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book review

The Perpetual Enterprise Machine: Seven Keys to Corporate Renewal Through Successful Product and Process Development
H. Kent Bowen, Kim B. Clark, Charles A. Holloway, and Steven C. Wheelwright, editors
Oxford Business Press, ©1994
442 pp.
$27.50

The Perpetual Enterprise Machine is not the usual cliche-ridden soporific fare. While the writing is often pedantic, especially in the first half, the book is filled with real-world success and failure stories of US manufacturing firms and the lessons to be drawn from them.

The book is based on the findings of The Manufacturing Vision Group—whose members are from Chaparral Steel, DEC, Eastman Kodak, Ford, and Hewlett-Packard and from Harvard, MIT, Purdue, and Stanford. The group argues that the successful manufacturer will be the one that can initiate successful projects, leading to new products and processes. "The future of the corporation rests on the ability of [empowered] individuals to create and champion new products and processes that may grow into a whole new business." Some of the 20 projects analyzed, four from each of the five companies, are Kodak's single-use Funsaver camera, Ford's 1991 Crown Victoria, Chaparral Steel's first-in-the-world horizontal steel caster, and H-P's smashingly successful Deskjet printer.

Among common elements of successful projects were using a company's core capabilities across functions and disciplines, sharing a guiding vision among project team members, pushing the performance envelope to deal with the competitive environment, navigating the uncertainties of business, developing a sense of ownership and commitment around the project, consciously using prototyping to speed learning and reduce mistakes, and going against the old corporate "walls-and moats" culture so that the whole company could learn from the team's positive experience.

Chapter 2, on the recently popular "core competence of the corporation" concept, says new product development projects are learning experiences on two fronts: renewing existing or creating new capabilities but also revealing core rigidities or vulnerabilities. One case: Hewlett-Packard's development of the HP150 computer/terminal revealed a managerial systems weakness—the company was not strong enough in interdivisional cooperation. Another case: DEC learned from the Decstation 3100 development project that lower status for nondominant disciplines slowed critical learning. When manufacturing engineers always went to design sites, but design engineers rarely went to the factory floor, this reinforced the lower status of the manufacturing engineers and slowed learning. When design engineers learned what manufacturing engineers were up against, development projects went much faster, in part because of greater equality and respect among team members.

Frederick Mason

Robot Evolution: The Development of Anthrobotics
Mark E. Rosheim, editor
John Wiley & Sons Inc., ©1994
440 pp.
$39.95

This lavishly illustrated history of robotics technology—particularly mechanical men, arms, joints, and hands—is fascinating. Mark Rosheim, author of *Robot Wrist Actuators* and holder of 14 robot design patents, reviews the history of robots with delight and technical sophistication. His main interest is anthrobotics, the study of robots that have a human form, sometimes called androids.

He briefly covers the contributions of the Greeks and Arabs, the ancient Chinese and Japanese, Leonardo da Vinci, and Nikola Tesla's robot boat. He treats with insight how the interrelations among available mechanical and electronic technologies gave rise to the machines and robot technology of each period. The book details the design principles behind the range of robot arms, wrists, hands, legs, and other subsystems found in robots since the 1950s. A wealth of examples are given on what worked and what did not and why, making the book interesting for the general reader as well as the specialist.

Rosheim evaluates the kinematics of robotic components by comparing them to the anatomy and movements of the human body. The enabling roles of computers, controller technology, artificial intelligence, vision systems, sensor technology, and related topics are also covered. Technically sophisticated robots built for the US space program get lots of attention.

Manufacturing applications of robots are not treated extensively. Readers might want to know why the earlier promise of robots in factories was not fulfilled. Rosheim does criticize the detachment of university researchers from industry and its needs, but he does not examine why the robot industry in the US succeeded in only a few manufacturing applications.

Frederick Mason