

Gary S. Prinz, Ph.D., P.E.

Assistant Professor
Department of Civil Engineering
University of Arkansas
4190 Bell Engineering Center, Fayetteville, AR 72701

Office: Bell 4156
Phone: (479) 575-2494
prinz@uark.edu

PROFESSIONAL APPOINTMENTS:	2014–Cur	Assistant Professor University of Arkansas Department of Civil Engineering
	2011–2013	Postdoctoral Research Scientist, Swiss Federal Institute of Technology (EPFL) Supervisor: Alain Nussbaumer Research Area/Skills: Ductile fracture, ultra low-cycle fatigue, earthquake resistant design, large-scale experimental testing.
	2010–2011	Staff Engineer IV, Applied Research Associates, Inc. Security Engineering & Applied Science Sector Notable Projects: <ul style="list-style-type: none">■ Blast assessment and design of new embassy compound MSGQ facility in Santo Domingo, Dominican Republic■ Blast assessment and preliminary retrofit of existing FAA TRACON Facility■ System-level blast analysis of 22-story glass curtain wall for Wendell Wyatt, Edith Green Federal Building in Portland, Oregon■ Development of retrofit guidelines for hurricane wind hazard mitigation along the Mississippi coast
EDUCATION:	2011-2013	Postdoc, Swiss Federal Institute of Technology (EPFL) Steel Structures Laboratory, ICOM School of Architecture, Civil and Environmental Engineering, ENAC
	2010	Ph.D., Civil and Environmental Engineering, Brigham Young University Advisor: Paul W. Richards Dissertation: <i>Using buckling-restrained braces in eccentric configurations</i>
	2007	M.S., Civil and Environmental Engineering, Brigham Young University Advisor: Paul W. Richards Thesis: <i>Effect of beam splicing on seismic response of buckling-restrained braced frames</i>
	2007	B.S., Civil and Environmental Engineering, Brigham Young University <i>Minor in Mathematics: Elective coursework in advanced numerical methods</i>
RESEARCH INTERESTS:		Mechanics and simulation of ductile fracture; Ultra low-cycle fatigue; Seismic design and retrofit solutions for steel structures; Infrastructure fatigue assessment methods; Large-scale experimental testing of structural components and systems; Computer simulation of structures under dynamic loads.
RECENT RESEARCH PROJECTS:	2014-2015	<u>Fatigue of welded shear studs and re-evaluation of CAFL in AASHTO standard:</u> <i>This study re-evaluates the fatigue capacity of welded shear studs using existing fatigue push-out data and an advanced probabilistic approach wherein data uncertainties are characterized and accounted for. In addition, new stud fatigue tests are conducted to better characterize fatigue performance at low stress ranges to re-asses the existing AASHTO CAFL which often govern in composite bridge designs. Funding for this project is provided by W&W/AFCO Steel.</i>

PUBLICATIONS:

(Journal Articles)

- J14. Cortes, G., and **Prinz, G.S.** “Seismic fragility analysis of large unanchored steel tanks considering instability and fatigue damage.” *Bulletin of Earthquake Engineering*, Accepted.
- J13. Ovuoba, B., and **Prinz, G.S.** “On the fatigue capacity of headed shear studs in composite bridge girders.” *Journal of Bridge Engineering, ASCE*, Accepted.
- J12. Dang, C.N., Floyd, R.W., **Prinz, G.S.**, and Hale, W.M. (2016). “Determination of bond stress distribution coefficient by maximum likelihood method.” *J. Structural Engineering, ASCE*, DOI: 10.1061/(ASCE)ST.1943-541X.0001460
- J11. **Prinz, G.S.**, and Richards, P.W. “Demands on reduced beam section connections with out-of-plane skew.” *J. Structural Engineering, ASCE*, 142(5).
- J10. Ghafoori, E., Motavalli, M., Nussbaumer, A., Herwig, A., **Prinz, G.S.**, and Fontana, M. (2015). “Determination of minimum CFRP pre-stress levels for fatigue crack prevention in retrofitted metallic beams.” *Engineering Structures*, 84(2015), pp.29-41
- J9. Ghafoori, E., Motavalli, M., Nussbaumer, A., Herwig, A., **Prinz, G.S.**, and Fontana, M. (2015). “Design criterion for fatigue strengthening of riveted beams in a 120-year-old railway metallic bridge using pre-stressed CFRP plates.” *Composites Part B*, 68(2015).
- J8. **Prinz, G.S.**, and Nussbaumer, A. (2014). “Effect of radial base-plate welds on the ULCF capacity of tank connections” *J. Constructional Steel Research*, 103(2014), p.131-139
- J7. Ghafoori, E., **Prinz, G.S.**, Nussbaumer, A., Motavali, M., Herwig, A., and Fontana, M. (2014). “Finite element analysis for fatigue damage reduction in metallic riveted bridges using pre-stressed CFRP plates.” *Polymers*, 6(4), p.1096-1118.
- J6. **Prinz, G.S.**, Coy, B., and Richards, P.W. (2014). “Experimental and numerical investigation of ductile top-flange beam splices for improved buckling-restrained braced frame behavior” *J. of Structural Engineering, ASCE*, 140(9), p.04014052:1-9.
- J5. **Prinz, G.S.**, Nussbaumer, A., Borges, L., and Khadka, S. (2014). “Experimental testing and simulation of bolted beam-column connections having thick extended end-plates and multiple bolts per row” *Engineering Structures*, 59(2014), p. 434-447.
- J4. **Prinz, G.S.**, and Nussbaumer, A. (2012). “On the low-cycle fatigue capacity of unanchored steel liquid storage-tank shell-to-base connections” *Bulletin of Earthquake Engineering*, 10(6), p.1943-1958
- J3. **Prinz, G.S.**, and Nussbaumer, A. “Fatigue analysis of liquid storage-tank shell-to-base connections under multi-axial loading” *Engineering Structures*, 40(2012), p.75-82
- J2. **Prinz, G.S.**, and Richards, P.W. (2012). “Seismic performance of buckling-restrained braced frames with eccentric configurations.” *J. Structural Engineering, ASCE*, 138(3), p.345-353
- J1. **Prinz, G.S.**, and Richards, P.W. (2009). “Eccentrically braced frame links with reduced web sections” *J. Constructional Steel Research*, 65(2009) 1971-78

(Book Chapters)

- B1. **Prinz, G.S.**, and Nussbaumer, A. (2013). “On fast transition between shelters and housing after natural disasters in developing regions.” Chapter 19 in “*Technologies for Sustainable Development: A Way to Reduce Poverty?*” Springer-Verlag. ISBN 978-3-319-00638-3.

(Conference Papers)

- C11. Ghafoori, E., Motavalli, M., Herwig, A., Nussbaumer, A., **Prinz, G.S.**, and Fontana, M. (2016). “Fatigue strengthening of riveted girders in a historic railway metallic bridge in Switzerland using pre-stressed un-bonded CFRP laminates.” *8th International Conference on Bridge Maintenance, Safety and Management (IABMAS)* Foz do Iguaçu, Brazil.

- C10. Ghafoori, E., Motavalli, M., Herwig, A., Nussbaumer, A., **Prinz, G.S.**, and Fontana, M. (2016). “A strengthening theory to prevent fatigue crack initiation in old metallic bridges.” *8th International Conference on Bridge Maintenance, Safety and Management (IABMAS)* Foz do Iguaçu, Brazil.
- C9. **Prinz, G.S.**, and de Castro-e-Sousa, A. (2014). “Effect of slab stiffness on EBF link rotation demands and implications for link ultra low-cycle fatigue susceptibility.” *ASCE Structures Congress, 2014*, Boston, Massachusetts.
- C8. Ghafoori, E., Motavalli, M., Nussbaumer, A., Herwig, A., **Prinz, G.S.**, and Fontana, M. (2014). “Determination of minimum CFRP pre-stress level for fatigue crack prevention in retrofitted metallic beams.” *7th International Conference on FRP Composites in Civil Engineering (CICE)*, Vancouver, Canada.
- C7. **Prinz, G.**, Ghafoori, E., Nussbaumer, A., Motavalli, M., Herwig, A., and Fontana, M. (2013). “Finite element modeling for fatigue strengthening of metallic riveted bridges using un-bonded pre-stressed CFRP plates.” *2nd Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR)*, Istanbul, Turkey.
- C6. **Prinz, G.S.**, and Nussbaumer, A. (2013). “Ultra low-cycle fatigue modeling of welded joints under multi-axial strain conditions for better seismic design.” *Darmstadter Ingenieurkongress: Bau und Umwelt*, Technische Universität Darmstadt (TUD), Darmstadt, Germany. [*Invited presenters*].
- C5. **Prinz, G.S.**, and Richards, P.W. (2012). “Dynamic performance comparison between buckling-restrained braced frames with concentric and eccentric configurations” *15th World conference on earthquake engineering*, Lisbon, Portugal.
- C4. **Prinz, G.S.**, Nussbaumer, A., and Cortes, G. (2012). “Fatigue analysis of unanchored steel liquid storage tank shell-to-base connections during dynamic earthquake induced uplift.” *15th World conference on earthquake engineering*, Lisbon, Portugal.
- C3. Cortes, G., **Prinz, G.S.**, and Nussbaumer, A. (2012). “Cyclic demand at the shell-bottom connection of unanchored steel tanks” *15th World conference on earthquake engineering*, Lisbon, Portugal.
- C2. **Prinz, G.S.**, and Richards, P.W. (2008). “Seismic response of buckling-restrained braced frames with beam splices.” *14th World conference on earthquake engineering*, Beijing, China
- C1. Richards, P.W., and **Prinz, G.S.** (2007). “Non-linear time history analysis of refined mesh steel structures.” *9th Canadian conference on earthquake engineering*, Ontario, Canada.

(Technical Reports)

- R7. Ovuoba, B., and **Prinz, G.S.** (2015). “On the fatigue capacity of headed shear studs in composite bridge girders.” SSRN Report No 2015-1 Submitted to W&W|AFCO Steel and AASHTO T-14 Committee. University of Arkansas, Fayetteville AR.
- R6. **Prinz, G.S.**, and Nussbaumer, A. (2013). “Seismic performance of liquid storage-tank shell-to-base connections – Phase 3,” *Report submitted to the Swiss Federal Office for the Environment (OFEV) and CARBURA*, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, Rapport d’EPFL 186862, Mandat N° IC 495-3.
- R5. **Prinz, G.S.**, and Nussbaumer, A. (2013). “Fatigue strengthening of metallic riveted bridges using un-bonded pre-stressed CFRP plates,” *Report prepared for the Swiss Commission for Technology and Innovation (CTI)*, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, Rapport d’EPFL 185959, Mandat N° IC 497.
- R4. **Prinz, G.S.**, and Nussbaumer, A. (2012). “Seismic performance of liquid storage-tank shell-to-base connections – Phase 2,” *Report submitted to the Swiss Federal Office for the Environment (OFEV) and CARBURA*, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, Rapport d’EPFL 174640, Mandat N° IC 495-2.
- R3. **Prinz, G.S.**, and Nussbaumer, A., (2012). “Material characterization of existing Swiss tanks for fatigue reliability – Supplement to Report EPFL 174640.” *Report submitted to*

the Swiss Federal Office for the Environment (OFEV) and CARBURA, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

- R2. Prinz, G.S.,** and Nussbaumer, A. (2013). “Experimental testing and simulation of bolted beam-column connections having thick extended endplates and multiple bolts per row,” *Report submitted to the Swiss Institute of Steel Construction (SZS), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, Rapport d’EPFL 181194, Mandat N° IC 707.*
- R1. Prinz, G.S.,** and Richards, P.W. (2008). “Eccentrically braced frame links with reduced web sections.” *Report submitted to the American Institute of Steel Construction (AISC), Department of Civil and Environmental Engineering, Brigham Young University, Provo, UT.*

PRESENTATIONS: (Invited Talks)

- T19.** “Earthquake Resistant Design Strategies, Case Studies, and Recent Research Efforts” Presented at the Arkansas Governor’s Earthquake Advisory Council Meeting, Fayetteville, AR, July 22, 2016
- T18.** “Research on the fatigue capacity of headed shear studs in composite bridge girders” Presented at NASCC World Steel Bridge Steel Bridge Symposium, Orlando, FL, April 13, 2016.
- T17.** “Final recommendations on the fatigue capacity of shear connectors in composite bridge girders” Presented to the AASHTO T-14 Committee and Bridge Task Force Design Advisory Group (DAG), Orlando, FL, January 26-29, 2016. (*Invited Talk*)
- T16.** “Re-visiting the fatigue capacity of shear connectors in composite bridge girders” Presented to the AASHTO T-14 Committee and Bridge Task Force Design Advisory Group (DAG), Philadelphia, PA, August 6, 2015. (*Invited Talk*)
- T15.** “On the fatigue capacity of shear connectors in composite bridge girders” Presented to Brigham Young University graduate seminar series, Provo, UT, October 8, 2015. (*Invited Talk*)
- T14.** “A Proposal for Revisiting the Shear Fatigue Capacity of Stud Connectors in Composite Bridge Girders,” presented to: American Iron and Steel Institute (AISI) Design Advisory Group, August 2014, Denver, Colorado.
- T13.** “Implications of Reducing the Number of Required Shear Studs in Bridge Girders,” presented to: Short Span Steel Bridge Alliance (SSSBA) semi-annual meeting, August 2014, Denver, Colorado.
- T12.** “Earthquake-induced fatigue and fracture of liquid storage tank connections,” presented to: Structural Engineering and Structural Mechanics (SESM) Seminar, Department of Civil and Environmental Engineering, UC Davis, May 2014, Davis, California.
- T11.** “Fatigue of welded joints,” presented to: Dept. of Civil and Environmental Engineering, Brigham Young University, October 2013, Provo, Utah.
- T10.** “On LCF and ULCF of welded steel connections during earthquakes,” presented to: College of Engineering, University of Tennessee, March 2013, Knoxville, Tennessee. (Faculty Interview).
- T9.** “On LCF and ULCF of welded steel connections during earthquakes,” presented to: College of Engineering, University of Arkansas, January 2013, Fayetteville, Arkansas. (Faculty Interview).
- T8.** “Findings from ULCF experiments on welded tank connections,” presented to: ICOM seminar, Swiss Federal Institute of Technology (EPFL) April 2012, Lausanne, Switzerland.
- T7.** “On the Low-Cycle Fatigue Capacity of Steel Liquid Storage Tank Shell-to-Base Connections,” presented to: Cockrell School of Engineering, University of Texas at Austin, February 2012, Austin, Texas. (Faculty Interview)

- T6. “Steel Ductile Braced Frame Systems with Architectural Flexibility,” presented to: Dept. of Civil and Environmental Engineering, Wayne State University, August 2010, Detroit, Michigan (Faculty Interview).

(Conference/Workshop Talks)

- T5. “Earthquake resistant design strategies: life safety during the “big one” presented at: ATC-20 Workshop, November 2014, Fayetteville, Arkansas, USA.
- T4. “MBTC 5103: Evaluation and repair of existing bridges in extreme environments” presented at: MBTC Advisory Board Meeting, November 2014, Fayetteville, Arkansas, USA.
- T3. “Effect of slab stiffness on EBF link rotation demands and implications for link ultra low-cycle fatigue susceptibility” presented at: ASCE Structures Congress, April 2014, Boston, Massachusetts, USA.
- T2. “On fast transition between shelters and housing after natural disasters in developing regions” presented at: International Conference on Technologies for Sustainable Development, May 2012, Lausanne, Switzerland.
- T1. “Locally produced structural elements for fast rebuilding,” presented at: FAST Rebuilding Workshop – Fabricating Steel Housing in Developing Regions, Swiss Federal Institute of Technology (EPFL), September 2011, Lausanne, Switzerland.

FUNDED RESEARCH:	\$158,780	Evaluation and repair of existing bridges in extreme environments Funded by: Southern Plains Transportation Center (SPTC) US DOT Grant Number <i>DTRT13-G-UTC36</i> PI: Royce Floyd, Co-PI: Gary S. Prinz (\$75,780 to UofA)
	\$234,482	Corrosion-tolerant pre-stressed CFRP fatigue retrofits for improved waterway lock reliability Funded by: Maritime Transportation Research and Education Center (MarTREC) PI: Gary S. Prinz, Co-PI: C.M. Wood (UofA)
	\$22,500	Toward a fast reconstruction paradigm for urban environments in developing regions affected by natural disasters Funded by: Engineering Research and Innovation Seed Funding Program PI: Gary S. Prinz, Co-PI: J.L. Fairey (UofA)
	\$100,000	Fatigue of welded shear studs in composite bridge girders Funded by: W&W AFCO Steel PI: Gary S. Prinz, Co-PI: W. Micah Hale (UofA)
	\$920,000*	ULCF of welded joints under variable multi-axial strains Funded by: Swiss National Science Foundation (SNSF), (D-A-CH proposal) Total Funding: 800,000 CHF (approx. \$920,000) Collaborating Universities: Graz University of Technology (Austria) Karlsruhe Institute of Technology, KIT (Germany)
	\$88,182*	Effect of radial base-plate welds on tank shell-to-base connection rotation capacity Funded by: the Swiss Federal Office for the Environment (OFEV) and CARBURA, Total Funding: 76,680 CHF (approx. \$88,182)
	\$10,000*	Sustainable FABricated STEel (FAST) structures for developing regions Funded by: Ingénieur du Monde (EPFL), TRONCO Systems (InterTronco S.A.) Collaborating Universities: University of Stellenbosch (South Africa) Indian Institute of Technology (India) Universidade do Estado do Rio de Janeiro (Brazil)

[*Funded while at EPFL]

TEACHING

- 2014-Cur Assistant Professor, University of Arkansas:
Graduate Courses:
 CVEG 563(V) - Fundamentals of Fracture and Fatigue in Structures
 Mean Purdue Rating (Spring 2014): 4.88/5.0 (9 students)
 CVEG 5323 – Structural Dynamics
 Mean Purdue Rating (Spring 2015): 4.79/5.0 (15 students)
Undergraduate Courses:
 CVEG 3304 – Structural Analysis
 Mean Purdue Rating (Fall 2014): 4.70/5.0 (47 students)
 Mean Purdue Rating (Fall 2015): 4.54/5.0 (37 students)
 Mean Purdue Rating (Spring 2016): 4.83/5.0 (35 students)
- 2009-2010 Instructor, Brigham Young University, UT: Engineering Mechanics - Statics
 (2-Terms) Class size of 32-39 undergraduate students.
 Mean Instructor Rating: 7.6/8.0
- 2006-2010 Teaching Assistant, Brigham Young University, UT:
Advanced Courses:
 Structural Dynamics (3-Semesters)
 Design of Aircraft Structures (3-Semesters)
Intermediate Courses:
 Structural Engineering Materials (5-Semesters): Taught experimental labs.

STUDENT
SUPERVISION

- 2014-Cur Supervisor: University of Arkansas
 (UofA)
Post-Doctoral Researchers (1):
 1) Qian Lin (2014 – Curr.)
PhD Students (2):
 1) Brianna Ovuoba (degree expected May 2017): “Fatigue of welded shear connectors in composite bridge girders.”
 2) Alhussin Aliwan (degree expected Dec 2019): “Orthogonal effects in seismically loaded steel systems”
Master’s Students (4):
 1) Clovis Desrochers (degree expected Dec 2016): “Effect of column axial load on the seismic performance of special moment frame connections containing skew”
 2) Christine Lozano (degree expected May 2018): “Full-scale experimental testing of pre-stressed CFRP retrofits for fatigue mitigation in steel lock gate components”
 3) Korey Pough (M.S., Dec. 2015): “Pre-stressed CFRP fatigue retrofits for steel bridge connections.” – *Now at AHTD Bridge Division*
 4) Patrick Jacot-Guillarmod (M.S. EPFL, June 2015): “Effect of concrete slab stiffness on the seismic performance of EBF links”. Co-Advised with Alain Nussbaumer at EPFL – *Now design engineer in Switzerland*
Undergraduate Honors Students (4):
 1) Mallory Maestri: “Developing effective structural and geotechnical engineering demonstrations and curricula for k-12 outreach.”
 2) Peter Vayda (Honors, Dec. 2015): “Cost analysis comparison and design of EBF and BRBF-E seismic systems” – *Now developmental engineer at Hanscom Air-Force Base*

- 3) Clay Sutherland (Honors, Dec. 2015): “Effect of column web stiffeners on the performance of bolted beam-column connections having multiple bolts per row” –*Now at Kimley-Horn*
- 4) Chris Maestri (Honors, May 2016): “Toward a fast reconstruction paradigm for urban environments in developing regions affected by natural disasters” –*Now at Tatum Smith Engineers*

2011-2013 (EPFL) Co-Supervisor: 4 master’s student theses, School of Architecture, Civil and Environmental Engineering, Swiss Federal Institute of Technology (EPFL)

- 1) John Monk: “Seismic design and stability of modular constructions”
- 2) Payam Hashemi: “Development and calibration of ductile fracture models for simulating progressive cyclic fracture in steels”
- 3) Martin Garcia: “Development and optimization of a 3-story building made of cold-formed elements (quickly erectable for developing regions)”
- 4) Emmanuel Mayor: “Stress analysis of the riveted Munchenstein bridge”

Supervisor: School of Architecture, Civil and Environmental Engineering, Swiss Federal Institute of Technology (EPFL).

7 master’s semester projects: guided students in laboratory testing and analytical calculations; oversaw project details.

3 Bachelor final projects: guided students in design calculations and analysis; oversaw project details; participated in university review of students work.

CERTIFICATIONS
HONORS
& AWARDS:

- Licensed Civil Engineer (P.E. license), State of California, State of Arkansas
- 2nd Place, Earthquake Engineering Research Institute, Graphics Competition (2009)
- Appointment as Instructor- BYU Dept. of Civil and Env. Engineering (2 Terms)
- T Leslie Youd Family Fellow (2007)
- Joseph Layne Black scholarship recipient (2007)
- NCGA Top of the State Golf Scholarship (2003-2007)

UNIVERSITY
SERVICE

- 2011–Cur Reviewer: ASCE Journal of Bridge Engineering [(1)2012; (2)2013;] ASCE Journal of Structural Engineering [(1)2013; (2)2015] Bulletin of Earthquake Engineering [(1)2012; (1)2013; (1)2014] Advances in Structural Engineering [(1)2014] International Journal of Computational Methods [(1)2014] Earthquake Engineering and Structural Dynamics [(1)2015] Swiss Zwahlen & Mayr Prize, jury member (EPFL)
- 2013 Steel Structures Assistant: School of Architectural, Civil and Environmental Engineering, Swiss Federal Institute of Technology (EPFL). Aided students in analysis and design calculations related to steel structures.
- 2012 Mathematics Assistant: Course in analytical geometry and linear algebra, School of Basic Sciences (FSB), Swiss Federal Institute of Technology (EPFL). Aided students in analytical geometry calculations, linear algebra.
- 2012 Oversight of Oral Examinations: School of Architecture, Civil and Environmental Engineering, Swiss Federal Institute of Technology (EPFL). Performed quality control for oral examinations (ensuring uniformity) and participated in review of student performance.
- 2009 Reviewer, Brigham Young University Office of Research and Creative Activities mentoring grants (ORCA Grants), Fulton College of Engineering and Technology.
- 2007-2009 Build-it-Big Program: prepared structural design aids, taught design concepts and promoted engineering education to Utah high school students.

MEMBERSHIPS
& SOCIETIES: Member, American Society of Civil Engineering, ASCE (2011-Cur)
Member, Swiss Society for Earthquake Engineering and Structural Dynamics (2012-Cur)
Member, Arkansas Governor's Earthquake Council (2016-Cur)
Member, European Association for Earthquake Engineering (2012-2014)
Member, American Institute of Steel Construction, AISC (2014-Cur)
Member, ASCE/SEI Fatigue and Fracture Committee (2014-Cur)
Chair, ASCE/SEI Methods of Design Committee (2014-Cur)

LANGUAGES: English Fluent, Mother Tongue
French Conversational

NATIONALITY: American,
Date of Birth: October 8, 1984