

CRISPIN HALES, PhD, CEng, FIMechE.

EDUCATION

❖ BE	Mechanical Engineering	Canterbury University (NZ)	1970
❖ MTech	Engineering Design	Loughborough University (UK)	1975
❖ PhD	Engineering Design	Cambridge University (UK)	1987

PROFESSIONAL CERTIFICATION

- ❖ Registered Chartered Engineer (United Kingdom), since 1979.

PROFESSIONAL SOCIETIES

- ❖ Institution of Mechanical Engineers (UK): Fellow since 1997; Member since 1979.
- ❖ American Society of Mechanical Engineers: Fellow since 2002; Member since 1979:
ASME Awards:
 - *Robert E. Abbott Service Award*, Design Engineering Division 2002.
 - *Meritorious Service to the Profession Award*, Chicago Section 2003.ASME Service:
 - Design Engineering Division (DED) Chair, 1999-2000.
 - DED Vice-Chair/Treasurer, 1998-1999.
 - DED Executive Committee 1995-2001.
 - DED Advisory Committee, 2000-2006.
 - DED Honors and Awards Committees, 2003 - 2015.
 - Design Theory & Methodology Committee, Chair 1992-1994.
- ❖ Design Society (International): Member since 2000; Advisory Board 2000-2003.
- ❖ ASM International: Member since 1980.
- ❖ Institution of Engineering Designers (UK): *2013 Hills Millennium Award*.

CONTINUING EDUCATION

1. *Pressure Vessel Design and Analysis*. Four-day course at Center for Professional Advancement, East Brunswick, New Jersey, USA, September 1978.
2. *Symposium on Valves for Coal Conversion and Utilization*. Three-day seminar at Morgantown Energy Technology Center – U.S. Dept. of Energy, October 1980.
3. *PVE 5 Pressure Vessel Training Course with FDA5 for Flange Design to ASME VIII Division 1 and BS 5500*. One-day course at Whessoe Technical & Computing Systems Limited, Darlington, UK, October 1983.
4. *Fusion Welded Steel Pressure Vessels*, Lloyd's Register of Shipping, 50th Anniversary International Conference, Institution of Mechanical Engineers, London, UK, May 1984.
5. *The Effects of Fabrication Related Stresses on Product Manufacture and Performance*. Two-day international conference in Cambridge, UK, September 1985.
6. *Technology Executives Conference*. Two-day training for Division Officers, ASME International, Dallas, Texas, USA, March 1995.
7. *Technology Executives Conference*. Two-day training for Division Officers, ASME International, Chicago, Illinois, USA, March 1996.
8. *Congress of Divisions and Technology Executive Conference*. Three-day training for Division Officers, ASME International, Washington, D.C., USA, March 1999.

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9. *ASME Public Affairs Leadership Conference*. Two-day training conference and Congressional meetings, ASME International, Washington, D.C., USA, September 1999.
10. *Indo-US Workshop on Design Engineering*. Three-day Carnegie Mellon University / Indo-US Science and Technology Forum, Bangalore, India, January 2006.
11. *Engineers Without Borders*. ASME Technical Meeting, Chicago, USA, February 2006.
12. *Excel for Engineers 102*. ASME Professional Development, Chicago, February 2007.
13. *SolidWorks 3D Seminar*. ASME Professional Development, Chicago, February 2007.
14. *Laser Welding and Machining*. ASM Technical Meeting, Chicago, January 2008.
15. *Corrosion Failure of Materials*. ASM Technical Meeting, Chicago, March 2008.
16. *Failure Analysis*. ASM Technical Meeting, Chicago, March 2009.
17. *Cam Design*. ASME Technical Meeting and Plant Tour, Chicago, February 2010.
18. *Ceramic Bearings*. ASM Technical Meeting, Chicago, May 2010.
19. *Alloy Design and Processing Challenges for Advanced Power Systems*. ASM Technical Meeting, Chicago, March 2012.
20. *NZ Pressure Equipment Workshop*, Institution of Professional Engineers (IPENZ), Auckland, New Zealand, October 2014.
21. *Product Development Symposium*, Technical University of Denmark, Lyngby, Copenhagen, Denmark, September 2016.
22. *New Zealand Manufacturing and Design Conference: MaD for the Future 2017*, Auckland, New Zealand, May 2017.

EMPLOYMENT

1. Employer: Hales & Gooch Ltd., Illinois, USA.
Business: Consultants in Engineering Design and Large Loss Investigations
Position: President and Principal Engineer
Duration: 18 years, November 2004 - Present
Experience: Consulting in engineering design, forensic investigations, failure analysis, and mechanical systems. Over 160 investigations of major mechanical equipment, boiler and pressure vessel failures including expert reports, depositions and trial testimony. Analysis of engineering designs and underlying design process issues. Seminar presentations on engineering design and failure analysis. Research and education in engineering design.
2. Employer: Triodyne Inc., Northbrook, Illinois, USA.
Business: Consulting Engineers and Scientists
Position: Principal Mechanical Engineer
Duration: 16 years, August 1989 – December 2005
Experience: Consulting in forensic engineering, failure analysis, engineering design, and mechanical systems. Over 400 investigations of major boiler, pressure vessel, mechanical equipment and vehicle accidents/failures, including expert reports, depositions and trial testimony. Seminar presentations on failure analysis, engineering design and vehicle accident prevention.

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3. Employer: IIT Research Institute, Chicago, Illinois, USA.
 Business: Manufacturing Technology
 Position: Engineering Design Consultant
 Duration: 1988-1989
 Experience: Design and development of mechanical and pressurized systems including evaluation of gear set designs; design / modification of high-pressure, high-temperature vessels and high-vacuum seals for steel strip processing.
4. Employer: University of Cambridge, England, UK. - Engineering Department
 Position: Senior Research Associate
 Duration: 1987-1989
 Experience: Engineering design research, teaching and industrial training. Teaching engineering design courses at undergraduate and postgraduate levels. Supervision of doctoral research students in the design and manufacturing field. Training of engineering graduates with industry partners. Initiation of an International Network of Engineering Design Researchers.
5. Employer: University of Cambridge/British Gas, England, UK. - Joint Venture
 Position: Senior Research Engineer
 Duration: 1982-1987
 Experience: Doctoral engineering design research program on national gas utility project. Design of high-pressure, high-temperature materials testing equipment and ancillaries. Teaching undergraduate and postgraduate engineering design courses. Student project supervision and assessments.
6. Employer: IIT Research Institute, Chicago, Illinois - Materials Technology Division
 Business: Contract research in materials development, testing and applications
 Positions: Manager, Mechanical Systems and Design; Senior Engineer/Research Engineer/Associate Engineer
 Duration: 1976-1982
 Experience: Design and development of numerous high-pressure, high-temperature systems used for materials testing and evaluation, including a \$3 million refractory testing facility for U.S. Department of Energy, and a multi-specimen creep test facility for NASA. Construction and operation of high-pressure vessels with complex internals, high-pressure control systems and ancillary equipment. Design of a wide variety of mechanical equipment, including vehicle components.
7. Employer: L. Kahn Manufacturing Co. Ltd., London, UK.
 Business: Plastic components and applicators for the cosmetics industry.
 Position: Design Engineer
 Duration: 1974-1976
 Experience: Design and development of equipment to manufacture cosmetic applicators and mascara brushes. Manufacture and assembly of complex mechanical systems and automatic machines with multiple workstations.
8. Employer: Chrysler (UK) Ltd., Dunstable, UK.
 Business: Automobile/truck manufacturer
 Position: Contract Mechanical Engineer
 Duration: 1973-1974
 Experience: Layout design and contract specifications for mechanical services to exhaust emission test facilities in 3 U.K. automobile manufacturing plants.

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9. Employer: Trans Africa Expeditions Ltd., London, UK.
Business: Long haul journeys across African Continent
Position: Expedition leader and driver
Duration: 1972-1973
Experience: Overland expedition from South Africa to Kenya through six countries. Four 8,000-mile overland expeditions between Kenya and Morocco through ten countries. Modification design and repair of Land Rover vehicles. Design assessment for off-road and rough track vehicles.
10. Employer: Dorman Long Swan Hunter Ltd., Cape Town, South Africa
Business: Engineering and shipbuilding
Position: Mechanical Draftsman
Duration: 1971-1972
Experience: Metrication of detail drawings for South African Railways. Redesign of casing for large industrial gearbox.
11. Employer: N.Z. Forest Products, Ltd., Kinleith, New Zealand
Business: Pulp and paper
Position: Assistant Engineer
Duration: 1970-1971
Experience: Investigative projects concerning design, maintenance and failure of plant equipment involving all aspects of pulp and paper manufacture. Redesign, installation and commissioning of steam/air heat exchangers for paper machine felt dryers. Survey of fuel oil piping system for plant boilers.
12. Employer: Andrews and Beaven Ltd., Christchurch, New Zealand
Business: Transmissions and gearing product manufacture
Position: Assistant Engineer
Duration: Summer 1969
Experience: Detail design and testing of pillow block bearing assemblies and worm reduction gearboxes. Calculation of gearbox overhung load capabilities.
13. Employer: McKechnie Bros. Ltd., New Plymouth, New Zealand
Business: Non-ferrous extrusions
Position: Laboratory Assistant
Duration: Summer 1967
Experience: Quality control and alloy composition analysis for metal extrusion production processes.
14. Employer: Swanson Engineering Co., New Plymouth, New Zealand
Position: Boilermaking and Steel Rigger Assistant
Duration: Summers, 1964, 1965, 1968
Experience: Manufacture and erection of steel components for buildings and structures; repair of industrial and marine mechanical equipment.
15. Employer: Kibby's Metal Pressing, New Plymouth, New Zealand
Position: Metal stamping press operator
Duration: Summer, 1963
Experience: Manufacture of steel components for lawn edger product.

UNIVERSITY TEACHING & RESEARCH

- **University of Cambridge**, England, United Kingdom. Four years teaching, 1985-1989.
 1. *Advanced Course in Design, Manufacture and Management*: post-graduate students. Six-lecture course on engineering design process presented each year in conjunction with team projects in industry (joint course with Lancaster University).
 2. *Production Engineering Tripos*: final-year undergraduate students. Four-week course on engineering design process each year, with supervision of group design projects.
 3. *Engineering Tripos*: first-year undergraduate students. Supervision of first-year students on engineering drawing courses.
- **Texas A&M University**, College Station, TX, USA – 1987 (by invitation).
Four lectures on engineering design process - undergraduate engineering design course.
- **University of Canterbury**, Christchurch, New Zealand – 1990 (secondment from Triodyne).
Six-week course of lectures on engineering design process and supervision of final-year undergraduate conceptual design projects.
- **Illinois Institute of Technology**, Chicago, IL, USA – 1991 (by invitation).
Eight-lecture course in engineering design to senior mechanical engineering class.
- **University of Queensland**, Brisbane, Australia – 1991 (by appointment).
External examiner of doctoral dissertation submitted by candidate for Ph.D. in Engineering Design. Formal review of proposals for university research projects.
- **University of Canterbury**, Christchurch, New Zealand – 1997-1999 (by appointment).
Research advisor and external examiner for Master's Degree candidate.
- **University of Canterbury**, Christchurch, New Zealand – 2000 (Erskine Fellowship).
Nine-week Visiting Erskine Fellowship to provide the Mechanical Engineering Department with updated undergraduate teaching and project supervision in engineering design.
- **University of Canterbury**, Christchurch, New Zealand – March 2001 (by invitation).
Two lectures presented as part of undergraduate engineering design course.
- **Massey University**, Palmerston North, New Zealand – July 2003 (by appointment).
External examiner of doctoral candidate for Ph.D. in field of Industrial Design.
- **Wellington Institute of Technology**, Petone, New Zealand – December 2005.
Consultation on development of new Product Design Engineering Programme and use of *Managing Engineering Design* as a course textbook.
- **University of Bath**, Bath, UK – March 2009 (by appointment).
External examiner for PhD candidate in field of Design-Induced Error.
- **Northwestern University**, Evanston, IL, USA – 2007 through 2023 (by invitation).
Bi-annual “*Design for Safety*” lectures for Senior Design class in mechanical engineering.
Member of design review team for multi-disciplinary student projects 2012 through 2023.
- **Lectures on doctoral research presented at the following universities:**
 - USA:** University of West Virginia (CERC)
 - Germany:** Technical University of Berlin; Technischen Hochschule Darmstadt
 - UK:** University of Cambridge
 - Australia:** University of Melbourne
 - New Zealand:** University of Canterbury; University of Auckland

PROFESSIONAL PRESENTATIONS

1. *Engineering Design Process*. Six-lecture in-house course for printing machine design engineers, APV-Baker/Cambridge University, Peterborough, England, UK, 1988.
2. *Engineering Design Consulting in the USA*. One-day seminar to over 100 professional engineers from industry and universities. Konservis, Prague, Czechoslovakia, 1991.
3. *Commercial Vehicle Preventable Accident Manual*. Publicity booth. Society of Automotive Engineers Truck and Bus Exposition, Rosemont, IL, USA, November 1991.
4. *Role of Forensic Engineering*. Presentation of Loss-Control Seminar session. Zurich-American Insurance Company, Schaumburg, IL, USA, November 1991.
5. *Role of Forensic Engineering in Accident Investigations*. One-day seminar. CPD Investigative Services, Decatur, IL, USA, January 1992.
6. *Recent Developments in Design Theory and Methodology*. Seminar session. American Society of Mechanical Engineers, Design Conference, Chicago, USA, February 1992.
7. *Commercial Vehicle Preventable Accident Manual*. Presentation of seminar session. American Trucking Associations, Baltimore, USA, April 1992.
8. *Vehicle Accident Investigations*. Presentation of one-day seminar with Dror Kopernik. Nationwide Insurance Company, Canton, Ohio, USA, May 1992.
9. *Conducting Business Effectively in the U. K.* Cross-cultural training seminar sessions for engineering managers transferred to the UK, Germany, or Luxembourg. Twelve seminar sessions 1992 - present. International Orientation Resources, Northbrook, IL, USA.
10. *Conducting Business Effectively in New Zealand and Australia*. Cross-cultural training seminar sessions for engineering managers transferred to New Zealand or South Pacific region. 1992 - present. International Orientation Resources, Northbrook, IL, USA.
11. *Commercial Vehicle Preventable Accident Manual*. Presentations at Region 5 Meeting. U.S. Dept. of Transportation - Federal Highway Administration - Office of Motor Carriers, Homewood, IL, USA, February 1993.
12. *"Train-the-Trainer" Accident Countermeasures Course*. U.S. Dept. Transportation, Federal Highway Administration, Office of Motor Carriers, Oklahoma City, OK, USA, July 1993.
13. *Driving Safety*. Seminar for company drivers based on *Commercial Vehicle Preventable Accident Manual*. Jolliff Transportation, Inc., Peoria, IL, USA, October 1993.
14. *Product Engineering and Product Liability Engineering Design*. Seminar for insurance managers and engineers. Liberty Mutual Insurance Co., Niles, IL, USA, November 1993.
15. *Product Liability and Engineering Design*. Keynote address, at 10th Joint Management Conference. Conveyor Equipment Manufacturers Association, Florida, USA, May 1994.
16. *Driving Safety*. Seminar for insurance underwriters on *Commercial Vehicle Preventable Accident Manual*. The Home Insurance Company, Chicago, IL, USA, June 1994.
17. *Forensic Engineering and Product Liability*. Seminar presented to 27 visiting specialists from the Institute of Product Testing and Education in Japan. Japan Consumer Information Center, Niles, IL, USA, October 1994.
18. *Managing Engineering Design*. Session MGT-2. ASME International Mechanical Engineering Congress and Exposition, Chicago, IL, USA, November 1994.

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19. *Strategies and Tips on Preventing Commercial Vehicle Accidents*. National Institute on Transportation Megaconf. II. American Bar Association, New Orleans, USA, March 1995.
20. *Accident Analysis Study and Countermeasures to Improve Traffic Safety*. Transportation Practice Group Seminar, American Law Firm Association, Atlanta, GA, USA, May 1995.
21. *Hazardous Materials Incident Prevention Manual*. Third Annual Industry Seminar. Trucking Industry Defense Association, Indianapolis, IN, USA, October 1995.
22. *The 3027 Dynamometer*. Midwest Dynamometer & Engineering Company, River Grove, IL, USA, January 1996.
23. *Training Video: Hazardous Materials Incident Prevention Manual*. U.S. Department of Transportation - Federal Highway Administration, Washington, D.C., USA, April 1996.
24. *A Lethal Pallet*. Organization of a safety seminar/field visit at Triodyne and presentation of session. American Contractors Insurance Group, Inc., Dallas, TX, USA, Sept. 1996.
25. *A Car, A Bicycle, Two Trucks and a Manual*. American Bar Association/TIPS - Commercial Transportation Litigation Committee Meeting, San Francisco, CA, USA, August 1997.
26. *Engineering Design in the USA - Looking Back and Looking Forward*. Keynote address at workshop on Future Issues in Design Research, Department of Trade and Industry and EPSRC, Bath, UK, February 1999.
27. *Forensic Analysis of the Engineering Design Process*. Department of Mechanical Engineering, University of Canterbury, New Zealand, March 2000.
28. *Why Follow, When You Can Lead - Adding Value to the New Zealand Genius*, Mechanical Engineering Dept., University of Canterbury, New Zealand, March, 2000.
29. *Adding Value to the New Zealand Genius*, Engineering Management Programme, University of Canterbury, New Zealand, March, 2000
30. *Boiler Feedwater Pipe Failure by Flow-Assisted Chelant Corrosion*. Crispin Hales, Kelly J. Stevens, Phillip L. Daniel, Mehrooz Zamanzadeh and Albert D. Owens. Presented at 69th General Meeting, National Board of Boiler and Pressure Vessel Inspectors and the ASME International Main Committee, Toronto, Canada, May 2000.
31. *Design Disasters and the Need To Do Better*. Presentation at Workshop on the Role of Empirical Studies in Understanding and Supporting Engineering Design, National Institute of Standards and Technology (NIST), Gaithersburg, USA, April, 2002.
32. *Some Issues for Future Design Research*. Presentation at meeting of Interagency Government Working Group on Engineering Design, National Institute of Standards and Technology (NIST), Gaithersburg, USA, July, 2002.
33. *The Design Society and Some Development Issues*. Presentation to Board of Management/Advisory Board of the Design Society, Rigi, Switzerland, March 2003.
34. *Respect Design or Expect Disaster!* Keynote address at the International Conference on Engineering Design, ICED 03, Stockholm, Sweden, August 2003.
35. *Respect Design or Expect Disaster!* Presentation to engineering students (adapted from ICED 03 keynote) at Carnegie Mellon University, Pittsburgh, PA, USA, October 2003.
36. *Defective Design Process: Precursor to Disaster!* Presentation to joint meeting of ASME Chicago Section/Design Engineering Division, Chicago, USA, February 2004.

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37. *Acting as a Non-Disclosed Expert: Moving the Goalposts*. Seminar presentation at 13th SEAK National Expert Witness Conference, Hyannis, MA, USA, June 2004.
38. *Ten Critical Factors in the Design Process*. Seminar presentation at University of Illinois, Chicago, IL, USA, October 2004.
39. *Adding Value to Design Research*. Presentation at Engineering Design Centre, Spring 05 Conference, University of Cambridge, UK, April 2005.
40. *The 1999 Ford Power Plant Explosion: Explosion and Loss Issues*. Kim Mniszewski, Crispin Hales and Hal Lyson. NFPA National Conference, Las Vegas, USA, June 2005.
41. *Ten Tips for Better Design from Forensic Experience*. Keynote address at the International Conference on Engineering Design, ICED 05, Melbourne, Australia, August 2005.
42. *Design Quality and Global Teams: Risks and Challenges*. Presentation at Indo-US Workshop on Design Engineering, Bangalore, India, January 2006.
43. *Archiving Engineering Case Files for Future Reference*. Presentation at NIST Workshop on Long Term Knowledge Retention: Archival and Representation Standards, National Institute of Standards and Technology, Gaithersburg, MD, USA, March 2006.
44. *Industrial Design without Engineering Design: "Cheap, Plastic and Broken"*. Presentation at ASM International Workshop for Industrial Designers, Chicago, IL, June 2006.
45. *Engineering Design Forensics*. Keynote talk at the ASME International Design Engineering Technical Conferences, Design Education Symposium, Philadelphia, USA, September 2006.
46. *Industrial Design without Engineering Design: "Cheap, Plastic and Broken"*. Invited lecture at University of Illinois Chicago, Chicago, IL, USA, January 2007.
47. *Designing Today Without Trouble Tomorrow*. Keynote address at the Design 2008 International Conference, Dubrovnik, Croatia, May 2008.
48. *Forensic Investigation in Engineering Design*. Seminar presentation at University of Bath, UK, March 2009.
49. *Forensic Investigation in Engineering Design*. Seminar presentation at University of Cambridge, UK, March 2009.
50. *Forensic Engineering Investigations*. Set of 4 seminar presentations in Christchurch, Wellington, New Plymouth and Auckland for the Institution of Professional Engineers (IPENZ), New Zealand, November 2009.
51. *Ten Tips for Better Design*. University of Auckland, New Zealand, September 2010.
52. *Strength, Stability & Safety in Engineering Design*. Seminar presentation at University of Auckland, New Zealand, September 2010.
53. *Engineering Design – Marvels & Mishaps!* Evening presentation for Jaguar Drivers' Club, Area 44, Northampton, UK, June 2012.
54. *Ten Tips for Better Design from Forensic Engineering Experience*. Seminar presentations for the Institution of Professional Engineers (IPENZ), in Wellington and New Plymouth, New Zealand, March 2014.
55. *Engineering Design – Marvels & Mishaps!* Evening presentation for Constructor's Car Club, Petone, New Zealand, March 2014.
56. *Pressure Vessel Projects*. Keynote presentation for the NZ Pressure Equipment Workshop, Institution of Professional Engineers (IPENZ), Auckland, New Zealand, October 2014.

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57. *Forensic Engineering – Design-Related Failures*, Product Development Symposium: Robust Design Day, Technical University of Denmark, Copenhagen, Denmark, September 2016.
58. *Why Follow, When You Can Lead? Adding Value to the New Zealand Genius*, Keynote presentation at NZ Manufacturing & Design Conference: MaD for the Future 2017, Auckland, New Zealand, May 2017.
59. *Specialty New Zealand – Kiwi Innovation & Engineering Design*, Keynote presentation at University of Waikato Engineering Design Show, Hamilton, New Zealand, October 2017.
60. *Pressure System Design Issues*. Keynote presentation (remotely via Microsoft Teams) for the NZ Pressure Equipment Conference, New Zealand Heavy Engineering Research Association (HERA), Auckland, New Zealand, November 2020.

BOOKS AND CHAPTERS OF BOOKS

1. *Development of a Laboratory Test Facility for High-Pressure Erosion/Corrosion Evaluation of Coal Conversion Structural Materials*. C. Hales, M.A.H. Howes and S. Bhattacharyya. The Properties and Performance of Materials in the Coal Gasification Environment, 1981. V.L. Hill and H.L. Black (eds). USA: American Society for Metals. **(ISBN 0-87170-112-X)**
2. Analysis of the Engineering Design Process in an Industrial Context. (Ph.D. Dissertation, Cambridge University). Crispin Hales. Eastleigh, UK: Gants Hill Publications, 1987. **(ISBN 0-9512912-0-3)**
3. *Analysis of an Engineering Design - The Space Shuttle Challenger*. Crispin Hales. Engineering Design and Manufacturing Management. Andrew E. Samuel (ed) Amsterdam: Elsevier Scientific Publishing Co., 1989. **(ISBN 0-444-88123-9)**
4. *Project proposals, project briefs and design specifications*. Crispin Hales. Chapter 31 in: Design Management, A Handbook of Issues and Methods. Basil Blackwell, UK, 1990. **(ISBN 0-631-15404-3)**
5. Analysis of the Engineering Design Process in an Industrial Context. (Second Edition) Crispin Hales. Winnetka, IL, USA: Gants Hill Publications, 1991. **(ISBN 0-9512912-2-X)**
6. **Managing Engineering Design**. Crispin Hales. Longman Scientific & Technical, UK (co-published by Wiley & Sons, Inc., USA), 1993. **(ISBN 0-582-03933-9)**
7. *Forensic Analysis of the Engineering Design Process*. Crispin Hales, Chapter in: Designers - The Key to Successful Product Development. Springer-Verlag, London, 1998. **(ISBN 1-852-33031-7)**
8. *Design Review for Failure Analysis and Prevention*. Crispin Hales and Cheryl Pattin, Chapter 1C in: Volume 11, ASM Handbook. ASM International, USA, 2002. **(ISBN 0-87170-704-7)**
9. **Managing Engineering Design (Second Edition)**. Crispin Hales and Shayne Gooch. Springer-Verlag (London), UK, 2004. **(ISBN 1-85233-803-2)**
10. *Adding Value to Design Research*. Chapter 9 in: Engineering Design Theory and Practice, A symposium in honour of Ken Wallace, (ed) John Clarkson and Mari Huhtala, Engineering Design Centre, University of Cambridge, UK, 2005. **(ISBN: 0-9545243-1-4)**

MANUALS

1. Commercial Vehicle Preventable Accident Manual, A Guide to Countermeasures. S. C. Uzgiris, C. Hales and M. A. Dilich, under contract to FHWA, DOT, Washington, D.C., Published by Triodyne Inc., Niles, IL, 1991. (ISBN 0-9633957-0-X)
2. Program Manager's Guide to Transportation Planning. Under contract to U.S. Department of Energy, Office of Environmental Restoration and Waste Management Office of Special Programs, Washington, D.C., November, 1993. (DOE Internal Document)
3. The Professional Driver's Preventable Accident Manual. Carl Uzgiris, Crispin Hales and Michael Dilich. Triodyne Inc., Niles, IL 60714, 1994. (ISBN 0-9633957-1-8)
4. Hazardous Materials Incident Prevention Manual. Crispin Hales, John Goebelbecker and Kenneth d'Entremont. Triodyne Inc., Niles, IL 60714, 1995. (ISBN 0-9633957-4-2)
5. Commercial Vehicle Preventable Accident Manual, A Guide to Countermeasures. Carl Uzgiris, Crispin Hales, Michael Dilich. Third Edition. Edited by Ken d'Entremont. Triodyne, Inc., Niles, IL 60714, 1997. (ISBN 0-9633957-5-0)

TECHNICAL PAPERS

1. *Erosion-Corrosion of Materials in Coal Conversion Systems*. S. Bhattacharyya, D. Yates and C. Hales. Fall Meeting Proceedings, The Metallurgical Society of AIME, 1977.
2. *Design of Slagging Gasifier Refractory Lining Test Unit*. R.F. Firestone, C. Hales and M.J. Greaves. 81st Annual Meeting Proceedings, The American Ceramic Society, 1980.
3. *Refractory Test Facility*. C. Hales and R.F. Firestone. Materials for Coal Conversion and Utilization. Proceedings of Sixth Annual Conference, U.S. Department of Energy, EPRI, GRI and National Bureau of Standards, USA, 1981.
4. *Design, Engineering and Evaluation of Refractory Liners for Slagging Gasifiers*. B. J. deTineo, G. Booth, R. F. Firestone, M. J. Greaves, C. Hales, J. P. Lamoureux, R. R. Ledford. Materials for Coal Conversion and Utilization. Proceedings of Seventh Annual Conference. U.S. Department of Energy, 1982.
5. *Design and Operation of High-Pressure Multiphase Test Loop for Evaluation of Internal Corrosion in Offshore Pipelines*. C. Hales and S. Bhattacharyya. Journal of Pipelines, No. 3. B.V. Amsterdam: Elsevier Science Publishers, 1983.
6. A Material Optimization Selection Technology for Minimizing the Cost of Products. Maurice A. H. Howes and Crispin Hales. Chicago: IIT Research Institute, 1982.
7. *The Application and Evaluation of Formal Engineering Design Methods*. K.M. Wallace & C. Hales. WDK 10, Computer-Aided Design and Design Methods, Hubka & Andreasen (Eds). Proc. ICED 83 Intl. Conf. on Eng. Design, pp.518-535. Zurich: Heurista, 1983.
8. *Engineering Design Research at Cambridge*. C. Hales. Engineering Design Education. London: The Design Council, Summer 1984.
9. *Designer as Chameleon*. Crispin Hales. Design Studies, Vol. 6, No 2. UK: Butterworth & Co. (Publishers) Ltd., April 1985.
10. *Possible Future Trends in Engineering Design Research*. K.M. Wallace and C. Hales. WDK 12, Theory and Practice of Engineering Design in International Comparison, Hubka (Ed). Proc. ICED 85 Intl. Conf. on Eng. Design, pp. 899-909. Zurich: Heurista, 1985.

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11. *High-Pressure Creep Tests*. C. Hales, S. Bhattacharyya and J. Lamoureux. Journal of Metals, Vol. 38 No. 7, pp. 35-38, July 1986.
12. *Analyzing the Engineering Design Process in Industry*. Crispin Hales. Proc. IPENZ Annual Conference, Engineering Technology Past and Present. Vol. II, pp 403-415. Wellington, New Zealand: Institution of Professional Engineers NZ, 1987.
13. *Some Applications of a Systematic Design Approach in Britain*. K.M. Wallace and C. Hales. Konstruktion, 39, H.7, pp. 275-279. Berlin: Springer-Verlag, July 1987.
14. *Detailed Analysis of an Engineering Design Project*. K.M. Wallace and C. Hales. WDK 13: Proc. ICED 87 Intl. Conf. on Eng. Design, pp. 94-101. New York: ASME, 1987.
15. *Detailed Analysis of an Engineering Design Project*. C. Hales and K.M. Wallace. International Journal of Applied Education. Vol. 4, No. 3, Pergamon Journals Ltd., 1988.
16. *Analysis of an Engineering Design - The Space Shuttle Challenger*. Crispin Hales. International Workshop on Engineering Design and Manufacturing Management, Melbourne, Australia: University of Melbourne, 1988.
17. *Engineering Design Research Areas*. K.M. Wallace and C. Hales. WDK 18: Proc. ICED 89 Intl. Conf. on Eng. Design, pp. 555-562. London: Institution of Mechanical Engineers, 1989.
18. *Photographic Documentation and Analysis in Vehicle Accident Reconstruction*. Dror Kopernik and Crispin Hales. Paper 910128 in SP-853: Proc. 1991 SAE Intl. Congress and Exposition. Detroit, Michigan: SAE International, 1991.
19. *Photographic Documentation and Analysis in Vehicle Accident Reconstruction*. Dror Kopernik and Crispin Hales. Reprinted by permission of SAE as Triodyne Safety Brief, Vol. 6, No. 4, May, 1991 (ISSN 1041-9489).
20. *Systematic Design in Practice*. C. Hales and K. M. Wallace. WDK 20: Proc. ICED 91 Intl. Conf. on Eng. Design, Hubka (Ed), p. 105-112. Zurich: Heurista, 1991.
21. *Five Fatal Designs*. Crispin Hales. WDK 23: Proc. ICED 95, International Conference on Engineering Design, Hubka (Ed). Zurich: Heurista, 1995.
22. *Forensic Analysis of the Engineering Design Process*. Crispin Hales. Designers -- the Key to Successful Product Development, Darmstadt Symposium, Germany, December 1997.
23. *Engineering Design Process Issues*. Crispin Hales. Safety Bulletin, Vol. 6, No. 3, Triodyne Inc., Niles, IL. USA, April 1998 (ISSN 1081-4140).
24. *Legal Threats to Innovation in Design*. Crispin Hales. ICED 99, International Conference on Engineering Design, Munich, Germany, August 1999.
25. *Ten Critical Factors in the Design Process*. Crispin Hales. Failure Prevention Through Education: Getting to the Root Cause. pp. 49-55, ASM/ASME International Conference Proceedings (Jim Scutti, Ed.), Strongsville, Ohio, USA, May 2000 (ISBN 0-87170-698-9).
26. *Ten Critical Factors in the Design Process*. Crispin Hales. Reprinted by permission of ASM International as Triodyne Safety Brief, Vol. 19, No. 1, July 2001 (ISSN 1041-9489).
27. *From Patent to Product – The Long Hard Road*. C. Hales and P.J. Poczynok, International Conference on Engineering Design, ICED 01, Paper C586/291, Design Applications in Industry and Education, WDK 28, pp. 99-106, The Institution of Mechanical Engineers (IMechE), 2001 (ISBN 1-86058-357-1).

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28. *Engineering Design in New Zealand – Introducing Internet Based Design at Canterbury*. Shayne Gooch, Crispin Hales and John Raine, Design Engineering Technical Conferences. Paper DETC2001/IED-21206, American Society of Mechanical Engineers (ASME), September, 2001.
29. *Critical Factors in Design*. Mechanical Engineering Design supplement to Mechanical Engineering, pp. 36-38, ASME International, March 2001.
30. *Boiler Feedwater Pipe Failure by Flow-Assisted Chelant Corrosion*. Crispin Hales, Kelly J. Stevens, Phillip L. Daniel, Mehrooz Zamanzadeh and Albert D. Owens. Journal of Engineering Failure Analysis, Vol. 9 (2002) pp. 235-243, Elsevier, UK.
31. *Boiler Feedwater Pipe Failure by Flow-Assisted Chelant Corrosion*. Crispin Hales et al. Reprinted as Triodyne Safety Brief, Vol. 20, No. 3 (ISSN 1041-9489) May, 2002.
32. *Power Loss – The 1999 Ford Power Plant Explosion: A Study of Problems Encountered During Large-Loss Fire Investigations*. Kim Mniszewski, Hal Lyson and Crispin Hales. NFPA Journal, Vol. 98, No. 4, National Fire Protection Association, July/August 2004.
33. *Design Research Reflections – 30 Years On*. Ken Wallace and Crispin Hales. ICED-11, International Conference on Engineering Design, Copenhagen, Denmark, August 2011.

SELECTED TECHNICAL PROJECT REPORTS

1. Coupling and Brake Failure on No. 5 Paper Machine Cranes. C. Hales. N.Z. Forest Products Ltd., New Zealand, 8 July 1970.
2. Carmichael Safari Vehicle. C. Hales. Design review on behalf of Trans-African Expeditions Ltd., UK, February 1973.
3. Design of Mascara Brush-Making Machine. E. Charlson, C. Hales, J. Hawkesworth and F. Reeves. Loughborough University of Technology, UK, September 1975.
4. A Program to Discover Materials Suitable for Service Under Hostile Conditions Obtaining in Equipment for the Gasification of Coal and Other Solid Fuels. V.L. Hill, S. Bhattacharyya, D. Yates, C. Hales, A. Humphreys, J. Torok, Y. Harada and R. Firestone. IIT Research Institute Report No. FE-1784-42 under Contract No. EX-76-C-01-1784 to The Metal Properties Council, Inc., New York, July 1978.
5. Light Duty Truck Weight Reduction Evaluation. O. Viergutz, M. Nusbaum, W. Fillman, C. Hales and G. Waring. IIT Research Institute Report No. T6002 under Contract No. DOT-TSC-1467 for U.S. Department of Transportation, December 1979.
6. Development of the Herman Wire Galvanizing Process. C. Hales, W. J. Courtney and K. J. Barton. IIT Research Institute, January 1981.
7. Design of Test Windmill. R. Kasparas, I. Fieldhouse, C. Hales and J. E. Hahn. IIT Research Institute Report No. IITRI-M08138-1 for International Harvester, June 1981.
8. Design, Engineering and Evaluation of Refractory Liners for Slagging Gasifiers (Final Report). B.J. deTineo, G. Booth, R.F. Firestone, M.J. Greaves, C. Hales, J.P. Lamoureux and R.R. Ledford. IIT Research Institute Report IITRI-MO6043-16 under U.S. Department of Energy contract DE-AC05-78ET13410, August 1982.
9. Creep-Rupture Behavior of Candidate Stirling Engine Iron Superalloys in High-Pressure Hydrogen (Final Report). S. Bhattacharyya, W. Peterman and C. Hales. IIT Research Institute Report IITRI-MO6116-15 (NASA-Lewis Report No. CR-174705), June 1984.

CRISPIN HALES

10. Application of Engineering Design Methods. C. Hales. Cambridge University, June 1983.
11. Gasifier Test Rig Design Report. Crispin Hales, British Gas Corporation, UK, August 1985.
12. Cost Effective Gear Design (Final Report). Crispin Hales. IIT Research Institute Report No. IITRI-PO8534 for Navistar International Transportation Corp., August 1989.
13. State-of-the-Art Study of Vacuum Seals for the Continuous Vacuum Processing of Coiled Metal Sheets. I. B. Fieldhouse, C. Hales and J. F. Zasadzinski. IIT Research Institute Report for Chugai Ro Co., Ltd., Japan, August 1990.
14. Motor Carrier Preventable Accident Countermeasures. C. Hales and S. C. Uzgiris, Final Triodyne report, FHWA/MC/91/011, for DOT Contract DTFH61-89-C-00029, March 1991.
15. Layout Design Report - High Speed Coupling Test Bed. C. Hales & C. Uzgiris, Oct. 1994.
16. Hazardous Materials Incident Prevention Manual & Quick Reference Indicator. Crispin. Hales and K.L. d'Entremont. Final Triodyne report, FHWA/MC/95/013, for DOT Contract DTFA-02-93-C-93006, April 1995.
17. Investigation Report on Boiler No. 9 Feedwater Line Failure for Georgia-Pacific Corp. Crispin Hales, April 2002.
18. Satala Power Plant Generation Facility – Assessment Report on Tsunami Damage for American Samoa Power Authority, Crispin Hales, January 2010.

APPOINTMENTS AND REVIEW PANELS

- National Science Foundation (NSF), Washington, D.C., USA, 1994.
Review Panel for Unsolicited Proposals in Engineering Design.
- Australian Research Council (ARC), Canberra, Australia.
Assessor for ARC Grants and Research Fellowships on an annual basis.
- American Society of Mechanical Engineers (ASME), New York, USA.
6-year appointment to Executive Committee of the Design Engineering Division.
- International Conference on Engineering Design (ICED-95), Zurich, Switzerland, 1995.
Member, International Organizing Committee and Chair, Engineering Design Management.
- First International Design Debate, Glasgow, Scotland, UK, 1996 – Organizing Committee.
- International Conference on Engineering Design (ICED-99), Munich, Germany, 1999.
Member, International Programme Committee; Chair of “*Innovation Products*” Sessions.
- The Design Society (International), Darmstadt, Germany, 2000-2003 – Advisory Board.
- Journal of Research in Engineering Design, Springer, London, UK. Paper reviews.
- Natural Sciences and Engineering Research Council (NSERC), Ottawa, Canada, 2001-2006.
Assessment Reviews of University Proposals for Chairs in Engineering Design program.
- International Conference on Engineering Design (ICED-01), Glasgow, UK, 2001
Member of Industrial Advisory Board and Session Chair.
- Engineering and Physical Sciences Research Council (EPSRC), Swindon, UK, 2002.
Assessment of Individual Grant Review (IGR) for University Engineering Design Centre.
- The Design Society (International), Darmstadt, Germany, 2003
Member of Special Interest Group (SIG)-Best Design Practice in Industry.

CRISPIN HALES

- International Conference on Engineering Design (ICED-05), Melbourne, Australia, 2005
Member of Industrial Advisory Board and Keynote Speaker.
- International Conference on Engineering Design (ICED-07), Paris, France, 2007
Member of Scientific Committee and Paper Reviewer.
- Design 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020 & 2022 Conferences, Dubrovnik, Croatia. Member of Scientific Advisory Board and Paper Reviewer.
- Journal of Engineering Design, Taylor & Francis, London, UK. Paper reviews.
- Natural Sciences and Engineering Research Council (NSERC), Waterloo, Canada, 2010.
Site Review of University of Waterloo Renewal Proposal for Chair in Engineering Design.
- International Conference on Engineering Design (ICED-11), Copenhagen, Denmark, 2011
Member of Scientific Committee and Paper Reviewer.
- International Conference on Engineering Design (ICED-13), Seoul, Korea, 2013
Member of Scientific Committee and Paper Reviewer.
- Selwyn College Alumni Association, Cambridge, U.K., 2013 - 2021
Overseas Member of Association Committee.
- International Conference on Engineering Design (ICED-15), Milan, Italy, 2015
Member of Scientific Committee and Paper Reviewer.
- International Conference on Engineering Design (ICED-17), Vancouver, Canada, 2017
Member of Scientific Committee and Paper Reviewer.
- International Conference on Engineering Design (ICED-19), Delft, The Netherlands, 2019
Member of Scientific Committee and Paper Reviewer.
- International Conference on Engineering Design (ICED-21), Gothenburg, Sweden, 2021
Member of Scientific Committee and Paper Reviewer.
- International Conference on Engineering Design (ICED-23), Bordeaux, France, 2023
Member of Scientific Committee and Paper Reviewer.

NEWSLETTERS

- 66 Monthly Newsletters as U.K. Correspondent to the New Zealand Heavy Engineering Research Association, 1982-1988.
- 11 Annual Newsletters as U.S. Correspondent, Design Research Society, UK, 1989-2000.
- 8 Annual Newsletters as Originator and U.S. Correspondent for the International Network of Engineering Design Researchers, 1988-1995.
- Design Perspective: Editorial article in *Mechanical Engineering Design*, Supplement to Mechanical Engineering, ASME International, November 1999.
- ASME Design Engineering Division Annual Newsletter: Message from Chair, 1999 and Past Chair's Report, 2000.

PATENTS

- U.S. Patent No. 5,151,303 granted September 29, 1992. *Method and apparatus for using evacuated, detachable web containers with high vacuum treating means.*

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