About the authors

Dell K Allen *is presently the Director of the Computer-Aided Manufacturing Software Research Center and Professor of Manufacturing Technology at Brigham Young University. He obtained degrees in engineering and education from Utah State University and Brigham Young University. He has also taken graduate course work in Metallurgical Engineering at Illinois Institute of Technology. Dr Allen has been with Boeing Commercial Airplane Company as a Research Engineer engaged in classification and group technology (1977); at Lawrence Livermore Laboratory as a Mechanical Engineer doing metrology and precision machining (1975); with EIMCO Corporation as Process Engineer, Tool Engineer and N/C Programmer (1954–1960); and with Hill Air Force Base as Aircraft Draftsman (1953). He has many publications which cover the broad range of computer-aided manufacturing, standards, databases, adaptive process control, material and process selection, group technology, and instructional systems.*

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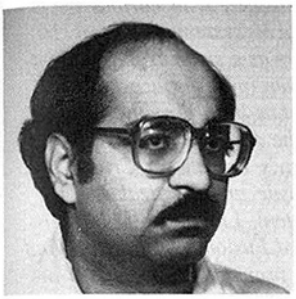
Clive L Dym *is Professor of Civil Engineering and Adjunct Professor of Computer and Information Sciences at the University of Massachusetts, Amherst, where he has also been Head of the Department of Civil Engineering (1977–1985). He was a Senior Scientist at Bolt Beranek and Newman in Cambridge MA (1974–1977), and served on the faculties of SUNY Buffalo (1966–1969) and Carnegie-Mellon University (1970–1974). He has held visiting appointments at the Technion–Israel Institute of Technology (1971), the Institute for Sound and Vibration Research at the University of Southampton (1973), and Stanford and the Xerox Palo Alto Research Center (1983–84). Dr. Dym completed undergraduate work at the Cooper Union (1962), received an MS from the Polytechnic Institute of Brooklyn (1964) and a PhD from Stanford University (1967). Dr. Dym has done research on a variety of problems in applied mechanics and acoustics. Recently his research activities have focused on the development of expert (knowledge-based) systems for engineering analysis and design. Dr. Dym's research results have been published in some 60 journal articles and in seven books. He was the recipient of the 1980 Walter L Huber Research Prize of the ASCE and the Western Electric Fund Award of the New England Section of the ASEE (1983). He is on the Editorial Board of the* Journal of Sound and Vibration, *has been an Associate Editor of the* Journal of the Acoustical Society of America, *and will be (founding) Editor-in-Chief of a new journal,* Artificial Intelligence for Engineering Design, Analysis and Manufacturing, *which will be published by Academic Press.*

Philip H Francis *is the Director of the Flexible Inspection and Assembly Laboratory at the Industrial Technology Institute in Ann Arbor MI. Prior to joining ITI in 1984, he was Professor and Chairman of the Mechanical and Aerospace Engineering Department at the Illinois Institute of Technology for five years, following a 14 year association with the Southwest Research Institute. He has written more than 50 published papers, and has authored or edited three books, in a wide range of subjects from impact of solids, fracture and fatigue,*

composite materials, and, for the past five years, computer integrated manufacturing automation. A former Technical Editor of AMR, he directs ASME's new initiative, the Manufacturing Science and Technology Program. Dr. Francis holds a PhD in applied mechanics from the University of Iowa, and an MBA from St. Mary's University. He is a Fellow of the ASME.



Mukesh V Gandhi *received his PhD in applied mechanics from the University of Michigan in 1984. Dr. Gandhi has over seven years of experience as a consultant, educator, and systems designer. In his present position as a Senior Research Associate in ITI's Flexible Machining Laboratory, Dr. Gandhi is primarily responsible for developing innovative flexible fixturing technologies for computer-integrated manufacturing systems. In addition, he is involved in the development of a new generation of computer-based, high-speed robotic systems. Some of his major past accomplishments include: the development of a CAD/CAM laboratory; the development of software packages for stress analysis based on finite element methods, computer graphics and digitizing techniques; the development of composite-based, high-speed mechanical systems. In addition to his systems design and consulting work, Dr. Gandhi has taught mechanics of materials, dynamics, and computer-aided design courses to mechanical engineering students. He also is the author or co-author of over twenty technical publications.*

Yoram Koren *received his DSc (1970), MSc (1968), and BSc (1965) in electrical engineering from Technion–Israel Institute of Technology. Presently, he is a consultant at ITI's Flexible Inspection and Assembly Laboratory. Dr. Koren has 20 years of research, teaching, and consulting experience in the automated manufacturing field. His research experience includes industrial robot design, construction, and guidance; optimization and simulation of a manufacturing cell; and adaptive control systems for machine tools. He has served as a consultant for numerous American and foreign companies. As a consultant, he has introduced robots to firms, developed software, researched adaptive control of machine tools, and developed NC controllers and alarm systems. The author or co-author of more than 70 technical reports and papers, Dr. Koren has also published a textbook and two reference books in the automated manufacturing field.*

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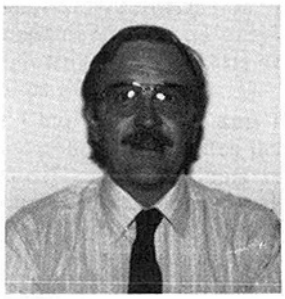
Paul G Ranky *gained an MS degree in Mechanical and Production Engineering and an MS degree in Engineering Education at The Technical University of Budapest in 1974. He spent over two years with United Nation's UNDP–SZAMOK program as a senior lecturer and researcher, developing CAD and CAI programs and videotapes for educating computer sciences for engineers and data processing students. As a result of winning a national engineering award he was invited to take part in the project team of the first FMS development at Csepel Machine Tool Company in 1976. While working as a senior research engineer there, he gained his PhD by research in the field of FMS at the Technical University of Budapest in 1980. Between 1980 and 1985 he was visiting Senior Lecturer at Trent Polytechnic, Nottingham, UK, where he was involved in setting up labs and NC, FMS, and robotics courses for undergraduate and graduate students, as well as doing research in flexible assembly and inspection systems and CAD/CAM. Since 1985 he has been a Visiting Associate Professor at the University of Michigan and ITI, conducting robotics, FMS, and CIM courses for undergraduate and graduate courses and performing research in various software and mechanical hardware design and simulation aspects of FMS and CIM systems. He has published over 60 technical articles in the field of CAD/CAM, FMS, robotics, and CIM, and three books:* Design and Operation of FMS *(1983),* Robot Modelling, Control and Applications with Software *(co-author C Y Ho) (1985), and* Computer Integrated Manufacturing, An Introduction with Case Studies *(1985).*



Henry W Stoll, *PhD, PE, is manager of Design for Manufacture at the Industrial Technology Institute, Ann Arbor, Michigan. He was formerly Professor of Mechanical Engineering at the University of Wisconsin–Platteville and has over 20 years of experience in design education and the design and development of mechanical systems. He received his PhD from the University of Illinois, Urbana-Champaign, for work in mechanical design. Dr. Stoll has written many papers and reports and has served as a consultant for the Jet Propulsion Laboratory, NASA-Marshall Space Flight Center, Deere and Co, and many others. He has also worked for Xerox Corp, The Boeing Co, the Naval Ship Engineering Center and has taught a variety of courses at several universities.*

Brian S Thompson *received his PhD in mechanical engineering from the University of Dundee, Scotland, in 1976, and his MSc and BSc in mechanical engineering from the University of Newcastle-upon-Tyne, UK, in 1973 and 1972, respectively. Dr. Thompson has over ten years of experience as a researcher, design engineer, educator and consultant. In his present position as a*

Senior Research Associate in ITI's Flexible Machining Laboratory, Dr. Thompson is developing innovative flexible fixturing technologies for flexible manufacturing systems. This work involves a combination of theoretical, computational and experimental investigations and includes integrating design, manufacturing and computer engineering methodologies. He has also begun work on developing a new generation of high-speed composite-based robotic systems. In addition to teaching numerous mechanical engineering courses at both the graduate and undergraduate level, Dr. Thompson has been the recipient of thirteen research grants, including funding from the National Science Foundation for work on the analysis of high-speed machinery and robots fabricated in composite materials. Dr. Thompson is also the author or co-author of over 80 technical publications and has served as program chairman and editorial advisor to several professional societies. As a design engineer, Dr. Thompson worked on testing solar-array drive systems, modeling the deployment of large antenna structures from spacecraft, designing the fin actuators for a sounding rocket, and also engineering the pallet payload bearings for the NASA space shuttle.

W Van Twelves *has worked extensively with various CAD / CAM systems for some 10 years as a structural design engineer in aerospace industry. He has been directly involved in the development of the Navy's Tomahawk Cruize Missile and Vertical Launch System, Livermore Lab's Mirrored Fusion Test Facility, and has provided CAD system instruction to practicing engineers. He is currently an assistant professor at Brigham Young University and an active research associate in the school's CAM Software Research Center.*