzer.

Rosenstein: That mechanical monster . . .

Van Vorst: Well, I think there's a lot of evidence that the unified curriculum was really basically very good. I remember, for example, a survey of our early graduates of that program revealed that an outstanding percentage shot up in management after a few years in engineering. Boelter wasn't entirely happy with this. He thought they should have stayed in engineering, but the fact was that our students – are presidents in corporations all over the country – so we're left with a little bit of a mystery. Thank you for your insights.

Rosenstein: You're welcome. I'm sure I can come up with a few more stories if you need them.

Van Vorst: Thank you, Allen.

Rosenstein: It was my pleasure. You've brought back memories of wonderful things I had completely forgotten.