

Unleashing the Profession

How Performance-Based Design Will Shape Our Future

By Anne M. Ellis, P.E., F.ACI, F.ASCE



Meeting and getting to know leaders of our profession – authors of textbooks, chairs of committees, ENR newsmakers – is one of the many perks of SEI engagement. In sharing insights from recent conversations with leaders helping to shape our future, I intend to inspire you to join in.

Performance-Based Design (PBD) is a powerful approach anticipated to shape the future of the structural engineering profession. PBD turns the traditional design paradigm upside down as required performance is the starting point for the design. Ron Klemencic, P.E., S.E., Hon.AIA, F.SEI, F.ASCE, Chairman and C.E.O. of Magnusson Klemencic Associates and Director of the Charles Pankow Foundation (CPF), emphasizes that “Innovation in the building industry is many times hampered by prescriptive code provisions, which are arcane and based on technologies and methodologies decades old. Performance-based design unshackles the engineer, encouraging creative thinking enabled by the tools and technologies of today.”

Is PBD the answer? Is the profession ready? Per Don Dusenberry, P.E., SECB, F.SEI, F.ASCE, Consulting Principal of Simpson Gumpertz & Heger Inc. and Chair of the SEI Committee to Advance PBD, attests, “Engineers have the tools to perform the necessary analyses and the imperative to design reliable structures that provide economy, serviceability, sustainability, and robustness. PBD is the means to accomplish these goals.” Dusenberry notes SEI initiatives presently underway will coordinate the activities of the many organizations that are advancing PBD and provide frameworks and guidance resources that engineers can use to pursue PBD. He predicts, “We will build structures with established reliability, are responsive to the goals – beyond life safety – that are important to our clients and society.”

However, do our model codes allow PBD? Ron Hamburger, S.E., P.E., SECB, F.SEI, Senior Principal of Simpson Gumpertz & Heger Inc. and Chair of ASCE 7 responds, “Like most contemporary design specifications, the industry loading standard ASCE 7,

Minimum Design Loads and Associated Criteria for Buildings and Other Structures, has been performance-based for many years, meaning that adherence to its design recommendations, and those of its companion reference standards, is intended to meet certain performance standards. This includes a defined notional probability of failure, as well as protection of service performance for routine loadings. While these performance goals had been present for many years, they remained invisible to much of the practicing profession.” He further explains that clearly included PBD methodology – starting with ASCE 7-10 and continuing with ASCE 7-16 – provides an alternative to traditional design approaches, includes performance goals associated with the operability of critical service equipment, and PBD design criteria associated with tsunami loading and fire resistance.

Experts agree, PBD is needed, many tools are established, and there is a precedent for use. So, what comes next? SEI in partnership with CPF is leading efforts to enable PBD for wind and structural fire engineering.

Performance-based Wind Design

Donald Scott, P.E., S.E., F.SEI, F.ASCE, Vice President, Director of Engineering, PCS Structural Solutions and Chair of the ASCE 7-22 Wind Loads Subcommittee, is Principal Investigator of the ASCE/SEI *Pre-standard for Performance-Based Design for Wind*. Scott shares, “As the use of PBD has advanced for seismic design, and in certain areas of the country, utilizing prescriptive, code-based wind loading provisions tends to ‘fight against’ the benefits of the PBD seismic provisions, resulting in overall poorer performance for these buildings.” Scott believes, “the Pre-Standard currently being developed will allow the designer more flexibility and creativity in the design of the lateral force resisting system for the building and advance the requirements for the design of the components and cladding systems that protect the building interior. The provisions will provide for the

same reliability for the building as if it were designed per the existing code requirements.”

Structural Fire Engineering

Structural fire engineering is another area in which using PBD can make a difference. As Kevin LaMalva, P.E., M.ASCE, Senior Staff at Simpson, Gumpertz & Heger and Chair of the SEI Fire Protection Committee, explains, “Structural fire protection has not appreciably changed in a century, and there is little to no synergy between structural design and applied fire protection. Conversely, PBD structural fire engineering involves the rational allocation of resources to achieve an acceptable level of intrinsic structural fire performance.” Structural Fire Engineering may be a new topic to many of us; however, according to LaMalva, “structural fire engineering (SFE) is about 90% structural engineering, so the bridge that a structural engineer needs to cross in order to practice structural fire engineering is shorter than most think.” To this end, LaMalva is leading an SEI/CPF effort to develop SFE exemplar designs based on actual buildings following the PBD framework of ASCE 7-16 *Appendix E*.

Both projects will be completed this year and available for free from SEI and CPF. Thanks to these leaders, SEI members sharing expertise, and SEI with financial support from ACIF, AISC, ArcelorMittal, and MKAF via CPF, we will catapult forward. As stated by Ron Klemencic, “We are advancing our profession’s quest for better ways to design and build, and performance-based design is key to this advancement.”

Join us at Structures Congress, April 24-27 in Orlando, to learn more from these experts and about these initiatives during the panel session titled, *Unleashing the Profession*, on April 26. www.structurescongress.org



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