



*Daniel W. Fox*

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By John F. Welch

In December of 1988, weak and sick with the cancer that would claim his life less than two months later, Dan Fox, a legend in the plastics industry and a founding father of the \$5 billion General Electric (GE)-engineered materials business, made yet another exhausting trip to Tokyo to inspect a new process for producing the Lexan polycarbonate resin he had invented over thirty years before. It was to be his last trip, but by no means the end of his quest for the perfect material, which continued in the animated technical conversations he had with his saddening friends until the day he died.

I was a recent chemical engineering graduate on the job interview circuit when I met Dan in 1960 at a GE plant in Pittsfield, Massachusetts. They brought me in, late in the day, to meet a fellow doing chemical research who, it was claimed, had some ideas about new plastics. By early evening I was a goner, infected by his enthusiasm, enthralled with his ideas, and impatient to work for him. It was the first, and one of the few times I ever met a man who could not, or would not, savor his triumphs. As soon as he completed one of his many inventions, he would shift from passionate advocate of his work to devil's advocate, criticizing its thermal characteristics, solvent resistance, hardness or whatever, and jumping into the hunt once again for a better plastic. I

met him shortly after he had invented Lexan, yet he exhibited none of the pride even the most modest of men allow themselves over a recent achievement. If anything, he criticized the shortcomings of the plastic even as the world was beginning to celebrate its virtues. He wanted, instead, to talk about the next project, in this case a polyether polymer resin, which culminated in yet another GE plastic—Noryl.

This cycle repeated itself over and over, with GE following eagerly in his wake to market his creations. Dan was a scientist, not a marketing man in the professional sense, although qualities desirable in the marketplace were always the goals of his experiments. He was, however, one of the best salesmen I've ever seen when it came to squeezing another million or two out of tight-fisted bosses for the facilities and equipment to pursue his quests. I vividly remember him coming to budget reviews with bulging pockets, into which he would reach periodically to pull out a chunk or strip of plastic that illustrated some characteristic he was in a fever to explore.

He was inquisitive beyond measure, and his curiosity led him up unlikely paths that often yielded astonishing rewards. The discovery of Lexan was one of them, and its story has become a legend at GE.

Lexan was created shortly after Dan joined the company in 1953 after earning an M.S. and Ph.D. at the University of Oklahoma. Scientists at the GE Research and Development lab were tantalizingly close to developing a better thin film insulating material for wire, but every material that served the purpose deteriorated when exposed to water. Dan recalled a substance called guaiacol carbonate that had frustrated him in graduate school precisely because of its resistance to being broken down by boiling water. When he mixed it with other ingredients as a possible solution to the wire coating problem, he got what he called a "glob" of material so hard he couldn't remove his stirring rod from it. By then the wire coating problem had been solved by other means, and the curious glob was kept around the lab like

an inanimate mascot, occasionally used to drive nails, sometimes thrown down stairwells in futile attempts to make it break, until its unique properties began to provoke increasing curiosity, and then excitement. The world's best-selling high-performance engineered plastic had been born, and within a few years it had begun to appear in computer housings, automobile bumpers, baby bottles, football helmets, and countless thousands of other applications. But by then Dan was three or four plastics down the road, pausing only long enough to get, as he put it, "a big kick", when astronauts wearing "fishbowls" of his Lexan landed on the moon in 1969. In a world full of people who come out for a third or fourth bow, he was ever impatient to get on with the next act.

During Dan's thirty-six years with GE Plastics, he compiled an astonishing record of inventions, achievements, and honors. His forty-fifth patent was filed a month before his death. The plastics that he invented, coinvented, or helped perfect include, besides Lexan, Noryl, the commercial version of a polyether polymer; polybutylene terephthalate, commercialized as Velox resin; Alkanex wire enamel; and several others. His other work focused on polymerization processes, and he wrote the first book on polycarbonates in 1962, one of the earliest of his twenty major technical publications.

Dan was inducted into the Society of Plastics Industry Hall of Fame in 1976, and became its youngest living member. He was inducted into the National Academy of Engineering in 1984, and in 1987 he was presented with the Midgely Award by the American Chemical Society for outstanding chemical research relating to the automotive industry. Around GE he is commonly referred to as the "Father of Lexan," but he was, in fact, the scientific father of the entire business, which is now number one in the world. His genius, centered in polycarbonates, included most areas of polymer chemistry.

I have many fond personal memories of Dan—decades worth—but some of the best were in the 1960s, whenever we could drag him out of his laboratory and experience

the warmth, the humor, and the graciousness of the man and visit with him and his wonderful wife Joyce, who never got to see enough of him. Their home was the gathering place for young engineers and scientists, always gaily decorated at Christmas, filled with terrific food, and the scene of many long and pleasant evenings. It was a treat for us to be in his company, as if in doing so we might absorb some of his brilliance.

Dan wasn't the world's greatest manager. He was shy. He never had a bad word for anybody, certainly couldn't fire anyone, and was bored with the paperwork that went with management; but he was as aggressive and confident in the lab as he was unassuming and diffident outside it. His great personnel talent was in the hiring and professional cultivation of scientists. Scores of us proudly call ourselves graduates of "Fox U."

Glen Hiner, who runs our plastics business, tells of visiting Dan a day or two before his death. Punctuating his customary harangue about technical issues and challenges, and how they should be dealt with, were frequent prideful references to his newborn grandson, a picture of whom he kept on a table next to his bed, where he could see it. His affection for the boy knew no bounds, and it was so typical of him that, at a time when most men would stop to reflect on the past, on a lifetime of achievement, in his grandson he was looking toward, and loving, the future.

On February 15, 1989, my old friend and mentor, Dan Fox, passed on. This nearly perfect man, ever in search of the perfect plastic, finally found a perfect rest.

He will never be forgotten at GE.

