

## CRISPIN HALES, PhD, CEng.

### 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

Fellow, Institution of Mechanical Engineers (UK)1997; Member since 1979.

Fellow, American Society of Mechanical Engineers, 2002; Member since 1979:

*ASME Meritorious Service to the Profession Award*, Chicago Section 2002-2003.

*ASME Robert E. Abbott Service Award*, Design Engineering Division 2002.

ASME Design Engineering Division:

- Honors and Awards Committee, 2003-present.
- Advisory Committee, 2000-present.
- Chair of Division, 1999-2000.
- Vice-Chair/Treasurer of Division, 1998-1999.
- Executive Committee Member 1995-2001.
- Design Theory & Methodology Committee, Chair 1992-1994.
- Design Theory & Methodology Committee, Vice-Chair 1990-1991.

Member, ASM International, since 1980.

Member, Design Research Society (UK), since 1982; U.S. Correspondent 1989-2000.

Member, the Design Society (International), since 2000; Advisory Board 2000-2003.

### 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. 50<sup>th</sup> 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.

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1000 Sheridan Road, Winnetka, Illinois 60093, USA. [crispin@halesgooch.com](mailto:crispin@halesgooch.com) Phone: +1-847-501-3765

[www.halesgooch.com](http://www.halesgooch.com)

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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.
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.

## EMPLOYMENT

1. Employer: Hales & Gooch Ltd., Illinois, USA.  
Business: Consultants in Engineering Design and Large Loss Investigations  
Position: President  
Duration: November 2004 - Present  
Experience: Consulting in design process issues, forensic investigations, failure analysis, and mechanical systems. Investigation of major mechanical equipment failures, including expert reports and testimony. Analysis of engineering design problems and underlying design process issues. Presentation of seminars and courses in the areas of engineering design, failure analysis, and cross-cultural training. Engineering design research and education.
2. Employer: Triodyne Inc., Northbrook, Illinois, USA.  
Business: Consulting Engineers and Scientists  
Position: Principal Mechanical Engineer  
Duration: August 1989 – December 2005  
Experience: Consulting in forensic engineering, failure analysis, engineering design, and safety of mechanical systems. Investigation and analysis of major boiler, pressure vessel and mechanical equipment failures, including expert reports and testimony. Analysis of engineering design problems and underlying design process issues. Presentation of seminars in the areas of failure analysis, engineering design and commercial 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 in conjunction with 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 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.

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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.
  
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 north 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. Assessment of new vehicle designs for off-road and rough track applications.
  
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 puller 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

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- 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 presented each year in conjunction 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.  
Four lectures on engineering design process - undergraduate engineering design course.
- **University of Canterbury**, Christchurch, New Zealand, February - March 1990.  
Six-week course of lectures on engineering design process and supervision of final-year undergraduate conceptual design projects (on secondment from Triodyne Inc.)
- **Illinois Institute of Technology**, Chicago, IL, USA, 1991.  
Eight-lecture course in engineering design to senior mechanical engineering class.
- **University of Queensland**, Brisbane, Australia, 1991.  
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.  
Research advisor and external examiner for Masters Degree candidate.
- **University of Canterbury**, Christchurch, New Zealand, February - April 2000.  
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.  
Two lectures presented as part of undergraduate engineering design course.

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- **Massey University**, Palmerston North, New Zealand, July 2003.  
External examiner of doctoral dissertation submitted 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.
- **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.

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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.
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*. Presentation of session at 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

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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 69<sup>th</sup> 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.
37. *Acting as a Non-Disclosed Expert: Moving the Goalposts*. Seminar presentation at 13<sup>th</sup> 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 address at the ASME International Design Engineering Technical Conferences, Design Education Symposium, Philadelphia, USA, September 2006.

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46. *Industrial Design without Engineering Design: "Cheap, Plastic and Broken"*. Invited lecture at University of Illinois Chicago, Chicago, IL, USA, January 2007.
47. *Safety in Design*. Invited lecture at Northwestern University, Evanston, IL, USA, January 2007.
48. *Safety in Design*. Invited lecture at Northwestern University, Evanston, IL, USA, February 2008.
49. *Designing Today Without Trouble Tomorrow*. Keynote address at the Design 2008 International Conference, Dubrovnik, Croatia, May 2008.

## 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.

## CRISPIN HALES

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.
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).

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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).
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.

## 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.
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## 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  
Member of 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  
Member of Advisory Board.

## CRISPIN HALES

- International Conference on Engineering Design (ICED-01), Glasgow, UK, 2001  
Member of Industrial Advisory Board and Session Chair.
- Natural Sciences and Engineering Research Council (NSERC), Ottawa, Canada, 2001-2006.  
Assessment Reviews of University Proposals for Chairs in Engineering Design program.
- Journal of Research in Engineering Design, Springer, London, UK.  
Periodic reviews of papers submitted to Journal.
- 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.
- Design 2004, Dubrovnik, Croatia, 2004.  
Conference scientific advisory board and review of papers.
- International Conference on Engineering Design (ICED-05), Melbourne, Australia, 2005  
Member of Industrial Advisory Board and Keynote Speaker.
- Design 2006, Dubrovnik, Croatia, 2006.  
Conference scientific advisory board and review of papers.
- International Conference on Engineering Design (ICED-07), Paris, France, 2007  
Member of Scientific Committee and Paper Reviewer.
- Design 2008, Dubrovnik, Croatia, 2008.  
Conference scientific advisory board and review of papers.

## 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.
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