Prevention through Design (PtD) in the Construction Industry

Literature Sources (2019)

Compiled by Nicholas Tymvios, PhD Bucknell University

Table of Contents

1	revention through Design (PtD) in the Construction Industry	1
	Original PtD Manuscripts and Documents about the PtD concept	3
	Legislation for PtD	3
	Standards and Regulations	4
	About the PtD Concept	4
	Accident causation and PtD	5
	PtD and Sustainability	7
	PtD and the Business Case	8
	Quantifying PtD Impact / Effectiveness	8
	PtD and Industry Participants	<u>9</u>
	PtD and Owners	<u>9</u>
	PtD and Designers	10
	PtD and Contractors (Field personnel)	11
	Implementing PtD in Design	12
	Design and Construction Integration for Safety	12
	Procedures – Guidelines – Tools	13
	PtD and Contracts	16
	BIM – Virtual Reality	16
	PtD Examples/Solutions/Case Studies	18
	Design for Safety and Maintenance / Life Cycle – Maintenance Safety	22
	PtD Experiences from Other Industries	23
	PtD Training and Instructional Material - Education	23
	PtD and Research	26
	PtD and Innovation	26
	Communication, Collaboration, and PtD	26
	PtD Issues & Concerns	27
	PtD Constraints/Viability	27

Cultural/Ethical Issues	28
Insurance Issues	
Legal Issues	28
Regulatory/Policy Issues	
Experience from Countries	
Moving PtD Forward / The future of PtD	
Dissertations/Theses	

Original PtD Manuscripts and Documents about the PtD concept

Champagnac, E., Lorent, P., Paoli, P., and Rollier, M. (1992). "Guide de Conduite de Projet pour l'Industrie de la Construction." European Foundation for the Improvement of Living and Working Conditions, Dublin, Ireland.

Lorent, P. (1987). "Les conditions de travail dans l'industrie de la construction - Productivité, conditions de travail, qualité concertée et totale." Comité National d'Action pour la Sécurité et l'Hygiène dans la Construction, Brussels.

Lorent, P., Champagnac, E., Birdcall, D., Kooren, J., Rollier, M., Spannhake, B., and Paoli, P. (1989). "Du Projet au Chantier: Conditions de Travail, Quialite, Performances Economiques." P. Mardaga, ed., European Foundation for the Improvement of Living and Working Conditions, Dublin, Ireland.

Lorent, P., Champagnac, E., Birdcall, D., Kooren, J., Rollier, M., Spannhake, B., and Paoli, P. (1991). "From Drawing Board to Building Site: Working Conditions Quality Economic Performance." P. Mardaga, ed., European Foundation for the Improvement of Living and Working Conditions, Dublin, Ireland.

NSC (1955). Accident prevention manual for industrial operations, 3rd edition, National Safety Council, Chicago.

Szymberski, R. (1997). "Construction project safety planning." TAPPI Journal, 80(11), 69-74.

Legislation for PtD

EEC (1989). "Council Directive on the introduction of measures to encourage improvements in the safety and health of workers at work." 89/391/EEC, EEC, ed., EEC, Brussels, Belgium.

EEC (1992). "Council Directive on the implimentation of minimum safety requirements at temporaty or mobile construction sites." 92/57/EEC, EEC, ed., EEC, Brussels, Belgium.

Her Majesty's Government (2007). "The Construction (Design and Management) Regulations 2007." Her Majesty's Stationery Office, London.

Her Majesty's Government (1994). "The Construction (Design and Management) Regulations 1994." Her Majesty's Stationery Office, London.

Her Majesty's Government (2015). "The Construction (Design and Management) Regulations 2015." Her Majesty's Stationery Office, London.

INSHT (1997). "REAL DECRETO 1627/1997, de 24 de octubre, por el que se establecen disposiciones mínimas de seguridad y salud en las obras de construcción." I. N. d. S. e. H. e. e. Trabajo, ed., Ministerio de Presidencia - Departamentos implicados, Madrid, Spain.

Senato della Repubblica Italiana (1996). "Attuazione Della Direttiva 92/57/CEE Concernente le Prescrizioni Minime di Sicurezza e di Salute da Attuare nei Cantieri Temporanei o Mobili." Decreto Legislativo 14 agosto 1996, n.494Rome, Italy.

Senato della Repubblica Italiana (2008). "Testo Unico Sulla Salute e Sicurezza Sul Lavoro." Decreto Legislativo 9 aprile 2008, n.81 Rome, Italy.

Standards and Regulations

ASSP (2018). "Prevention through Design - A Life Cycle Approach to Safety and Health in the Construction industry TR-A10.100-2018." American Society of Safety Professionals, Park Ridge, Illinois, USA.

ANSI/ASSE Z590.3 (2011). "Prevention through Design Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes." American National Standards Institute/American Society of Safety Engineers, ed., American Society of Safety Engineers, Des Plaines. Illinois.

DOE (2008). "Integration of Safety into the Design Process." US Department of Energy, Washington DC.

NSW Workcover (2001). "CHAIR, Safety Design Tool."

Safe Work Australia (2008). "Code of Practice: Safe Design of Buildings and Structures." Commission for Occupational Safety and Health, Cannington, Western Australia.

Safe Work Australia (2012). "Code of Practice: Safe Design of Structures." Safe Work Australia, Cannington, Western Australia.

SFPUC (2012). "Safe Design Guidelines." City and County of San Francisco, San Francisco Public Utilities Commission, Health and Safety Program, San Francisco, CA.

WSHC (2008). "Guidelines on Design for Safety in Buildings and Structures." Workplace Safety and Health Council, Singapore, 46.

WSHC (2016). "Workplace Safety and Health Guidelines: Design for Safety." Workplace Safety and Health Council & Ministry of Manpower, Singapore.

About the PtD Concept

Aurioles, G. (1988). "Safety And Modern Technology." Professional Safety, 33(9), 14.

Behm, M. "Design for construction safety: an introduction, implementation techniques, and research summary." Proc., ASSE Professional Conference, ASSE.

Behm, M. (2008). "Construction Sector." Journal of Safety Research, 39(2), 175-178.

Culvenor, J. (2003). "Eliminate Hazards at the Design Stage. What does that mean?" Safety in Australia, 25(3), 19-27.

Dickinson, J., and Gwyn, Y. (2006). "Safety in Design in Construction." CIC Safety in Design Project Team, Hyder Consulting.

EFCA, and ACE (2006). "Designing for Safety in Construction: Taking Account of the 'General Principles of Prevention'." European Federation of Engineering Consulting Associations (EFCA) and Architects' Council of Europe (ACE), Brussels, Belgium.

Fadier, E., and De la Garza, C. (2006). "Safety design: Towards a new philosophy." Safety Science, 44(1), 55-73.

Floyd, H. L. (2010). "Prevention Through Design." Industry Applications Magazine, IEEE, 16(3), 14-16.

Floyd, H. L., and Liggett, D. P. (2010). "Hazard Mitigation Through Design." Industry Applications

Magazine, IEEE, 16(3), 17-22.

Gambatese, J., and Hinze, J. (1999). "Addressing construction worker safety in the design phase: Designing for construction worker safety." Automation in Construction, 8(6), 643-649.

Hecker, S., and Gambatese, J. (2003). "Safety in Design: A Proactive Approach to Construction Worker Safety and Health." Applied Occupational and Environmental Hygiene, 18(5), 339-342.

Hecker, S., Gambatese, J., and Weinstein, M. (2004). "Designing for Safety and Health in Construction." University of Oregon Press, Eugene, OR.

Karakhan, A. A. (2016). "Prevention through Design in Construction Engineering." ByDesign, Engineering Practice Specialty, ASSE.

Langan, E. (2009). "Construction- Blueprint for action." http://www.shponline.co.uk/construction-blueprint-for-action/. (August 17, 2015).

Lingard, H., Pirzadeh, P., Harley, J., Blismas, N., and Wakefield, R. (2014). "Safety in Design." RMIT University, Centre for Construction Work Health and Safety, Melbourne, Australia.

Main, B. W. (2008). "Social Controls for Reducing Risks: Observations on U.S. & European Approaches." Professional Safety, Journal of the American Society of Safety Engineers (ASSE), 53(5), 41-49.

Mann, A. "Construction safety: An agenda for the profession." Institution of Structural Engineers, 28-34.

Morse, J. S., and Batzer, S. A. "Prevention through design - An idea whose time has come." Proc., ASME 2009 International Mechanical Engineering Congress and Exposition, IMECE2009, November 13, 2009 - November 19, 2009, American Society of Mechanical Engineers (ASME), 213-221.

Mroszczyk, J. W. (2006). "Designing for Construction Worker Safety." ASSE Blueprints, 5(3), 1,3-4,11.

Mroszczyk, J. W. (2015). "Improving Construction Safety: A Team Effort." Professional Safety, 2015(6), 55-68.

Reason, J. (2000). "Human error: models and management." BMJ: British Medical Journal, 320(7237), 768-770.

Rubio, M. C., Menéndez, A., Martínez, G., and Rubio, J. C. (2011). "Managing occupational health and safety in the civil engineering constructions." Revista Ingeniería de Construcción, 19(3), 171-175.

Toole, T. M. (2017). "Prevention through design, Concept." http://www.designforconstructionsafety.org/concept.shtml. (January 9, 2017, 2017).

Tymvios, N., Behm, M., Gambatese, J., Lingard, H., Gibb, A., Smallwood, J. J., and McAleenan, C. (2015). "Revisiting Lorent." CIB W099 International Health and Safety Conference, Benefiting Workers & Society through Inherently Safe(r) ConstructionBelfast, UK.

Young, M., Shorrock, S., Faulkner, J., and Braithwaite, G. (2004). "Who Moved My (Swiss) Cheese? The (r)evolution of human factors in transport safety investigation." International Society of Air Safety Investigators (ISASI), 35th International SeminarGold Coast, Queensland, Australia.

Accident causation and PtD

Abdelhamid, T. S., and Everett, J. G. (2000). "Identifying Root Causes of Construction Accidents." Journal

of Construction Engineering and Management, 126(1), 52-60.

Behm, M. (2005). "Linking construction fatalities to the design for construction safety concept." Safety Science, 43(8), 589-611.

Behm, M. (2006). "An Analysis of Construction Accidents from a Design Perspective." CPWR - The Center to Protect Workers' Rights, Silver Spring, MD, 23.

Gambatese, J., Behm, M., and Rajendran, S. (2008). "Design's role in construction accident causality and prevention: Perspectives from an expert panel." Safety Science, 46(4), 675-691.

Gibb, A., Haslam, R., Hide, S., and Gyi, D. "The Role of Design in Accident Causality." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 11-21.

Haslam, R., Hide, S., Gibb, A., Gyi, D., Atkinson, S., Pavitt, T., Duff, R., and Suraji, A. (2003). "Causal Factors in Construction Accidents." Health and Safety Executive.

Haslam, R. A., Hide, S. A., Gibb, A. G. F., Gyi, D. E., Pavitt, T., Atkinson, S., and Duff, A. R. (2005). "Contributing factors in construction accidents." Applied Ergonomics, 36(4), 401-415.

Hide, S., Hastings, S., and Haslam, R. (2000). "By Accident or Design? Causal Factors in Construction Industry Accidents." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 45-52.

Hinze, J., and Gambatese, J. (1994). "Design decisions that impact construction worker safety." 5th Annual Rinker International Conference Focusing on Construction Safety and Loss Control, Gainesville, Fl, 187-199.

Kasirossafar, M., and Shahbodaghlou, F. (2015). "Construction Design: Its Role in Incident Prevention." Professional Safety, 2015(8), 42-46.

Lingard, H., Pirzadeh, P., Blismas, N., Wakefield, R., and Kleiner, B. (2014). "Exploring the link between early constructor involvement in project decision-making and the efficacy of health and safety risk control." Construction Management and Economics, 32(9), 918-931.

Lingard, H., Saunders, L., Pirzadeh, P., Blismas, N., Kleiner, B., and Wakefield, R. (2015). "The relationship between pre-construction decision-making and the effectiveness of risk control: Testing the time-safety influence curve." Engineering, Construction and Architectural Management, 22(1), 108-124.

Soeiro, A., Silva, B., and Barkokebas, B. (2014). "Prevention Guide for Designers Based on Analysis of about 2000 Accidents." International Conference on Achieving Sustainable Construction Health and Safety, W099 – Safety and Health in Construction, International Council for Research and Innovation in Building and Construction (CIB) Lund, Sweden.

Suraji, A., and Duff, R. (2000). "Constraint-Response Theory of Construction Accident Causation." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 53-60.

Suraji, A., Duff, A., and Peckitt, S. (2001). "Development of Causal Model of Construction Accident Causation." Journal of Construction Engineering and Management, 127(4), 337-344.

PtD and Sustainability

Albattah, M., Roucheray, M., and Hallowell, M. (2013). "Sustainable buildings applying prevention through design." Professional Safety, 58(6), 76.

Behm, M. (2011). "Rooftop Vegetation: An Opportunity to Influence Green Buildings via Prevention through Design." CIB W099 - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington DC.

Behm, M., and Hock, P. C. (2012). "Safe Design of Dkyrise Greenery in Singapore." Smart and Sustainable Built Environment, 1(2), 186-205.

Behm, M., Lentz, T. J., Heidel, D., and Gambatese, J. A. (2009). "Prevention through Design and Green Buildings: A US Perspective on Collaboration." Working Together: Planning, Designing, and Building a Health and Safe Construction Industry, International Council for Research and Innovation in Building and Construction (CIB) W99 Conference, Melbourne, Australia.

Dewlaney, K. S., and Hallowell, M. (2012). "Prevention through design and construction safety management strategies for high performance sustainable building construction." Construction Management and Economics, 30(2), 165-177.

Hinze, J., Godfrey, R., and Sullivan, J. (2012). "Integration of Construction Worker Safety and Health in Assessment of Sustainable Construction." Journal of Construction Engineering and Management, 139(6), 594-600.

Karakhan, A. A., and Gambatese, J. A. (2017). "Integrating Worker Health and Safety into Sustainable Design and Construction: Designer and Constructor Perspectives." Journal of Construction Engineering and Management, 143(9), 04017069.

Karakhan, A. A., and Gambatese, J. A. (2017). "Identification, Quantification, and Classification of Potential Safety Risk for Sustainable Construction in the United States." Journal of Construction Engineering and Management, 143(7), 04017018.

Pérez-Alonso, J., Carreño-Ortega, Á., Callejón-Ferre, Á. J., and Vázquez-Cabrera, F. J. (2011). "Preventive activity in the greenhouse-construction industry of south-eastern Spain." Safety Science, 49(2), 345-354.

Rajendran, S., Gambatese, J., and Behm, M. (2009). "Impact of Green Building Design and Construction on Worker Safety and Health." Journal of Construction Engineering and Management, 135(10), 1058-1066.

Toole, T., and Carpenter, G. (2012). "Prevention through Design as a Path toward Social Sustainability." Journal of Architectural Engineering, 19(3), 168-173.

Toole, T., and Carpenter, G. (2012). "Prevention through Design: An Important Aspect of Social Sustainability." ICSDC 2011, American Society of Civil Engineers, 187-195.

USGBC (2015). "LEED BD+C: New Construction v4: Prevention through Design." http://www.usgbc.org/credits/preventionthroughdesign. (Jan 15, 2017, 2017).

van Gorp, A. (2007). "Ethical issues in engineering design processes; regulative frameworks for safety and sustainability." Design Studies, 28(2), 117-131.

PtD and the Business Case

Biddle, E. (2013). "Business Cases: Supporting PTD Solutions." Professional Safety, 2013(3), 56-64.

Malcolm, C. (2008). "Building the Case for Prevention through Design, Presentation - Kaizer Permanente." Journal of Safety Research, 39(2), 151-152.

Rajendran, S., and Gambatese, J. A. (2009). "Development and Initial Validation of Sustainable Construction Safety and Health Rating System." 135(10).

Tymvios, N., and Gambatese, J. A. (2019). "Benefit/Cost Model for Evaluating Prevention through Design (PTD) Solutions." CSCE Annual Conference Growing with youth – Croître avec les jeunes, Laval (Greater Montreal), Canada.

Quantifying PtD Impact / Effectiveness

Bottomley, B. (2001). "OHSMS Performance measures that add up." Proceedings of the First National Conference, WorkCover NSW, W. Pearse, C. Gallagher, and L. Bluff, eds.Sydney, Australia, 131-150.

Christensen, W. C. (2011). "Prevention Through Design: Long-Term Benefits." Professional Safety: Journal of the American Society of Safety Engineers, P. Safety, ed., ASEE, 60-61.

Dharmapalan, V., Gambatese, J., Fradella, J., and Moghaddam Vahed, A. (2014). "Quantification and Assessment of Safety Risk in the Design of Multistory Buildings." Journal of Construction Engineering and Management, 141(4), 04014090.

Dharmapalan, V., and Gambatese, J. A. "Comparison of design risk factors of multistory commercial office buildings." Proc., Construction Research Congress 2012: Construction Challenges in a Flat World, May 21, 2012 - May 23, 2012, American Society of Civil Engineers (ASCE), 299-309.

Driscoll, T., Harrison, J. E., and Bradley, C. (2004). "The Role of Design Issues in Work-related Injuries in Australia 1997-2002." National Occupational Safety & Health Commission, Canberra, Australia.

Driscoll, T. R., Harrison, J. E., Bradley, C., and Newson, R. S. (2008). "The role of Design Issues in Work-Related Fatal Injury in Australia." Journal of Safety Research, 39(2), 209-214.

Gambatese, J., Behm, M., and Rajendran, S. "Additional Evidence of Design's Influence on Construction Fatalities." Proc., CIB W99 Global Unity for Safety & Health in Construction, 438 - 447.

Gambatese, J., and Tymvios, N. (2012). "Designer and Contractor Perception of Project and Cost Impacts of Engineered Safety Solutions." Proceedings of the CIB W099 International Conference on "Modeling and Building Health and Safety", Singapore, 240-250.

Hayne, G., Kumar, B., and Hare, B. (2015). "Evaluating the effectiveness of modern building engineering studios to deliver Design for Safety (DfS)." CIB W099 International Health and Safety Conference, Benefiting Workers & Society through Inherently Safe(r) Construction Belfast, UK.

López-Arquillos, A., and Rubio-Romero, J. C. (2015). "Proposed Indicators of Prevention Through Design in Construction Projects." Revista de la construcción, 14, 58-64.

Louage, J. (2001). "The Impact on Safety of the Visibility of the cost of Prevention." CIB W099

International Health and Safety Conference, Costs and Benefits related to Quality and Safety and Health in Construction, Barcelona, Spain.

Rajendran, S., and Gambatese, J. A. (2013). "Risk and Financial Impacts of Prevention through Design Solutions." Practice Periodical on Structural Design and Construction, 18(1), 67-72.

Smallwood, J. J. "The Influence of Designers on Occupational Health and Safety." Proc., Implementation of Safety and Health on Constructions Sites, Proceedings on the First International Conference of CIB Working Commission W99, 203-214.

Wakefield, R., Lingard, H., Blismas, N., Pirzadeh, P., Kleiner, B., Mills, T., McCoy, A., and Saunders, L. (2014). "Construction Hazard Prevention: The need to Integrate Process Knowledge into Product Design." International Conference on Achieving Sustainable Construction Health and Safety, W099 – Safety and Health in Construction, International Council for Research and Innovation in Building and Construction (CIB) Lund, Sweden.

Weinstein, M., Gambatese, J., and Hecker, S. (2005). "Can Design Improve Construction Safety?: Assessing the Impact of a Collaborative Safety-in-Design Process." Journal of Construction Engineering and Management, 131(10), 1125-1134.

Weinstein, M., and Gambatese, J. H., S. "Outcomes of a Design-for-Safety Process: A Case Study of a Large Capital Project." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 242-263.

PtD and Industry Participants

Tymvios, N., Gambatese, J., and Sillars, D. (2012). "Designer, Contractor, and Owner Views on the Topic of Design for Construction Worker Safety." Construction Research Congress 2012, American Society of Civil Engineers, 341-355.

Tymvios, N. and J. A. Gambatese (2016). "Perceptions about design for construction worker safety: Viewpoints from contractors, designers, and university facility owners." *J Constr Eng Manage Journal of Construction Engineering and Management* 142(2).

PtD and Owners

Gambatese, J. (2000). "Owner Involvement in Construction Site Safety." Construction Congress VI, American Society of Civil Engineers, 661-670.

Gambatese, J. A., Toole, T. M., and Abowitz, D. A. (2017). "Owner Perceptions of Barriers to Prevention through Design Diffusion." Journal of Construction Engineering and Management.

Huang, X., and Hinze, J. (2006). "Owner's Role in Construction Safety." Journal of Construction Engineering and Management, 132(2), 164-173.

Huang, X., and Hinze, J. (2006). "Owner's Role in Construction Safety: Guidance Model." Journal of Construction Engineering and Management, 132(2), 174-181.

Liu, H., Jazayeri, E., and Dadi, G. B. (2017). "Establishing the Influence of Owner Practices on Construction Safety in an Operational Excellence Model." Journal of Construction Engineering and

Management, 143(6), 04017005.hazards

Nwaelele, O. D. (1996). "Prudent owners take proactive approach." Professional Safety, 41(4), 27-29.

Toole, M. (2007). "Design Engineers' Responses to Safety Situations." Journal of Professional Issues in Engineering Education and Practice, 133(2), 126-131.

Toole, M., Gambatese, J., and Abowitz, D. A. (2012). "Owners' Role in Facilitating Designing for Construction Safety. Final Research Report to the Center for Construction Research and Training."

Toole, T., Gambatese, J., and Abowitz, D. (2016). "Owners' Role in Facilitating Prevention through Design." Journal of Professional Issues in Engineering Education and Practice, 04016012.

Tymvios, N., and Gambatese, J. (2014). "Owner Views on Designer Participation in Construction Safety." International Conference on Achieving Sustainable Construction Health and Safety, W099 – Safety and Health in Construction, International Council for Research and Innovation in Building and Construction (CIB)Lund, Sweden, 481-491.

Votano, S., and Sunindijo, R. (2014). "Client Safety Roles in Small and Medium Construction Projects in Australia." Journal of Construction Engineering and Management, 140(9), 04014045.

PtD and Designers

Bong, S., Rameezdeen, R., Zuo, J., Li, R. Y. M., and Ye, G. (2015). "The designer's role in workplace health and safety in the construction industry: post-harmonized regulations in South Australia." International Journal of Construction Management, 1-12.

Breslin, P. (2009). "National harmonisation: designers' duties of care in the Australian building and construction industry." Journal of Occupational Health and Safety, Australia and New Zealand, 25(6), 495-504.

Davies, V. J. (1986). "Design for Safety - A Consulting Engineer's Approach." Proceedings of the Institution of Civil Engineers (London), 80, 15-32.

Gambatese, J. (2000). "Safety Constructability: Designer Involvement in Construction Site Safety." Construction Congress VI, American Society of Civil Engineers, 650-660.

Gambatese, J. (2000). "Safety in Designer's Hands." Civil Engineering, 2000(June), 56-59.

Goh, Y. M., and Chua, S. (2016). "Knowledge, attitude and practices for design for safety: A study on civil & structural engineers." Accident Analysis & Prevention, 93, 260-266.

Goldswain, C., and John, S. "Design for Construction Health, Safety, and Ergonomics: Encouraging Architectural Designers." Proc., Proceedings of CIB W099 Conference: Prevention - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington DC, USA, in-house publishing.

Hallowell, M. R., and Hansen, D. (2016). "Measuring and improving designer hazard recognition skill: Critical competency to enable prevention through design." Safety Science, 82, 254-263.

Hetherington, T. (1995). "Why involve design professionals in construction safety?" Structural Survey, 13(1), 5-6.

Hinze, J., and Wiegand, F. (1992). "Role of Designers in Construction Worker Safety." Journal of

Construction Engineering and Management, 118(4), 677-684.

Karakhan, A., Gambatese, J., Alomari, K., and Liu, D. (2018). "Consideration of Worker Safety in the Design Process: A Statistical-Based Approach Using Analysis of Variance (ANOVA)." Construction Research Congress 2018New Orleans, LA, 378-388.

Lam, P. T. I., Wong, F. W. H., and Chan, A. P. C. (2006). "Contributions of designers to improving buildability and constructability." Design Studies, 27(4), 457-479.

Lingard, H., Cooke, T., and Blismas, N. "Who is 'the designer' in construction occupational health and safety?" Proc., 27th Annual Conference of the Association of Researchers in Construction Management, ARCOM 2011, September 5, 2011 - September 7, 2011, Association of Researchers in Construction Management, ARCOM, 299-308.

Main, B. W., and Ward, A. C. (1992). "What do design engineers really know about safety?" Mechanical Engineering, 114(8), 44-51.

McLaughlin, M. (2015). "Safety by Design." Professional Engineer, 2015(5).

Morrow, S., Cameron, I., and Hare, B. (2015). "The effects of framing on the development of the design engineer: framing health and safety in design." Architectural Engineering and Design Management, 11(5), 338-359.

Rubio, M., Martinez, G., Rubio, J., and Ordoñez, J. (2008). "Role of the Civil Engineer as a Coordinator of Safety and Health Matters within the Construction Sector." Journal of Professional Issues in Engineering Education and Practice, 134(2), 152-157.

Rubio, M., Menéndez, A., Rubio, J., and Martínez, G. (2005). "Obligations and Responsibilities of Civil Engineers for the Prevention of Labor Risks: References to European Regulations." Journal of Professional Issues in Engineering Education and Practice, 131(1), 70-75.

Toole, M. "Rethinking Designers' Roles in Construction Safety." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 92-105.

Toole, M. (2005). "Increasing Engineers' Role in Construction Safety: Opportunities and Barriers." Journal of Professional Issues in Engineering Education and Practice, 131(3), 199-207.

Toole, M. (2011). "Internal Impediments to ASCE's Vision 2025." Leadership and Management in Engineering, 11(2), 197-207.

PtD and Contractors (Field personnel)

Atkinson, A. R. (2001). "Corporate Killing and the Role of Senior Managers in Accident Prevention." CIB W099 International Health and Safety Conference, Costs and Benefits related to Quality and Safety and Health in ConstructionBarcelona, Spain.

Coble, R., and Haupt, T. C. (2000). "Potential Contribution of Construction Foremen in Designing for Safety." Proceedings of the Designing for Safety and Health Conference, Sponsored by C.I.B. Working Commission W99 and the European Construction Institute (ECI)London, England.

Larsen, G. D., and Whyte, J. (2013). "Safe construction through design: perspectives from the site team." Construction Management and Economics, 31(6), 675-690.

Mills, T. (2009). "Constructor Led Construction Hazard Prevention through Design (CHPTD)." CIB W099 Conference on Construction Safety - Working Toghether: Planning, Designing and Building a Heathy and Safe Industry, H. Lingard, and A. Gibb, eds.Melbourne, Australia.

Mzyece, D., Ndekugri, I., Ankrah, N., and Hammond, F. (2012). "The Principal Contractor's Role Under Construction (Design and Management) Regulations 2007: Areas for Further Research based on a Qualitative Inquiry." 28th Annual ARCOM conferenceEdinburgh, UK.

Duff, R., and Suraji, A. (2000). "Incorporating Site Management Factors into Design for a Safe Construction Process." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 61-68.

Smallwood, J. J. (2000). "The Influence of Design on Construction Ergonomics: Management and Worker Perceptions." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 19-26.

Smallwood, J. J. (2000). "The Holistic Influence of Design on Construction Health and Safety: General Contractor Perceptions." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 27-36.

Smallwood, J. J., Deacon, C., and Ehrlich, R. (2000). "Hazardous Chemical Substances: The Role of the Designer." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 37-44.

Toole, M. (2002). "Construction Site Safety Roles." Journal of Construction Engineering and Management, 128(3), 203-210.

Implementing PtD in Design

Design and Construction Integration for Safety

Arévalo, C. (2013). "Integración de la prevención en el diseño de obras de construcción: relación con la siniestralidad laboral, análisis de su regulación normativa, bases conceptuales y desarrollo internacional." Informes de la Construcción; Vol 65, No 531 (2013).

Atkinson, A. R., and Westall, R. (2010). "The relationship between integrated design and construction and safety on construction projects." Construction Management and Economics, 28(9), 1007-1017.

Behm, M., Kramer, T., and Messer, K. (2008). "Enhancing Safety before Breaking Ground." Occupational Safety and Health, OH&S, Dallas, TX, 2.

Breslin, P. (2007). "Improving OHS standards in the building and construction industry through safe design." Journal of Occupational Health and Safety, Australia and New Zealand, 23(1), 89-99.

Churcher, D. W., and Alwani-Starr, G. M. "Incorporating Construction Health and Safety into the Design Process." Proc., First International Conference of CIB Working Commission 99: International Conference on Implementation of Safety and Health on Construction Sites.

Gottfried, A., and Marino, B. M. (2000). "Integrated Design for Safety: From Information and Design Simulation to Control during Execution." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 181-190.

Jørgensen, K. (2013). "Safety Design Integrated in the Building Delivery System." Safety Science Monitor, 17(1).

Jørgensen, K., Sander, D., and Staghøj, A. (2010). "Integration of Safety in the Building Delivery System." CIB World Congress 2010 - Building a Better World, Salford, UK.

Manu, P., Poghosyan, A., Mahamadu, A.-M., Mahdjoubi, L., Gibb, A., Behm, M., and Akinade, O. O. (2019) "Design for occupational safety and health: key attributes for organisational capability." Engineering, Construction and Architectural Management, 0(0), null. (PREPRINT)

Schultz, C. S. and K. Jørgensen (2014). Integrated Safety in Design. International Conference on Achieving Sustainable Construction Health and Safety, W099 – Safety and Health in Construction, International Council for Research and Innovation in Building and Construction (CIB). Lund, Sweden: 200-210.

Teixeira, J. M. C., and Azevedo, M. (2000). "Design Dafety Co-Ordination in Metro do Porto." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 191-198.

Trani, M. L. (2000). "Proposal for an Integrated Safety & Health Design System." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 85-94.

Trethewy, R. W., and Atkinson, M. (2003). "Enhanced Safety, Health and Environment Outcomes through Improved Design." Journal of Engineering, Design and Technology, 1(2), 187-201.

Trethewy, R. W., and Atkinson, M. (2003). "Enhanced Safety, Health and Environment Outcomes through Improved Design." Journal of Occupational Health and Safety, Australia and New Zealand, 19(5), 465-485.

Wakeling, H., and Knight-Jones, P. (2000). "Site Safety by Design." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 199-206.

Procedures – Guidelines – Tools

Akladios, M., McMullin, D., Gopalakrishnan, B., Bell, C., Carr, M., Kapoor, A., Lobo, P., Myers, W. R., and Becker, P. E. "Design for worker safety: an expert systems approach." Proc., SPIE 3833, Intelligent Systems in Design and Manufacturing II, 14, 14-23.

Akladios, M., Gopalakrishnan, B., Bird, A., Carr, M., Garcia, R., McMullin, D., Myers, W. R., Vennetti, V., Zayas, J., Becker, P. E., and McCullom, D. "Development of an expert system to help design for worker safety." Proc., SPIE 3517, Intelligent Systems in Design and Manufacturing, 240, 240-250.

Alzayd, R., Getuli, V., Giusti, T., and Capone, P. (2016). "Safety Constructability improvement adding spatial dimension and workers' safety in the Critical Path Method." CIB World Building Congress 2016 Tampere, Finland.

Amyotte, P. R., Khan, F. I., and Kletz, T. A. (2009). "Inherently safer design activities over the past decade." 21st Institution of Chemical Engineers Symposium on Hazards 2009 - Hazards XXI: Process Safety and Environmental Protection, November 10, 2009 - November 12, 2009, Institution of Chemical Engineers, Manchester, United Kingdom, 736-743.

Arditi, D., Elhassan, A., and Toklu, Y. (2002). "Constructability Analysis in the Design Firm." Journal of Construction Engineering and Management, 128(2), 117-126.

Baker, G., and Barsotti, A. "Procurement Methods to Facilitate Designing for Safety and Health." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 194-209.

Baxendale, T., and Jones, O. (2000). "Construction design and management safety regulations in practice—progress on implementation." International Journal of Project Management, 18(1), 33-40.

Casals, M., Muñoz, M. J., and Alavedra, P. (2000). "Data based Model for Risk Evaluation in Building Process." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 217-226.

Christensen, W. C. (2003). "Safety through Design: Helping design engineers answer 10 key questions." Professional Safety, 2003(2), 32-39.

Cooke, T., Lingard, H., Blismas, N., and Stranieri, A. (2008). "ToolSHeDTM: The development and evaluation of a decision support tool for health and safety in construction design." Engineering, Construction and Architectural Management, 15(4), 336-351.

CPN (2005). "Designing for Health & Safety." Construction Productivity Network-Ciria, London, UK.

Department of Labor (2012). "Taking all the Practicable Steps." http://www.dol.govt.nz/hs/law/quickguide/pdfs/allpracticablesteps.pdf. (Aug 22, 2015, 2015).

Duffy, B. M. "From Designer Risk Assessment to Construction Method Statements: Techniques and Procedures for Effective Communication of Health and Safety Information." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 118-135.

Ertas, A. (2010). "Prevention through Design: Transdisciplinary Process." The Atlas, Lubbock, TX.

Fauconnier, J.-M. (2000). "Industrial Design Model for risk Evaluation in Building Process." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 227-234.

Frijters, A. C. P., and Swuste, P. H. J. J. (2008). "Safety assessment in design and preparation phase." Safety Science, 46(2), 272-281.

Gangolells, M., Casals, M., Forcada, N., Roca, X., and Fuertes, A. (2010). "Mitigating construction safety risks using prevention through design." Journal of Safety Research, 41(2), 107-122.

Ghaderi, R., and Kasirossafar, M. (2011). "Construction Safety in Design Process." AEI 2011, American Society of Civil Engineers, 464-471.

Hadikusumo, B., and Rowlinson, S. (2004). "Capturing Safety Knowledge Using Design-for-Safety-Process Tool." Journal of Construction Engineering and Management, 130(2), 281-289.

Hallowell, M. R. "Prevention through Design Tool for High Performance Sustainable Buildings." Proc., Proceedings of CIB W099 Conference: Prevention - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington DC, USA, in-house publishing.

Hecker, S., Gambatese, J., and Weinstein, M. (2005). "Designing for Worker Safety: Moving the Construction Safety Process Upstream." Professional Safety, 2005(9), 32-44.

Hinze, J., and Marini, J. (2008). "Software To Select Design For Safety Suggestions." Evolution of and Directions in Construction Safety and Health, International Council for Research and Innovation in Building and Construction (CIB) W99 Working Commission Rinker International Conference Gainesville, FL 103-114.

Imriyas, K., Pheng, L. S., and Lin, T. A. (2007). "A Decision Support System for Predicting Accident Risks in Building Projects." Architectural Science Review, 50(2), 149-162.

Liang, D., and Song, L. (2008). "Development Of A Task-Based Safety Model For Construction Projects." Evolution of and Directions in Construction Safety and Health, International Council for Research and Innovation in Building and Construction (CIB) W99 Working Commission Rinker International Conference Gainesville, FL 144-155.

Lingard, H., Blismas, N., Wakefield, R., Jellie, D., and Fleming, T. (2008). "'Safer Construction': the Development of a Guide to Best Practice." Third International Conference of the Cooperative Research Centre (CRC) for Construction Innovation Gold Coast, Australia.

Lingard, H. C., Cooke, T., and Blismas, N. (2012). "Designing for construction workers' occupational health and safety: a case study of socio-material complexity." Construction Management and Economics, 30(5), 367-382.

Lyon, B. K., Popov, G., and Biddle, E. (2016). "Prevention Through Design: For Hazards in Construction." Professional Safety, 61(9).

MacCollum, D. V. (2006). "Inherently Safer Design: Five Principles for Improving Construction Safety." Professional Safety, 2006(5), 26-33.

Main, B. W. (2002). "Design Reviews: Checkpoints for Design." Professional Safety, 2002(1), 27-33.

Manu, P., Poghosyan, A., Mahamadu, A.-M., Mahdjoubi, L., Gibb, A., Behm, M., and Akinade, O. (2017). "Development of a Design for Occupational Safety and Health Capability Maturity Model." Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds., Cape Town, South Africa.

Manuele, F. A. (2007). "Prevention through Design: Addressing Occupational Risks in the Design & Redesign Processes." ByDesign, Engineering Practice Specialty, ASSE.

Manuele, F. A. (2008). "Prevention through Design: Addressing occupational risks in the design and redesign processes." Professional Safety, 2008(10), 28-40.

McClimans, C. (2011). "Safety through design: A proactive Safety tool." Iron and Steel Technology, 8(1).

Navon, R., and Kolton, O. (2006). "Model for Automated Monitoring of Fall Hazards in Building Construction." Journal of Construction Engineering and Management, 132(7), 733-740.

NIOSH (2010). "Prevention through Design: Plan for the national initiative." Department of Health and Human Services - Center for Disease Control and Prevention.

Saurin, T. A., and Formo, C. T. (2008). "Guidelines For Considering Construction Safety Requirements in The Design Process." Evolution of and Directions in Construction Safety and Health, International Council for Research and Innovation in Building and Construction (CIB) W99 Working Commission Rinker International Conference Gainesville, FL 115-129.

Scopes, J. P. (2009). "London 2012: A new approach to CDM coordination." Proceedings of the Institution of Civil Engineers: Civil Engineering, 162(2), 76-86.

Seo, J., and Choi, H. (2008). "Risk-Based Safety Impact Assessment Methodology for Underground Construction Projects in Korea." Journal of Construction Engineering and Management, 134(1), 72-81.

Sun, X., Chong, H.-Y., Liao, P.-C., Fang, D., and Wang, Y. (2019). "A System Dynamics Model of Prevention through Design towards Eliminating Human Error."

Taiebat, M., and Ku, K. (2011). "Design and Planning for Safety (DPfS): A Factor Modeling Approach to Find the Best Response to Hazard." AEI 2011, American Society of Civil Engineers, 437-447.

Vasconcelos, B., Soeiro, A., and Vasconcelos, B. "Prevention through Design: Guidelines for Designers." Proc., II Conference on Health and Safety Coordination in the Construction Sector.

Weidman, J., Dickerson, D., and Koebel, C. (2015). "Prevention through Design Adoption Readiness Model (PtD ARM): An integrated conceptual model." Work, 52, 865–876.

PtD and Contracts

Farooqui, R. U., Ahmed, S. M., and Azhar, N. (2008). "Designing For Construction Safety – A Construction Management Approach." Evolution of and Directions in Construction Safety and Health, International Council for Research and Innovation in Building and Construction (CIB) W99 Working Commission Rinker International Conference Gainesville, FL 130-143.

Gambatese, J., Nnaji, C., and Christianson, C. R. (2017). "Contracting for Prevention through Design (PtD): A Case Study." Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds.Cape Town, South Africa.

Mzyece, D., Ndekugri, I., Ankrah, N., and Hammond, F. (2012). "Contractual Provisions for Health and Safety: Standard Form Contracts in the UK Construction Industry." CIB W099 International Conference on "Modeling and Building Health and Safety" Singapore.

BIM – Virtual Reality

Alomari, K., Gambatese, J., and Anderson, J. (2017). "Opportunities for Using Building Information Modeling to Improve Worker Safety Performance." Safety, 3(1), 7.

Foster, B. (2011). "BIM for facility management: design for maintenance strategy." Journal of Building Information Modeling, 2011(Spring), 18-19.

Golabchi, A., Han, S., and AbouRizk, S. (2018). "A simulation and visualization-based framework of labor efficiency and safety analysis for prevention through design and planning." Automation in Construction,

96, 310-323.

Hadikusumo, B. H. W., and Rowlinson, S. (2002). "Integration of virtually real construction model and design-for-safety-process database." Automation in Construction, 11(5), 501-509.

Hardison, D., and Hallowell, M. (2018). "Identifying Safety Hazards in Design: Evaluating the Difference between BIM and 2D CAD Drawings." Construction Research Congress 2018 New orleans, LA, 154-163.

Hayne, G., Kumar, B., and Hare, B. (2014). "The Development of a Framework for a Design for Safety BIM Tool." Computing in Civil and Building Engineering (2014), American Society of Civil Engineers, 49-56.

Hongling, G., Yantao, Y., Weisheng, Z., and Yan, L. (2016). "BIM and Safety Rules Based Automated Identification of Unsafe Design Factors in Construction." Procedia Engineering, 164, 467-472.

Hossain, M. A., Abbott, E. L. S., Chua, D. K. H., Nguyen, T. Q., and Goh, Y. M. (2018). "Design-for-Safety knowledge library for BIM-integrated safety risk reviews." Automation in Construction, 94, 290-302.

Kamardeen, I. "Design-for-Safety analysis support system for building designers." Proc., Proceedings of the 13th International Conference on Construction Applications of Virtual Reality, CONVR 2013, 56-63.

Jia, Q., Issa, R. R. A., Olbina, S., and Hinze, J. (2014). "Use of Building Information Modeling in Design to Prevent Construction Worker Falls." Journal of Computing in Civil Engineering, 28(5), A4014008 (4014010 pp.).

Jin, Z., Gambatese, J., Liu, D., and Dharmapalan, (2019) V. "Using 4D BIM to assess construction risks during the design phase." Engineering, Construction and Architectural Management, 0(0), null. (PREPRINT)

Kasirossafar, M., Ardeshir, A., and Shahandashti, R. (2012). "Developing the Sustainable Design with PtD Using 3D/4D BIM Tools." World Environmental and Water Resources Congress 2012, American Society of Civil Engineers, 2786-2794.

Kasirossafar, M., and Shahbodaghlou, F. (2012). "Application of Visualization Technologies to the Design for Safety Concept." Forensic Engineering 2012, American Society of Civil Engineers, 370-377.

Kasirossafar, M., and Shahbodaghlou, F. (2012). "Building Information Modeling for Construction Safety Planning." ICSDEC 2012, American Society of Civil Engineers, 1017-1024.

Kiviniemi, M., Sulankivi, K., Kähkönen, K., Mäkelä, T., and Merivirta, M.-L. (2011). "BIM-based Safety Management and Communication for Building Construction - Research Notes 2597." VTT Technical Research Centre of Finland, Espoo, Finland.

Nickel, P. (2016). "Extending the Effective Range of Prevention through Design by OSH Applications in Virtual Reality." HCI in Business, Government, and Organizations: Information Systems: Third International Conference, HCIBGO 2016, Held as Part of HCI International 2016, Toronto, Canada, July 17-22, 2016, Proceedings, Part II, F. F.-H. Nah, and C.-H. Tan, eds., Springer International Publishing, Cham, 325-336.

Olbina, S., Hinze, J., and Issa, R. (2009). "Developing a Strategy for Integration of Designing for Construction Worker Safety and Building Information Modeling." CIB W099 Conference on Construction Safety - Working Together: Planning, Designing and Building a Heathy and Safe Industry, H. Lingard, and

A. Gibb, eds., Melbourne, Australia.

Parn, E. A., Edwards, D., Riaz, Z., Mehmood, F., and Lai, J. (2019). "Engineering-out hazards: digitizing the management working safety in confined spaces." Facilities, 37(3/4), 196-215.

Qi, J., Issa, R., Hinze, J., and Olbina, S. (2011). "Integration of Safety in Design through the Use of Building Information Modeling." Computing in Civil Engineering (2011), American Society of Civil Engineers, 698-705.

Rowlinson, S. (2000). "Virtually Real Construction Components and Processes for Design-for-Safety-Process (DFSP)." Construction Congress VI, American Society of Civil Engineers, 1058-1062.

Sacks, R., Whyte, J., Swissa, D., Raviv, G., Zhou, W., and Shapira, A. (2015). "Safety by design: dialogues between designers and builders using virtual reality." Construction Management and Economics, 33(1), 55-72.

Webb, T. A., and Langar, S. (2019). "Utilizing BIM as a Tool for Managing Construction Site Safety: A Review of Literature." 55th ASC Annual International Conference Proceedings, Denver, Colorado.

Xiaer, X., Dib, H., Yuan, J., Tang, Y., and Li, Q. (2017). "Design for Safety (DFS) and Building Information Modeling (BIM): A Review." ICCREM 2016Edmonton, Alberta, Canada, 69-80.

Yuan, J., Li, X., Xiahou, X., Tymvios, N., Zhou, Z., and Li, Q. (2019). "Accident prevention through design (PtD): Integration of building information modeling and PtD knowledge base." Automation in Construction, 102, 86-104.

Zhang, S., Sulankivi, K., Kiviniemi, M., Romo, I., Eastman, C. M., and Teizer, J. (2015). "BIM-based fall hazard identification and prevention in construction safety planning." Safety Science, 72, 31-45.

Zhang, S., Teizer, J., Lee, J.-K., Eastman, C. M., and Venugopal, M. (2013). "Building Information Modeling (BIM) and Safety: Automatic Safety Checking of Construction Models and Schedules." Automation in Construction, 29, 183-195.

Zhou, W., Whyte, J., and Sacks, R. (2012). "Construction safety and digital design: A review." Automation in Construction, 22, 102-111.

PtD Examples/Solutions/Case Studies

Alabern, X., Arribas, A., and Casals, M. (2000). "Design Criteria for Electrical Safety During the Construction Phase." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 207-216.

ASCC (2006). "Guidance on the Principles of Safe Design for Work." Australia Safety and Compensation Council (ASCC), Canberra, Australia.

Behm, M. (2012). "Safe Design Suggestions for Vegetated Roofs." Journal of Construction Engineering and Management, 138(8), 999-1003.

Bugaris, R. M. (2017). "Improving Electrical Safety in the Workplace: Applying Prevention Through Design to Voltage Testing." IEEE Industry Applications Magazine, 23(3), 12-23.

Cillis, E. D., Fargione, P., Maida, L., Patrucco, M., and Sambuelli, L. (2018). "Present and future contribution of geophysics to the prevention through design and quality management approaches for tunneling operations." First Break, 36(10), 35-41.

Cowley, S., and Leggett, S. (2003). "Prevention of falls and manual handling injuries among plasterers: the case for intervention." Journal of occupational health and safety Australia and New Zealand, 19(5), 447-456.

Crow, D. R., Liggett, D. P., Mitchem, J. E., and Work, F. "Design and build electrical safety into construction projects." Proc., 2015 IEEE Petroleum and Chemical Industry Committee Conference (PCIC), 1-6.

DBP (2016). "Design Best Practice - Promoting Safety in Design." http://www.dbp.org.uk/welcome.htm. (July 2, 2019, 2019).

EASHW (2004). "Factsheet 55 - Achieving better safety and health in construction." European Agency for Safety and Health at Work, Bilbao Spain.

Ezisi, U., and Issa, M. H. (2018). "Case Study Application of Prevention through Design to Enhance Workplace Safety and Health in Manitoba Heavy Construction Projects." Canadian Journal of Civil Engineering, 46(9).

Floyd, H. L., and Liggett, D. P. "The NIOSH "Prevention through Design" initiative applied to electrical hazards in construction." Proc., Petroleum and Chemical Industry Technical Conference, 2008. PCIC 2008. 55th IEEE, 1-7.

Fonseca, E. D., Lima, F. P. A., and Duarte, F. (2014). "From construction site to design: The different accident prevention levels in the building industry." Safety Science, 70, 406-418.

Gambatese, J. "An Overview of Design-for-Safety Tools and Technologies." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 109-117.

Gambatese, J., Hinze, J., and Haas, C. (1997). "Tool to Design for Construction Worker Safety." Journal of Architectural Engineering, 3(1), 32-41.

Gibb, A., Horne, K., Pavitt, T., and Haslam, R. "Eliminating Hand-Arm Vibration from In Situ Pile-top Breakdown." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 280-298.

Hansen, M. D. (2000). "Engineering Design for Safety: Petrochemical Process Plant Design Considerations." Professional Safety, 2000(1), 20-25.

Hansen, M. D., and Abrahamsen, E. (2001). "Engineering Design for Safety: Imagineering the Rig Floor." Professional Safety, 2001(3).

Hardison, D., Hallowell, M., and Henry, N. (2019). "The Relationship between Spatial Cognition and Hazard Anticipation in Prevention through Design Tasks." CSCE Annual Conference Growing with youth – Croître avec les jeunes Laval (Greater Montreal), Canada.

HIFI (2005). "Inherently Safer Design Principles for Construction." Hazard Information Foundation, Inc., Sierra Vista, AZ.

HIFI (2008). "Construction Design Safety in the Marketplace." Hazard Information Foundation, Inc.,

Sierra Vista, AZ.

Hinze, J., and Gambatese, J. (1996). "Addressing Construction Worker Safety in the Project Design, Research Report 101-11." Construction Industry Institute (CII), Austin, TX.

Hinze, J., and Gambatese, J. (1996). "Design for Safety RS 101-1." Construction Industry Institute (CII), Austin, TX.

Ho, C., Lee, H. W., and Gambatese, J. A. (2018). "Improving Safety in Solar Installations through Prevention through Design." Construction Research Congress 2018New Orleans, LA, 717-726.

Kim, C., Kim, T., Lee, U., Cho, H., and Kang, K. (2015). "Advanced Steel Beam Assembly Approach for Improving Safety of Structural Steel Workers." Journal of Construction Engineering and Management, 05015019.

Kovalchik, P. G., Matetic, R. J., Smith, A. K., and Bealko, S. B. (2008). "Application of Prevention through Design for Hearing Loss in the Mining Industry." Journal of Safety Research, 39(2), 251-254.

Ku, K. (2013). "Comparing Safety in Design Approaches and Tools in the US, UK, and Australia." CIB World Building CongressBrisbane, Australia.

Lamba, A. (2013). "Practice: Designing Out Hazards in the Real World." Professional Safety, 2013(1), 34-40.

Laskar, S. "Importance of Process Safety Information (PSI) and implementation of design best practices for upstream safety management program." Proc., SPE/APPEA International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production 2012: Protecting People and the Environment - Evolving Challenges, September 11, 2012 - September 13, 2012, Society of Petroleum Engineers, 2780-2787.

Laskar, S. "Implementation of design best practices for upstream process safety." Proc., 2nd International Conference on Upstream Engineering and Flow Assurance 2014 - Topical Conference at the 2014 AIChE Spring Meeting and 10th Global Congress on Process Safety, March 30, 2014 - April 3, 2014, AIChE, 286-294.

Lee, H. W., Gambatese, J., and Ho, C. (2017). "Applying Prevention through Design (PtD) to Solar Systems in Small Buildings." CPWR: The Center for Construction Research & Training, Silver Spring, MD, 56.

Lew, J. J., and Anspach, J. (2000). "Elimination of Utility Line Cuts on a Highway Project Using Subsurface Utility Engineering." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 235-242.

Lew, J., and Lentz, T. "Designing for safety–applications for the construction industry." Proc., W099-Special Track 18th CIB World Building Congress May 2010 Salford, United Kingdom, 37.

MacCollum, D. V. (2007). Construction safety engineering principles: designing and managing safer job sites, Mcgraw-Hill, New York.

Manu, P., Mahdjoubi, L., Gibb, A., and Behm, M. (2017). "New tool will help civil engineers meet CDM requirements to design for safety." Proceedings of the Institution of Civil Engineers - Civil Engineering, 170(2), 55-55.

NISD, and SEAA (2001). Detailing guide for the enhancement of erection safety, National Institute of Steel Detailing; Steel Erectors Association of America, Oakland, CA and Greensboro, NC.

Nussbaum, M. A., Shewchuk, J. P., Kim, S., Seol, H., and Guo, C. (2009). "Development of a decision support system for residential construction using panellised walls: Approach and preliminary results." Ergonomics, 52(1), 87-103.

Nussbaum, M. A., and Shewcuk, J. P. "Development of a System to Enhance Residential Construction Ergonomics and Productivity Using Wall Panels." Proc., Proceedings of CIB W099 Conference: Prevention - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington DC, USA, in-house publishing.

OSHA (2017). "Alliance Program Construction Roundtable."

https://www.osha.gov/dcsp/alliances/roundtables/roundtables_construction.html. (March 30, 2017, 2017).

Peres, S. C., Kortum, P. T., Akladios, M., and Muddimer, A. (2016). "Developing and validating a self-report assessment tool for software biomechanics." Work, 53(1), 193-204.

Renshaw, F. M. (2013). "Design: Methods for Implementing PTD." Professional Safety, 2013(3), 50-55.

Roberts, D. (2008). Pontcysyllte Aqueduct & Canal Nomination as a World Heritage Site - Nomination Document. Aberystwyth, Wales, Wrexham County Borough Council and the Royal Commission on the Ancient and Historical Monuments of Wales. (First documented case of PtD?)

Shepherd, S., and Woskie, S. (2010). "Case Study to Identify Barriers and Incentives to Implementing an Engineering Control for Concrete Grinding Dust." Journal of Construction Engineering and Management, 136(11), 1238-1248.

Spielholz, P., Carcamo, E., and Davis, G. "Working Upstream: Successes in Reducing Injury Risks in Construction." Proc., Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting, 1240-1243.

Tello, L., and Grau, D. (2018). "Design and Planning Opportunities for Effectively Minimizing Worker Exposure to Cumulative Health Hazards." Construction Research Congress 2018New Orleans, LA, 454-460.

Toole, M., Hervol, N., and Hallowell, M. R. (2006). "Designing for Construction Safety." Modern Steel Construction, 46(6), 55-59.

Toole, M., and Marshall, R. (2006). "Designing for GeoConstruction Safety." Trends Affecting the Geo-Community Workshop, American Society of Civil Engineers (ASCE)Reston, VA.

Tymvios, N. (2017). "Design Resources for Incorporating PtD." Practice Periodical on Structural Design and Construction, 22(4), 04017020.

Tymvios, N., and Gambatese, J. (2013). "Prevention through Design (PtD) Solutions in Wood Design and Construction." Wood Design Focus, Forest Products Society, 23(1), 31-37.

Walline, D. L. (2014). "Prevention through Design: Proven Solutions from the Field." Professional Safety, 2014(11), 43-49.

White, C. M. (2015). "Proactive Ergonomics: Stopping Injuries Before They Occur." Professional Safety, 2015(6), 69-73.

YAM, M. C., Wong, F. K., Chan, A. P., Cheung, A. A., Chan, D. W., and Chan, K. W. (2006). "Design for Safety—Safety Provisions for Residential Building Repair and Maintenance Work in Hong Kong." CIB

W99" Jian zhu an quan yu jian kang de quan qiu he zuo" guo ji hui yi lun wen ji, 137.

Young-Corbett, D. (2014). "Prevention through Design: Health Hazards in Asphalt Roofing." Journal of Construction Engineering and Management, 140(9), 06014007.

Xiahou, X., Yuan, J., Li, Q., and Skibniewski, M. J. (2018). "Validating DFS concept in lifecycle subway projects in china based on incident case analysis and network analysis." Journal of Civil Engineering and Management, 24(1), 53-66.

Zagres, T., and Giles, B. (2008). "Prevention through Design (PtD)." Journal of Safety Research, 39(2), 123-126.

Zou, P. X. W., Redman, S., and Windon, S. (2008). "Case Studies on Risk and Opportunity at Design Stage of Building Projects in Australia: Focus on Safety." Architectural Engineering and Design Management, 4(3-4), 221-238.

Design for Safety and Maintenance / Life Cycle – Maintenance Safety

Arditi, D., and Nawakorawit, M. (1999). "Designing Buildings for Maintenance: Designers' Perspective." Journal of Architectural Engineering, 5(4), 107-116.

Christensen, W. C. (2007). "Retrofitting for Safety: Career Implications for SH&E Personnel." Professional Safety, 52(5), 36-44.

Foster, B. (2011). "BIM for facility management: design for maintenance strategy." Journal of Building Information Modeling, 2011(Spring), 18-19.

Frijters, A. C. P., and Suddle, S. I. (2013). Design Safe and Maintainable Buildings Manual: The Impact of the Buildings Decree on the Roles and Duties of the Parties Involved in the Integration of the Safe Maintenance of Buildings Into the Design Process, Stichting Arbouw.

Hecker, S., and Gambatese, J. W., M. "Life Cycle Safety: An Intervention to Improve Construction Worker Safety and Health Through Design." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 212-241.

Hinze, J. (2000). "Designing for the Life Cycle Safety of Facilities." Proceedings of the Designing for Safety and Health Conference, Sponsored by C.I.B. Working Commission W99 and the European Construction Institute (ECI)London, England.

Iddon, J., and Carpenter, J. (2009). "Safe Access for Maintenance and repair - Guidance for designers 2nd Edition." Construction Industry Research and Information Assossiation, London, UK.

Kernohan, D., and Wrightson, W. (2000). "Building Access and Usability - A Manager's Guide." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 129-136.

Laganà, R. G. (2000). "Safety in Building Maintenance Design." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 137-142.

Lingard, H., Cooke, T., Blismas, N., and Wakefield, R. (2013). "Prevention through design: Trade-offs in reducing occupational health and safety risk for the construction and operation of a facility." Built Environment Project and Asset Management, 3(1), 7-23.

Mayo, G., and Tymvios, N. (2017). "Safety Maintenance Review from Facility Management Technician

Perspective." Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds.Cape Town, South Africa.

Parikh, S. N., Lewis, W. D., and Recchiuti, J. L. "Engineering life-cycle-safety: the view from design/the view from the field." Proc., Industry Applications Society 42nd Annual Petroleum and Chemical Industry Conference, 335-344.

PtD Experiences from Other Industries

Terry, E., and Dean, S. (2000). "The Importance of Design in Achieving Improved Health & Safety: Lessons from the Offshore Industry." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 1-8.

Goolen, J. v., Camp, L. O. D., and Crumfinger, A. (2000). "Behaviour-Based Improvement of Safety and Health During the Construction Phase." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 9-18.

Kjellén, U. (2007). "Safety in the design of offshore platforms: Integrated safety versus safety as an add-on characteristic." Safety Science, 45(1), 107-127.

Laskar, S., Mallinson, T., and Aldeeb, A. (2011). "Offshore safety through design: Practical implementation of best practices from the OSHA 1910 framework." SPE Americas E and P Health, Safety, Security, and Environmental Conference 2011, March 21, 2011 - March 23, 2011, Society of Petroleum Engineers, Houston, TX, United states, 238-244.

PtD Training and Instructional Material - Education

Akladios, M. (2007). "TSDS as an Educational Tool for Non-S&H Majors." American Society of Safety Engineers Annual Conference Orlando, FL.

ASCC (2006). "Safe Design for Engineering Students: An Educational Resource for Undergraduate Engineering Students." Australia Safety and Compensation Council (ASCC), Canberra, Australia.

Azmi, W. F. W., and Misnan, M. S. (2014). "View and Perspective of Architecture, Civil Engineer and Construction Management Students on Design for Construction Safety (DfCS): Initial Finding." International journal of Science Commerce and Humanities, 2(4), 232-237.

Batson, R. G. "Alternative approaches to incorporate design for safety into construction engineering Curricula." Proc., 120th ASEE Annual Conference and Exposition, June 23, 2013 - June 26, 2013, American Society for Engineering Education.

Behm, M., Culvenor, J., and Dixon, G. (2014). "Development of safe design thinking among engineering students." Safety Science, 63, 1-7.

Brown, G. "Creating a Knowledge Benchmark for Construction Sector Designers." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 136-143.

Care, L., Jary, D., and Parnell, D. R. (2012). "Healthy design, creative safety: Approaches to health and safety teaching and learning in undergraduate schools of architecture - reserach report RR 925." Health

and Safety Executive, London, UK.

Carpenter, J. (2000). "Tomorrow's Designers: We Build from Here ..." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 95-102.

Cortes, J. M., Pellicer, E., and Catala, J. (2012). "Integration of Occupational Risk Prevention Courses in Engineering Degrees: Delphi Study." Journal of Professional Issues in Engineering Education and Practice, 138(1), 31-36.

Din, Z. U., and Gibson, G. E. (2018). "Leveraging Pedagogical Innovation for Prevention through Design Education: Lessons Learned from Serious Game Development." Construction Research Congress 2018New Orleans, LA, 706-716.

Din, Z. U., and Gibson, G. E. (2019). "Serious games for learning prevention through design concepts: An experimental study." Safety Science, 115, 176-187.

European Communities (1993). "Safety and Health in the Construction Sector: Training-Temporary or Mobile Construction Sites." Commission of the European Communities, Luxembourg.

Foley, B., Howard, P., Toft, Y., and Hurd, M. (2016). "Increasing safe design practice within the engineering curriculum." 27th Annual Conference of the Australasian Association for Engineering Education: AAEE 2016Lismore, NSW: Southern Cross University.

Gambatese, J. (2000). "Designing for Safety: It Starts with Educations." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 103-110.

Gambatese, J. (2003). "Safety emphasis in university engineering and construction programs." International e-Journal of Construction(Special Issue: Construction Safety Education and Training: A Global Perspective).

Gambatese, J. "Safety Emphasis in University Engineering and Construction Programs." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 144-164.

Ghosh, S., and Bhattacharjee, S. (2016). "Can User Centered Design Methods Improve Construction Safety?" 52nd ASC Annual International ConferenceProvo, UT.

Ghosh, S., Mehany, M. S. H. M., Langar, S., and Bhattacharjee, S. (2017). "Prevention through Design (PtD) in AEC Programs: Educators' Perspective." 53rd ASC Annual International Conference Proceedings Seattle, WA.

Gottfried, A. (2000). "Education and Training in the Building process and Integration of Safety Disciplines: The Italian Experience." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 111-120.

Gupta, J. P. (2000). "A course on Inherently Safer Design." Journal of Loss Prevention in the Process Industries, 13(1), 63-66.

Hecker, S., and Gambatese, J. "Training Students for Design Safety in Construction." Proc., ASSE Professional Development Conference and Exposition, American Society of Safety Engineers.

Hinze, J. (2000). "The Need for Academia to Address Construction Site Safety through Design." Construction Congress VI, American Society of Civil Engineers, 1189-1195.

Jia, A. Y., and Gilbert, D. (2017). "The Content and Pedagogy of Project Safety Management in the Construction Management Curriculum: Does Design Matter?" Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds.Cape Town, South Africa.

Lentz, T. J. (2009). "Strategic Education Initiatives to Implement Prevention through Design (PtD) in Construction." 45th General Meeting of ASC Gainesville, FL.

López-Arquillos, A. (2014). "Prevention Through Design (PtD) as a Management Tool in Occupational Risk Prevention." Ph.D, Universidad de Málaga, Málaga.

Mann III, J. A. (2008). "Education Issues in Prevention through Design." Journal of Safety Research, 39(2), 165-170.

Martínez Montes, G., del Carmen Rubio Gámez, M., Moreno Escobar, B., and Ordóñez García, J. (2007). "Final Project Teaching in Higher Education within Civil Engineering: New Perspective." Journal of Professional Issues in Engineering Education and Practice, 133(2), 94-98.

McAleenan, C., and McAleenan, P. "Enhancing Ethical Reasoning in Design Education." Proc., Proceedings of CIB W099 Conference: Prevention - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington DC, USA, in-house publishing.

NIOSH (2013). "PtD - Architectural Design and Construction - Instructor's Manual." https://www.cdc.gov/niosh/docs/2013-133/>. (Jan. 10, 2017, 2017).

NIOSH (2013). "PtD - Mechanical-Electrical Systems - Instructor's Manual." https://www.cdc.gov/niosh/docs/2013-134/. (Jan. 10, 2017, 2017).

NIOSH (2013). "PtD - Reinforced Concrete Design - Instructor's Manual." https://www.cdc.gov/niosh/docs/2013-135/>. (Jan. 10, 2017, 2017).

NIOSH (2014). "PtD - Structural Steel Design - Instructor's Manual." https://www.cdc.gov/niosh/docs/2013-136/>. (Jan. 10, 2017, 2017).

Popov, G., Blunt, L. A., McGlothlin, J., Young-Corbett, D., Zey, J. N., and Heckel, P. (2013). "Education: Integrating PTD into Undergraduate Curricula." Professional Safety, 2013(3), 45-49.

Rinehart, R., Heidel, D., Okun, A., and Barsan, M. "Defusing prevention through design principles through engineering textbooks." Proc., 2009 ASEE Annual Conference and Exposition, June 14, 2009 - June 17, 2009, American Society for Engineering Education, BOEING.

Stacey, N., Simpson, K., and Schleyer, G. (2009). "Integrating Risk Concepts into Undergraduate Engineering Courses." Health and Safety Executive (HSE).

Toole, M. (2016). "The Need for Prevention through Design in Civil Engineering Curricula." 2016 ASEE Annual Conference & Exposition, ASEE Conferences, New Orleans, Louisiana.

Toole, T. M. (2017). "Adding Prevention through Design to Civil Engineering Educational Programs." Journal of Professional Issues in Engineering Education and Practice, 143(4), 02517005.

Wilbanks, D. W. (2015). "Prevention through Design: A Curriculum Model to Facilitate Hazard Analysis & Risk Assessment." Professional Safety, 2015(4), 46-51.

PtD and Research

Gambatese, J. (2008). "Research Issues in Prevention through Design." Journal of Safety Research, 39(2), 153-156.

Gambatese, J., Hallowell, M., Renshaw, F. M., Quinn, M. M., and Heckel, P. (2013). "Research: The Power of Collaboration." Professional Safety, 2013(1), 48-54.

Gambatese, J., Toole, T. M., and Behm, M. (2008). "Prevention through Design Practice and Research: A Construction Industry Perspective." Evolution of and Directions in Construction Safety and Health, International Council for Research and Innovation in Building and Construction (CIB) W99 Working Commission Rinker International Conference Gainesville, FL.

Ku, K., and Mills, T. (2010). "Research Needs for Building Information Modeling for Construction Safety." International Proceedings of the Associated Schools of Construction (ASC) 45th Annual ConferenceBoston, MA.

PtD and Innovation

Behm, M., Culvenor, J., and Genn, K. (2017). "Safe Design: A Source for Innovation in the Built Environment." Practice Periodical on Structural Design and Construction, 22(4), 04017024.

Behm, M., Culvenor, J., and Genn, K. (2011). "Can Safe Design be a Source for Construction Innovation?" Prevention: Means to the End of Construction Injuries, Illnesses, and Fatalities, Proceedings of the International Council for Research and Innovation in Building and Construction (CIB) W99 Conference Washington, DC.

Culvenor, J. (2006). "Creating Transformational Change through Innovation in Risk Management, keynote address." Risk Management Research and Practice: An Educational Perspective, Welsh Risk Pool and University of Wales, Bangor, Trearddur Bay Hotel and Conference Centre, Holyhead, Anglesey, UK.

Karakhan, A. A., and Gambatese, J. A. (2017). "Safety Innovation and Integration in High-Performance Designs: Benefits, Motivations, and Obstacles." Practice Periodical on Structural Design and Construction, 22(4), 04017018.

Weidman, J. E., Young-Corbett, D., Koebel, C. T., Fiori, C., and Montague, E. N. (2011). "Prevention through Design: Use of the Diffusion of Innovation Model to Predict Adoption." International Council for Research and Innovation in Building and Construction Conference (CIB) W099 Conference Washington, DC.

Communication, Collaboration, and PtD

Clark, J. (2000). "The Role of Information Technology in Improving Safety and Health Input into the Design Phase. A Planning Supervisors View." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 69-76.

Duffy, B. M. (2004). "From Designer Risk Assessment to Construction Method Statements: Techniques and Procedures for Effective Communication of Health and Safety Information." Designing for Safety and

Health in Construction, A Research and Practice Symposium, S. Hecker, J. Gambatese, and M. Weinstein, eds., University of Oregon Press, Eugene, OR, Portland, OR, 118-135.

Edic, J., and Cunningham, G. (2011). "Emerging Trends: Constructability through Design Review & Collaboration." <www.aia.org/practicing/groups/kc/AIAB081070>. (Aug 20, 2015, 2015).

Istephan, T. "Collaboration, Total Design, and Integration of Safety and Health in Design – Project Case Studies." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 264-279.

MacKenzie, J., Gibb, A., and Bouchlaghem, N. M. (2000). "Communication: The Key to Designing Safely." Proceedings of the Designing for Safety and Health Conference, Sponsored by C.I.B. Working Commission W99 and the European Construction Institute (ECI) London, England.

Norhidayah, M. U., Gibb, A., Anumba, C., and Gambatese, J. (2012). "Communication of Construction Health and Safety Information in Design." Proceedings of the CIB W099 International Conference on "Modeling and Building Health and Safety", Singapore, 230-239.

PtD Issues & Concerns

PtD Constraints/Viability

Gambatese, J., Behm, M., and Hinze, J. "Pilot Study of the Viability of Designing for Construction Worker Safety." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 22-43.

Gambatese, J., Behm, M., and Hinze, J. (2005). "Viability of Designing for Construction Worker Safety." Journal of Construction Engineering and Management, 131(9), 1029-1036.

Gambatese, J., Hinze, J., and Behm, M. (2005). "Investigation of the Viability of Design for Safety." CPWR - The Center to Protect Workers' Rights.

Ghosh, S., Young-Corbett, D., and Weidman, J. (2011). "Barriers to the Adoption of Prevention through Design (PtD) Controls among Masonry Workers." CIB W099 Conference: Prevention - Means to the End of Construction Injuries, Illnesses and Fatalities, Washington, DC.

Kletz, T. A. (1999). "Constraints on inherently safer design and other innovations." Process Safety Progress, 18(1), 64-69.

Mehany, M. S. H. M., Langar, S., Bhattacharjee, S., and Ghosh, S. (2016). "Prevention through Design (PtD): Current State of Implementation in the Design Industry." 52nd ASC Annual International Conference Proceedings Provo, UT.

Toole, M., and Gambatese, J. (2017). "Levels of Implementation of Prevention through Design in the United States." Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds., Cape Town, South Africa.

Cultural/Ethical Issues

Öney-Yazıcı, E., and Dulaimi, M. F. (2015). "Understanding designing for construction safety: the interaction between confidence and attitude of designers and safety culture." Architectural Engineering and Design Management, 11(5), 325-337.

Toole, M. (2007). "Design Engineers' Responses to Safety Situations." Journal of Professional Issues in Engineering Education and Practice, 133(2), 126-131.

Valdes-Vasquez, R., and Klotz, L. (2011). "Incorporating the Social Dimension of Sustainability into Civil Engineering Education." Journal of Professional Issues in Engineering Education and Practice, 137(4), 189-197.

Valdes-Vasquez, R., and Klotz, L. E. (2013). "Social sustainability considerations during planning and design: framework of processes for construction projects." Journal of Construction Engineering & Management, 139(1), 67-76.

Insurance Issues

Braun, T. W. (2008). "Prevention through Design (PtD) from the Insurance Perspective." Journal of Safety Research, 39(2), 137-139.

DeVries, S., and Grigg, D. "An Insurance Perspective on the Role of Architectural and Design Professionals in Worksite Safety and Health." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 178-185.

Karakhan, A. A. (2016). "Designer's Liability: Why Applying PTD Principles Is Necessary." Professional Safety, 2016(4), 53-58.

Legal Issues

Anderson, J. (2000). "Finding the Right Legislative Framework for Guiding Designers on their Health and Safety Responsibilities." Proceedings of the Designing for Safety and Health Conference, Sponsored by C.I.B. Working Commission W99 and the European Construction Institute (ECI) London, England.

Anderson, J. (2009). "With the Best Will in the World." SHP Online, London, UK.

Ash, R. (2000). "CDM and Design: Where Are We Now And Where Should We Go? - A Personal View." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 151-158.

Behm, M. "Legal and Ethical Issues in Designing for Construction Worker Safety." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 165-177.

Ciribini, A. (2000). "Safety Planning and Design Stages: Public Works Procurement Routes in Italy." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 159-166.

Coble, R., and Blatter, R. (1999). "Concerns with Safety in Design/Build Process." Journal of Architectural Engineering, 5(2), 44-48.

Gambatese, J. (1998). "Liability in Designing for Construction Worker Safety." Journal of Architectural Engineering, 4(3), 107-112.

Hatem, D. J. (2002). "Design Professionals and Construction Means, Methods, Techniques, Sequences, and Procedures: Are the Lines of Involvement and Responsibility Really that Absolute and Clear?" The 33rd Annual Meeting of Invited Attorneys, Victor O. Schinnerer & Company, Inc.

Judy, S. (2016). "Designers Face Collapse Fallout." Engineering News Record, McGraw-Hill, Troy, MI, 8-9.

Toole, T. M., and Erger, K. (2019). "Prevention through Design: Promising or Perilous?" Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 11(1), 04518023.

Regulatory/Policy Issues

Aires, D. M., Gámez, C. R., and Gibb, A. (2010). "Has the European Directive 92/57/EEC been a significant milestone in Prevention through Design (PtD) for construction?" 8th International Conference on Occupational Risk Prevention ORP, Valencia, Spain.

Aires, D. M., Gámez, C. R., and Gibb, A. (2010). "Prevention through design: The effect of European Directives on construction workplace accidents." Safety Science, 48(2), 248-258.

Aires, D. M., Gámez, C. R., and Gibb, A. (2016). "The impact of occupational health and safety regulations on prevention through design in construction projects: Perspectives from Spain and the United Kingdom." Work, 53(1), 181-191.

Andres, R. N. (2002). "Risk Assessment & Reduction: A Look at the Impact of ANSI B11.TR3." Professional Safety, 47(1), 20-26.

Asbury, S. (2009). "The CDM regulations: What difference have they made to construction safety?" Building Engineer, 84(10), 32-33.

ASCE (2012). "Policy Statement 350 - Construction Site Safety." http://www.asce.org/issues-and-advocacy/public-policy/policy-statement-350---construction-site-safety/. (July 6, 2016, 2016).

Ash, R. (2000). "CDM and Design: Where are We Now and Where should We Go? – A Personal View." Proceedings of the Designing for Safety and Health Conference, Sponsored by C.I.B. Working Commission W99 and the European Construction Institute (ECI) London, England.

Beal, A., Walter, H., Hordyk, M., Wood, A. M., and Reilly, N. (2007). "CDM regulations: 12 year of pain but little gain." Proceedings of the Institution of Civil Engineers: Civil Engineering, 160(3), 105-106.

Beal, A. N. (2007). "CDM regulations: 12 years of pain but little gain." Proceedings of the Institution of Civil Engineers: Civil Engineering, 160(2), 82-88.

Bluff, L. (2003). "Regulating Safe Design and Planning of Construction Works: A Review of Strategies for Regulating OHS in the Design and Planning of Buildings, Structures and Other Construction Projects." Australian National University.

Cavanaugh, D. "The Role of Design in OSHA Regulations." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 186-193.

CDM TASK GROUP (1998). "CDM regulations - the role of the designer." The Structural Engineer, 76(23/24).

Dias, L. A., Júnior, J. M., and Lopez-Valcárcel, A. (2009). "The ILO Convention 167 on Safety and Health in Construction and the Globalization of the Construction Industry." XXIX International Symposium of the ISSA Construction Section on Occupational Safety and Health in the Construction Industry Brussels, Belgium.

Frontline Consultants (2011). "Evaluation of Construction (Design and Management) Regulations 2007: Pilot Study." Prepared by Frontline Consultants, Health and Safety Executive, Research Report RR845.

Gambatese, J. (2013). "Assess the Effects of PtD Regulations on Construction Companies in the UK." NIOSH, Cincinnati, OH.

Gambatese, J., Behm, M., and Hinze, J. (2003). "Engineering Mandates Stipulated in OSHA Regulations." Construction Research Congress, American Society of Civil Engineers, 1-8.

Gambatese, J., Gibb, A. G., Bust, P., and Behm, M. (2009). "Industry's Perspective of Design for Safety Regulations." Working Together: Planning, Designing, and Building a Health and Safe Construction Industry, International Council for Research and Innovation in Building and Construction (CIB) W99 Conference Melbourne, Australia.

Gilbertson, A. (2007). "CDM2007 – Workplace "in-use" guidance for designers." Construction Industry Research and Information Association, London, UK.

Giusti, T., Capone, P., and Getuli, V. (2016). "Design and safety: from the EU directives to the national legislation." CIB World Building Congress 2016: Intelligent Built Environment for Life, Tampere, Finland.

Griffith, A., and Phillips, N. (2001). "The influence of the Construction (Design and Management) Regulations 1994 upon the procurement and management of small building works." Construction Management and Economics, 19(5), 533-540.

Howe, J. (2008). "Policy Issues in Prevention through Design." Journal of Safety Research, 39(2), 161-163.

Jeffrey, J., and Douglas, I. (1994). "Safety Performance of the United Kingdom Construction Industry." 5th Annual Rinker International Conference Focusing on Construction Safety and Loss Control Gainesville, Fl.

Lapping, J. (1997). "OSHA Standards that Require Engineers." Construction Safety Affected by Codes and Standards: Proceedings of a Session Sponsored by the Design Loads on Structures During Construction Standards Committee and the Performance of Structures During Construction Technical Committee of the Structural Engineering Institute, R. T. Ratay, ed., American Society of Civil Engineers, Minneapolis, MN.

Maloney, W., and Cameron, I. "Lessons Learned for the US from the UK's CDM Regulations." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 69-80.

Rowan, J. (2008). "Safety management + CDM regulations a year on." Building Engineer, 83(11), 16-17.

Toole, M., Heckel, P., and Hallowell, M. (2013). "Policy Development: A key Factor in Promoting PTD." Professional Safety, 2013(1), 41-47.

Toole, T., and Gambatese, J. (2002). "Primer on Federal Occupational Safety and Health Administration Standards." Practice Periodical on Structural Design and Construction, 7(2), 56-60.

Trenter, N. A., Anderson, J., Corbet, S., Allen, D., Hutchinson, V., and Gill, W. (1997). "Repercussions of CDM regulations in geotechnical engineering." Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 125(1), 53-54.

Experience from Countries

Behm, M., and Culvenor, J. (2011). "Safe Design in Construction: Perceptions of Engineers in Western Australia." J Health & Safety Research & Practice, 3(1), 9-32.

Berger, J (1999) 'Construction safety coordination in Germany' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 51-60.

Caldwell, S (1999) 'Construction safety coordination in the United Kingdom' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 141-148.

Casals M and Etxeberria M and Salgado R (1999) 'Construction safety coordination in Spain' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 121-133.

Choudhry, R. M., Lingard, H., and Blismas, N. (2009). "Designing for Safety: Perspectives from European Union, United Kingdom, Australia, and United States Pertaining to Safety and Health in Construction." CIB W099 Conference on Construction Safety - Working Together: Planning, Designing and Building a Heathy and Safe Industry, H. Lingard, and A. Gibb, eds., Melbourne, Australia.

Cosman, M. "Rules, Culture, Outcomes. What Does the UK Experience Mean?" Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 59-68.

Creaser, W. (2008). "Prevention through Design (PtD) Safe Design from an Australian Perspective." Journal of Safety Research, 39(2), 131-134.

Dias, L (1999) 'Construction safety coordination in Portugal' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 111-120.

Fleming, T., Lingard, H., and Wakefield, R. (2007). "Guide to Best Practice for Safer Construction:

Principles." Cooperative Research Center for Construction Innovation, Brisbane, Australia.

Gibb, A. "Designing for Safety and Health in Construction – A European/UK View." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 44-57.

Godfrey, P., and Lingard, H. (2007). "Safer construction: the development of a voluntary code of practice to improve safety performance in the Australian construction industry." 4th Civil Engineering Conference in the Asian Region, Taipei, Taiwan.

Gottfried, A (1999) 'Construction safety coordination in Italy' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 83-97.

Hellidi, U (1999) 'Construction safety coordination in Denmark' (pp 27-39) in Gottfried, A, Trani, M and Dias, L eds Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 27-39.

Hernandez-Arriaza, F. A., Perez-Alonso, J., Gomez-Galan, M., and Salata, F. (2018). "The Guatemalan Construction Industry: Approach of Knowledge Regarding Work Risks Prevention." Int J Environ Res Public Health, 15(10).

Lingard, H., and Blismas, N. (2008). "Occupational health and safety in Australia: The construction industry's response to the national strategy 2002-2012." 14th Rinker International Conference Gainesville, Florida.

Lakka, A and Sauni, S (1999) 'Construction safety coordination in Finland' in Gottfried, A, Trani, M and Dias, L eds Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 41-49.

Lorent, P. (1999). "Construction Safety Coordination in Belgium and Luxembourg." Safety Coordination and Quality in Construction, Proceedings of International Conference CIB W099 and TG 36, 22-23 June, A. Gottfried, L. Trani, and L. A. Sias, eds.Milan, Italy, 7-26.

McCabe, P (1999) 'Construction safety coordination in Ireland' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 69-81.

NOHSC (2003). Eliminating hazards at the design stage (safe design) [electronic resource]: options to improve occupational health and safety outcomes in Australia: issues paper, National Occupational Health and Safety Commission, Canberra, Australia.

Önsten, G and Patay, A (1999) 'Construction safety coordination in Sweden" in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department,

Polytechnic of Milan, Milan, pp 135-139.

Papaioannu, K (1999) 'Construction safety coordination in Greece' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 61-67.

Schaefer, W and Munck, M (1999) 'Construction safety coordination in the Netherlands' in Gottfried, A, Trani, M and Dias, L eds, Safety Coordination and Quality in Construction, International Council for Research and Innovation in Building and Construction, Building Engineering and Territorial Systems Department, Polytechnic of Milan, Milan, pp 100-109.

Song, H., and Kunishima, M. (2000). "The Roles of Client and Designer for Construction Safety Design in Japan." Designing for Safety and Health, A. Gibb, ed., European Construction Institute, London, UK, 167-174.

Toh, Y. Z., Goh, Y. M., and Guo, B. H. W. (2017). "Knowledge, Attitude, and Practice of Design for Safety: Multiple Stakeholders in the Singapore Construction Industry." Journal of Construction Engineering and Management, 0(0), 04016131.

Toole, M., and Marquis, S. "Site Safety Attitudes of US and UK Design Engineers." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 81-91.

Moving PtD Forward / The future of PtD

Akladios, M., McMullin, D., Becker, P. E., Gopalakrishnan, B., Carr, M., and Lobo, P. "Advances in safety by design." Proc., Intelligent Systems in Design and Manufacturing III, November 6, 2000 - November 8, 2000, Society of Photo-Optical Instrumentation Engineers, 338-347.

Akladios, M., McMullin, D., Gopalakrishnan, B., Becker, P. E., Carr, M., Lobo, P., Farmani, M., and Decker, A. "Safety by design and future developments." Proc., Intelligent Systems in Design and Manufacturing IV, 29-30 Oct. 2001, SPIE-Int. Soc. Opt. Eng., 11-21.

Bhattacharjee, S., Ghosh, S., and Young-Corbett, D. (2011). "The Next Step to Improve Safety – Prevention through Design." 47th Annual International Conference of Associated Schools of Construction (ASC) Omaha, Nebraska.

Gambatese, J., Gibb, A., Bust, P., and Behm, M. (2017). "Expanding Prevention through Design (PTD) in Practice: Innovation, Change, and a Path Forward." Joint CIB W099 and TG59 International Safety, Health, and People in Construction Conference, Towards better Safety, Health, Wellbeing, and Life in Construction, 11-13 June 2017, F. Emuze, and M. Behm, eds., Cape Town, South Africa.

Gambatese, J. A., Gibb, A. G., Brace, C., and Tymvios, N. (2017). "Motivation for Prevention through Design: Experiential Perspectives and Practice." Practice Periodical on Structural Design and Construction, 22(4), 04017017.

Gupta, J. P., and Edwards, D. W. (2002). "Inherently Safer Design—Present and Future." Process Safety

and Environmental Protection, 80(3), 115-125.

Hecker, S., Gambatese, J., and Weinstein, M. (2006). "Designing for Construction Safety in the U.S.: Progress, Needs, and Future Directions." IEA2006, 16th World Congress on Ergonomics, International Ergonomics Association (IEA) Maastricht, The Netherlands.

Hecker, S., and Gambatese, J. W., M. "The Way Forward for Design for Construction Safety and Health." Proc., Designing for Safety and Health in Construction, A Research and Practice Symposium, University of Oregon Press, Eugene, OR, 301-307.

Kletz, T. A. (1996). "Inherently safer design: the growth of an idea." Process Safety Progress, 15(1), 5-8.

Kletz, T. A. (2003). "Inherently Safer Design—Its Scope and Future." Process Safety and Environmental Protection, 81(6), 401-405.

Lin, M.-L. (2008). "Practice Issues in Prevention through Design." Journal of Safety Research, 39(2), 157-159.

Manuele, F. A. (2008). "Prevention through Design (PtD): History and Future." Journal of Safety Research, 39(2), 127-130.

Mroszczyk, J. (2009). "Safety Engineering: The Future of the profession in the U.S." Professional Safety, 2009(1), 33-41.

NIOSH (2014). "The State of the National Initiative on Prevention through Design - Progress Report 2014." CDC - NIOSH.

Toole, M., and Gambatese, J. (2007). "The Future of Designing for Construction Safety." Proceedings of the 2007 Construction Research Congress, ASCE, ed., Grand Bahama Island, Bahamas.

Toole, M., and Gambatese, J. (2008). "The Trajectories of Prevention through Design in Construction." Journal of Safety Research, 39(2), 225-230.

Tymvios, N., and Gambatese, J. A. (2016). "Direction for Generating Interest for Design for Construction Worker Safety - A Delphi Study." J Constr Eng Manage Journal of Construction Engineering and Management, 142(8).

Dissertations/Theses

Aires, D. M. (2009). "Analysis of the Management of Labor Risk Prevention in the Construction Sector in Europe. Prevention through Design (PtD) in Spain and United Kingdom." Ph.D, Universidad de Granada, Granada.

Behm, M. (2004). "Establishing the Link between Construction Fatalities and Disabling Injuries and the Design for Construction Safety Concept." Ph.D, Oregon State University, Corvallis, OR.

Bello, M. A. (2012). "Minimizing Impediments to Design for Construction Safety (DFCS) Implementation on Capital Projects." Ph.D, Carnegie Mellon University, Pittsburgh, PA.

Bolte, D. (2019). "Fall hazard prevention system in an early design stage with BIM." MS, Eindhoven

University of Technology, Eindhoven, Netherlands.

Cañamares, M. S. (2015). "Integración de la prevención de riesgos laborales en las pymes del sector de la construcción." Ph.D, Universidad de Castilla-La Mancha.

Cowley, S. (2006). "OH&S in Small Business: Influencing the Decision Makers." Ph.D, University of Ballarat, Victoria, Australia.

Dharmapalan, V. (2011). "Risk Factor Quantification of Design Elements for Multistory Commercial Office Buildings." MS, Oregon State University, Corvallis, Oregon.

Gambatese, J. (1996). "Addressing construction worker safety in the project design." Ph.D, University of Washington, Seattle.

Hollingsworth, J. C. (2011). "Design for Construction Worker Safety: A Field Research Project." MS, Indiana State University, Terre Haute, IN.

Hardison, D. C. (2018). "Hazard Recognition in Design: Evaluating the Effects of Design Information on Hazard Recognition Performance." PhD, University of Colorado at Boulder, Boulder, CO.

Haupt, T. C. (2001). "The Performance Approach to Construction Worker Safety and health." PhD, University of Florida, Gainesville, FL.

Huang, X. (2003). "The Owner's Role in Construction Safety." Ph.D, University of Florida, Gainesville, FL.

López-Arquillos, A., Rubio-Romero, J. C., and Martinez-Aires, M. D. (2015). "Prevention through Design (PtD). The importance of the concept in Engineering and Architecture university courses." Safety Science, 73, 8-14.

Marini, J. (2007). "Designing for Construction Worker Safety: A Software Tool for Designers." MS, University of Florida, Gainesville, FL.

Mwanaumo, E. M. u. (2013). "An Integrated Approach to Multi-Stakeholder Interventions in Construction Health and Safety." Ph.D, University of Johannesburg, Johannesburg, South Africa.

Mzyece, D. (2015). "An Investigation into the Implementation of the Construction (Design and Management) Regulations in the Construction Industry." Ph.D, University of Wolverhampton, Wolverhampton, UK.

Rwamamara, R. A. (2007). "Planning the Healthy Construction Workplace through Risk Assessment and Design Methods." Ph.D, Luleå University of Technology, Luleå, Sweden.

Sarrate, C. A. (2013). "Análisis del Modelo Regulatorio de la Seguridad y Salud en la Construcción en España e Integración de la prevención a través den Diseño." PhD, Universidad Politécnica de Madrid, Madrid, Spain.

Sulaiman, K. (2008). "A Study of Building Procurement Process as a Potential Tool to Enhance Safety Practice in the Construction Industry." Ph.D, University of Salford, Salford, UK.

Tymvios, N. (2013). "Direction, Method, and Model for Implementing Design for Construction Worker Safety in the US." Ph.D, Oregon State University, Corvallis, OR.

Ulang, N. M. (2012). "Communication of Construction Health and Safety Information in Design." Ph.D, Loughborough University, Loughborough, UK.

Umar, A. A. (2010). "Design for Safety Framework for Offshore Oil and Gas Platforms." PhD, The University of Birmingham, Birmingham, UK.