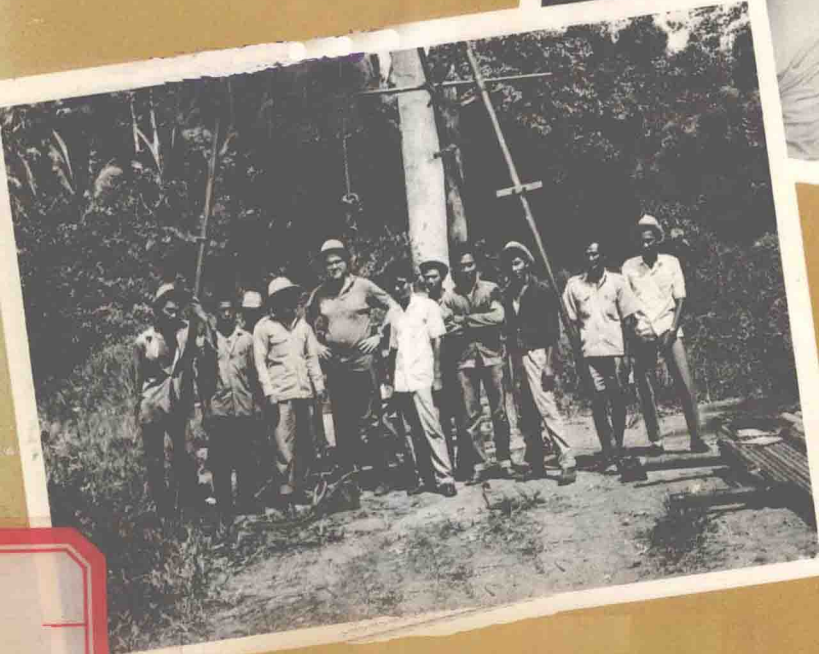
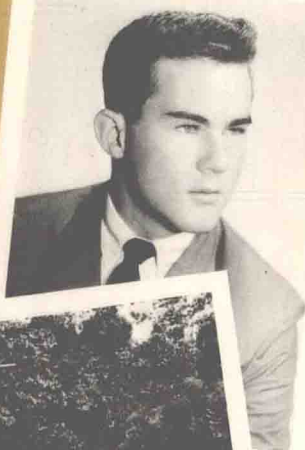


Getting Sued and Other Tales of the Engineering Life

Richard L. Meehan



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of the Engineering Life***

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Introduction

I was first introduced to calculus by a high school math teacher named Philbrick Bridgess, a dry and somber New Englander who would have fit well into a poem by Robert Frost. Mr. Bridgess had that rare ability for showing that the subject of his expertise was really ridiculously simple, and in this and other of his taciturn ways provided me with encouragement, which I badly needed in those forlorn adolescent days. I remember once after introducing us to the subject of integration, he passed out an aromatic mimeographed sheet filled with algebraic functions. "Integrate them, then differentiate 'em back again. That's a good habit," he said, pausing to look out the window over the school football field and track; a few years before, as seventh graders, we had made grubby computations of their perimeters and areas under his guidance. Then he made what was for him an uncharacteristically personal remark. "I had a roommate in college. He'd make up functions. Differentiate them. Integrate them back again. That way he'd know if he'd got them right. Seemed like a lot of work to me. That's why he's a big shot at GE and I'm a high school math teacher."

Mr. Bridgess's story, brief as it was, taught me something about math. And it taught me something about learning math, about teaching, and about Mr. Bridgess too. The calculus part of the lesson has faded from memory; no doubt today I would be unable to work the problems on that homework assignment. But I have not forgotten the other lessons in that laconic tale of the roommate.

This book aims in similar fashion to tell something about what it is like to become an engineer. I have ap-

x proached the subject by telling some stories from my own experience, hoping to convey something of the flavor of the technological life, recognizing that supplementary vitamins and minerals, not to speak of fiber, can be found in other volumes such as the *Chemical Rubber Handbook*.

Probably there is a more systematic way to approach this subject, based, perhaps, on taxonomies of personality types, hierarchies of motives, schedules of life passages, and the like. It is true that we scientists and engineers generally prefer the systematic to the anecdotal, the Aristotelian to the Homeric. But there are occasions when the point may be made more readily with a story than a dissertation. For example, let us say that twenty years of experience has led me to believe there is nothing inherently more dehumanizing in technological enterprise than in medicine or law, that there is a lot more to a career in technology than Ohm's law and FORTRAN and mixing concrete, that people and morals and delight and misery are all waiting to confront you whether you're a computer engineer or a public-interest or corporate lawyer or a village headman in Thailand. I believe that. My experience over the last few years teaching graduate students has convinced me that this kind of message—and I think it is an important one—can be more readily transmitted to students anecdotally than systematically.

Certainly the details of everyone's experience vary, and I do not pretend that designers of computer microprocessors or professors of chemical engineering have the same stories I present here. Nonetheless I expect that most technologists, whatever their specialty, at one time leave home, just as I did, to join a professional tribe, there encountering people who have been similarly trained but have cultural backgrounds that differ greatly from their own. At one time or other, they will, like *my man who bought Route 128*, be introduced to financial pressures and temptations. *They will experience, as I did, the confusion and panic*

that comes when one is caged with that different species, lawyers. They will discover that there are differences between homework problems and real problems; between clever analyses and clever designs; that organizations have a morality and will of their own; that bosses' or clients' goals are never entirely explicit or even rational; that there is always an unconscious gap between what people want and what they say they want.

Of course most of these lessons must be learned as well by accountants, military officers, architects, scientists, managers—anyone attempting to succeed in a profession. As Jacob Bronowski put it, “Whether our work is art or science or the daily work of society, it is only the form in which we explore our experience which is different.” So in a broad sense, this book addresses the experience that befalls all of us between the time we decide on our work, at say age eighteen, and the time we finally understand something about what is really going on, at about age thirty.

Although the stories that follow are set in chronological order, the gaps in their sequence and the absence of characters from my personal life (certain of whom nonetheless cast shadows, which no adjustment of stage lighting will remove) disqualifies this collection of tales as even a journeyman's autobiography. However, to provide readers with some general orientation, I include a few brief paragraphs describing my employment history.

We lived a comfortable suburban life when I was a child, and certainly I had no need to take a job. However, when I was in the fifth grade, I was influenced by other boys who were able to present glamorously swaggering accounts of the joys of caddying. It is a marvel of the human imagination that one could find romance in spending the better part of a day carrying heavy leather bags of golf clubs for rich men, all for one dollar. However, one of the more comforting lessons of life is that in the end there are certain

fixed quanta of pleasure and pain in almost any human activity or condition. The click of a perfect wood shot on a misty July morning; the unzipping of a strange leather pouch, pregnant with gleaming white balls and chrome yellow tees; the casual stroll up to the pin, carefully planned and perfectly executed so that one's shadow never falls between the ball and the hole; who can say that a slave's pleasures are not equal to a king's, a consultant's to a client's?

For several high school summers, I was a greengrocer's boy in the A&P. I whistled "Three Coins in the Fountain," split watermelons, and guarded the uppermost purple stratum of boxed cherries against assault by dangerous shoppers. After several summers as a produce clerk, I was promoted to checker, but I proved to be as inept a checker as I was an airplane pilot many years later, so I was demoted to the back room of the grocery department, where I slit cartons, stamped purple prices on cans, and speculated on the potentially bizarre disposition of horsemeat and sheets of Kleenex. I worked with men in their early twenties who hated themselves for loving the Great Atlantic and Pacific Tea Company, who swore they would get out even as they grew sick with desire for assistant store managerships. I was glad I did not need to worry about all that, for I possessed, and that summer read and reread, a single sheet of bond from MIT's admissions office, on which were typed the words that were going to carry me away from the A&P and into the world described in this book.

The summer after my freshman year at college, I took a job in the quality-control laboratory in a fish warehouse in South Boston. There I counted worms in cod filets and weighed fish sticks. My boss was a biochemist who derived an equation to predict the freshness of fish filets as a function of temperature and time. This was the first time I witnessed the transformation of a natural process into an

equation, and I was much impressed by the magic and pleasure of this fundamental engineering operation.

The following summer, between sophomore and junior year, I worked as a construction inspector for a contractor at a BOMARC missile site. The BOMARC missiles were supposed to pop out of the ground on Cape Cod and fly up to Canada to intercept Russian bombers arriving from the North Pole. The BOMARC struck me as a sort of aerial Nash Rambler. I was always glad that no one found cause to fire them off, for I feared that they would as likely fly off in the wrong direction or simply blow up their little cinderblock houses. Several people told me that my work was quite good, and halfway through the summer I thought on this basis that I should ask for a raise. This resulted in my being instantly fired. Walking through a contractor's office after being canned, with the project manager shouting at me for being ungrateful for the opportunity of a summer job and the bookkeepers and secretary and clerk of the works turning pale and wishing they were somewhere else, is a ten-second experience in free enterprise that should not be missed by any one.

A full account of life as an engineering undergraduate deserves to be written. Here I've tried to capture only a small part of that experience, in chapter 1 and in part of "Haiti One More Time." Subsequent experience as a student-citizen-soldier, which students of the 1980s probably will once again contemplate with the same feelings that we experienced in those Berlin Wall days of the early 1960s, is described in "Confessions of a Military Engineer." I've not yet attempted to write an account of post-army life as a New York commuter, working for a large New York architect-engineering firm; that is a future project.

"A Dam for Lam Pra Plerng" describes two years of the engineering life in Thailand in the early 1960s. After Thailand, between the steamy afternoon in June that I left my

dam at Lam Pra Plerng, bound for Calcutta, Peshawar, and Kabul, and that peculiar dreamlike morning, exactly two years later, when I arrived in Santiago, Chile (where my story picks up again), I spent a year in graduate school in London followed by a year back in Boston doing foundation engineering for structural engineer Bill LeMessurier. That year in Boston, 1967, I drilled soil borings in Cambridge argillite, Indian fish wiers, Beacon Hill, and, once, a buried cable carrying several thousand telephone conversations. Using the information gained from these boring results, I designed foundations for the high-rise buildings that were then changing the Boston skyline. Recently while visiting Copley Square with my daughter, I stopped to look at the construction joint between my favorite old building, the Boston Public Library, and Philip Johnson's new addition to it, a structure in which I have a special interest because I designed the daring foundation that supports it. The architect apparently chose not to follow the recommendation present in my report, which suggested that because both buildings are supported on two hundred feet depth of quaking, toothpaste-like Boston blue clay, they should be connected, if at all, with a joint that would permit two or three inches of differential play between them. Secretly I had faith in the efficacy of my Archimedean scheme of floating Johnson's massive new addition: carving out exactly enough soil from under it and designing the basements like the hull of a ship so that the weight of the excavated soil would equal the 300,000 ton weight of the structure and its heavy load of books. This way I figured the new addition would float, like the *Queen Elizabeth*, with tranquil equilibrium beside its prim neighbor. From the look of that cemented joint between old and new, unbroken today, I think the scheme worked. Far better, in any event, than a certain bungled effort at foundation engineering that nearly destroyed Trinity Church on the other side of the square.

My work in Boston was fun, but I soon departed Boston again for the Chilean Andes, an adventure described in "Snowbound on the Rio Pangal." But by the time I left my cabin in the bleak valley of the Pangal, the romance of life overseas had worn thin. More by accident than design, I settled on the San Francisco peninsula, where I have remained since. With the exception of an occasional pilgrimage to the tropics—one of which yielded the retaining wall described in "Haiti One More Time"—I have been content to tend my home gardens. In 1969, I joined with some geologists to start a consulting firm. Fortunately, "Getting Sued," the story that ends this book, did not end our consulting business, so the stories of other consulting and professorial events of the past few years await (to borrow an appropriately technological metaphor from Vladimir Nabokov) "the evaporation of certain volatiles and the melting of certain metals in my coils and crucibles."

The first of these stories, "A Dam for Lam Pra Plerng," was conceived at a moment of distress in the autumn of 1976. I kept a journal in those days, in which I find entered for September 26 the note, "Some ideas for essays. Thailand. How the dam was built. Luay, Vicha, Longmah, Nicom." This story and the ones that follow were written in various notebooks and on pieces of paper in a variety of settings, including Stapleton International Airport, the tomb of Leland Stanford, Jr., and the Oakland County courthouse. Final editing and polishing was done using the WILBUR text-editing system on an IBM 3033 computer.

These stories present people and events as I remember them. If I have sometimes seemed smug or intolerant in my portrayal of the character of those around me, let me say that none of them exhibit weaknesses or failings of which I myself have not been guilty at some time or in some context or degree.

This book is the result of the direct or indirect efforts of fifteen people, beginning with my grandmother, who

loved words, and ending with my wife, Ruth, who maintained the effort with support and affection. The remaining dozen friends, business associates, and mentors provided the crucial alloys of tolerance, criticism, encouragement, and skill necessary to amplify into final copy what began as only the faintest of glows in my neural synapses. I thank them all.

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1 **Coming of Age at SAE**

By the time I was ready to pick a college and a career in the late 1950s, I had learned that pursuit of romantic whims could bring woeful inconveniences, so I tried to be very cold-blooded and logical in my attack on the problem. After some deliberation, I concluded that my occupation had to satisfy three basic criteria.

First, I thought that it should be something for which I had some minimal inborn talent. Satisfaction of this rule required some understanding of the talents necessary for the work itself and also knowledge of my own abilities and weaknesses.

The know-your-job criterion was easy. My father was an engineer, and I knew that he knew about such matters as erector sets and concrete, refrigerators and film speeds. Indeed if (as it is said) child's play is a primitive form of work, I had undertaken my first engineering jobs on rainy winter days at age three, when, sitting on the floor of our Connecticut living room, listening to the season's hits, "Praise the Lord and Pass the Ammunition" and "White Christmas," I had built Incan tombs using my father's books. A text on steam engineering, which he still occasionally consults, served as a lintel that could be supported by twin pillars: one the U.S. Army Corps of Engineers *Field Manual*, 1917 edition (page 455: "A good mule has a soft kindly look in his eye which is difficult to describe but easily recognized"); the other a vermilion-colored schoolboy's edition of Plato's *Phaedra*, in Greek, heavily annotated in my father's neat hand.

The "know thyself" part of the rule was not so easy. When I was very young the women in my life had praised

2 me for my capability in such enterprises as disassembling door knobs, which led me to think that I had special mechanical interests and talents suitable for engineering. "Just like his father," they said. Alas, a little feminine flattery can create a persistent delusion; I did not admit to myself that I had neither talents nor patience for mechanical devices until I was about twenty-five and had already become an engineer. Fortunately by that time I realized that it is not necessarily a disadvantage to lack a talent popularly considered fundamental to a profession; indeed I have since observed that the best of any trade are often those who discover that they are not very skilled at the day-to-day practice of its basic techniques. Perhaps from a sense of inadequacy and desperation they become leaders and innovators. This is not a cynical observation. Two of the most admirably successful engineers I have known failed their professional registration exams; one is a brilliant designer, and the other created a worldwide market for the engineering talents of his firm.

A second career-selection principle that I attempted to follow then, and which has served me well in many subsequent decisions, is what I call the short-line rule. I first applied this rule on registration day of my sophomore year at MIT. At that time I had not decided on a major so I spent the morning walking the corridors of the institute, visiting various of its twenty-two departments. Great crowds of students milled around some of the department headquarters. Several classmates I remembered from my freshman physics sections were lined up before the electrical engineering and physics departments. I recalled that most of them had seemed to know as much about physics as our instructors did. Clearly I was not in their league. But I had done well enough in my freshman math sections; to me calculus was a collection of magic tricks that made me want to laugh with delight. Perhaps I would become a math teacher. But when I arrived at the headquarters of the

3 Department of Mathematics, I found another long and slowly moving line. “A career in math is probably the same as that line,” I thought to myself, and I knew at once that I did not want to be a mathematician.

The year was 1957. Civil engineering was much out of fashion in those days, and when I arrived at Building One, with its museum of model ships and laboratories of dusty heroic machines, there was no line at all in front of the civil engineering headquarters. In fact, the department head himself greeted me warmly and asked me to sit down for a little talk. “This department is in a bad way,” I thought to myself afterward. But then later I asked myself why that might be. The answer, it seemed, was not that civil engineering was obsolescent but that it was unfashionable. The basic idea of the short-line rule is that you should buck the trend. So I wrote “civil engineering” in the appropriate space of my pink IBM card, dropped it at the registrar’s office, and then went across the street to the Paradise Café for a beer. I have never regretted the decision.

For reasons that I do not understand, many otherwise logical and talented people, who in their hearts would like to attain some recognition for their professional accomplishments, defy the short-line rule by choosing careers in the same irrational way one might choose a pair of new shoes—on the basis of popular style. For example, when I was an undergraduate in the early 1960s *Life* magazine and the employment advertisements in the *Sunday New York Times* were full of enthusiasm over space exploration. Many students were excited by this publicity and worked toward careers in the aerospace industry. Predictably enough, the market became glutted with former space enthusiasts. Some of them ended up driving taxicabs and tending bar ten years later. A similar boom occurred a few years later in oceanography. There was a flurry of popular interest in the sea as a new frontier, which could be plundered in the old-fashioned mercantile manner, or, for the

counter-cultured, contemplated romantically in the new ecological mode. These reasons were enough to attract many students, and universities, which package and market their programs to students, not employers, met the demand. There was much disappointment when it became apparent that the job market for oceanographers was not much better than for moral philosophers. Were I a student today, I would be similarly careful to avoid that great hub-bub of lawyers or to wander into that jobless wilderness of environmental studies.

My third principle for career selection derived from the hunch that ambitions in large part are fronts for fantasies and that it is surely much easier to design a career that will take you at least part of the way toward a fantasy if you recognize what it is. For example, a man might greatly admire an uncle who happened to be a teacher of biology, without recognizing that what he really admired about his uncle was his position at the head of the class, not his work as a biologist. Without really understanding this, our man might spend a misguided career as a research biologist when he might have been much happier as an English teacher or even a clergyman or an army officer. I have seen some people experience great difficulties in the consulting business because they have a mistaken idea, usually founded on their admiration of some prominent academic mentor, that a consultant is a sort of oracle whom clients seek out for advice. To be such a person—that is the dream. The reality of the situation, that consulting is a highly competitive business requiring sales skills and attitudes, that clients generally prefer tried-and-true solutions, not revolutionary paradigms, does not square with their fantasy. Hence, though such people may do an excellent job of emulating their mentors, they may have great difficulties as consultants because they lack the interest, the persistence, or the attitudes necessary to sell and provide professional services on the open market.

5 So it happened that because I knew the business and thought I might be good at it, because it was not in fashion, and because it was a practical trade, a means to an end, I went off to MIT to be an engineer.

Rush week began at the twenty-five fraternities of MIT in mid-September, two weeks before the start of fall classes. It was a week of breakfasts, brunches, lunches, teas, cocktails, dinners, and parties. Behind this festivity lurked a serious purpose: the recruitment of new members, the pledges, from MIT's incoming freshman class. During rush week every fraternity brother was expected to be alert for new material, to "bird-dog" the ideal "neat guy" who fit the fraternity's image of itself. The younger brothers, the sophomores, were on the front line; they were to seek out promising candidates and introduce them to the older members. Then late in the evening, before the assembled brotherhood, they nominated their discoveries for membership, usually with the endorsement of one of the older brothers. If their candidate was not blackballed, the same two-man team then made a bid to the new man the next day, attempting by pressure, flattery, all the usual sales techniques, to persuade the candidate to accept the pledge pin. The pin, if accepted, was presented to the new pledge in a joyous celebration that lasted forty-five seconds, after which the new pledge was pressed into service as a recruiter.

Rush week was serious and competitive business, for the economic survival and social success of the fraternity depended on the annual recruitment of a good pledge class. After rush week there might be a few more opportunities, scattered nuggets missed in the first sluice. But a fraternity that slipped up in rush week was in trouble, and if your house had a great pledge class, you learned from the older brothers how to shake your head sympathetically and say it was too bad about the Delts, they were really up