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Andrew Rau, P.E.

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Professional Profile

Mr. Rau uses mechanical engineering principles and applies advanced technical tools to solve complex problems related to drug delivery systems, combination products, medical devices, consumer products, and consumer electronics. Using his knowledge of solid mechanics and material behavior, he provides consulting support for functional evaluations, failure analyses, as well as verification and validation activities for products, computational models, and test methods.

Mr. Rau has evaluated a variety of combination and drug delivery products, including drug eluting stents, on-body delivery systems (OBDS), prefilled syringes, ocular drug delivery and surgical systems, and hormonal contraceptive delivery devices. He assists clients by developing methods, justifications, and strategies for evaluating the performance of combination products, especially when standardized approaches are not well established. Mr. Rau has prepared technical materials for combination products for use in regulatory submissions.

Mr. Rau has extensive experience conducting and overseeing custom mechanical testing programs for a variety of products. He is proficient in the operation of mechanical load frames and specializes in the design of custom fixturing to meet unique client needs. Mr. Rau has performed standard and non-standard material tests on a variety of engineering and biomaterials, including biological tissues, Nitinol, ultra-high molecular weight polyethylene (UHMWPE), and polyetheretherkeytone (PEEK). He is familiar with industry standards pertaining to the evaluation of medical devices, combination products, and biomaterials, including regulatory requirements and quality assurance procedures.

Mr. Rau has been active for over a decade in the development of guidance documents related to best practices for verification and validation ("V&V") used in computational modeling of medical devices. He serves on the ASME Codes and Standards subcommittee: ASME V&V 40 Subcommittee on Verification and Validation in Computational Modeling of Medical Devices.

Academic Credentials & Professional Honors

M.S., Mechanical Engineering, Penn State University, 2010

B.S., Mechanical Engineering, Lafayette College, 2008

Tau Beta Pi

Sigma Xi

Professional Affiliations

American Society of Mechanical Engineers—ASME

American Society for Testing and Materials—ASTM

Patents

System for Testing Valves. Patent Number: 10,105,227 (U.S.), October 23, 2018.

Publications

Rau A, Rodriguez Quijada C, Wade R, Stabler CT. A Risk-Based Approach To Assess Particulate Generation For Cardiovascular Devices. MED Device Online. October 3, 2023 https://www.meddeviceonline.com/doc/a-risk-based-approach-to-assess-particulate-generation-for-cardiovascular-devices-0001.

Putnam M, Rau A, Frohbergh M, Ong K, Bushelow M, Blauth M. Comparing the volume of vascular intersection of two femoral neck fracture fixation implants using an In silico technique. OTA Int. 2023 May 4;6(2 Suppl):e256.

Rau A, Lovald ST, Nissman S, McNulty J, Ochoa JA, Baldwinson M. The mechanics of corneal deformation and rupture for penetrating injury in the human eye. Injury Dec. 2 2017.

Lovald ST, Rau A, Nissman S, Ames N, McNulty J, Ochoa JA, Baldwinson M. Finite element analysis and experimental evaluation of penetrating injury through the cornea. J Mech Behav Biomed Mater. 2016;66:104-110.

Rau A, Siskey R, Ochoa J, Good T. Factors affecting lethal isotherms during cryoablation procedures. The Open Biomedical Engineering Journal 2016; 10: 62-71.

Rodowicz KA, Olberding JE, Rau AC. Head injury potential and the effectiveness of headgear in women's lacrosse. Annals of Biomedical Engineering 2014; 43(4):949-957.

Rau AC, Frecker M, Mathew A, Pauli E. Multifunctional forceps for use in endoscopic surger--Initial design, prototype, and testing. Journal of Medical Devices 2011; 5(4):041001/1-10.

Rossmann JS, Rau AC. An experimental study of Wiffle ball aerodynamics. Am J Phys 2007; 75(12):1099-1105.

Rau AC. Design of a multifunctional endoscopic forceps for use in incisionless surgery. Master's Thesis, The Pennsylvania State University, 2010.

Conference Papers, Abstracts, and Presentations

Lovald S, Rau A, Nissman S, Ames N, Ochoa J, McNulty J, Baldwinson M. Finite element analysis of penetrating injury to the human eye. Presented at the BMES/FDA Frontiers in Medical Devices Conference, College Park, MD, May 23-25, 2016.

Rau A, Lovald S, Nissman S, McNulty J, Ochoa J, Baldwinson M. The mechanics of corneal deformation and rupture for penetrating injury in the human eye. Presented at the Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting, Seattle, WA, May 1-5, 2016.

Lovald S, Rau A, Nissman S, Ames A, McNulty J, Ochoa J, Baldwinson M. Finite element analysis of penetrating injury to the human eye. Presented at the Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting, Seattle, WA, May 1-5, 2016.

Garcia M, Rau A, Day J, Ochoa J, Lovald S. Finite element analysis of whole globe goldmann applanation tonometry: A closer look at model sensitivity and mechanics. Presented at the Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting, Seattle, WA, May 1-5, 2016.

Gong XY, Siskey R, Rau A, Anderson S. Effect of prestrain on the fatigue life of nitinol wire. Presented at the International Conference on Shape Memory and Superelastic Technologies (SMST), Pacific Grove, CA, May 12-16, 2014.

Popelar C, Rau A, Morrison T, Crane R. V&V40 verification & validation in computational modeling of medical devices panel session. Presented at the ASME Verification and Validation Symposium, Las Vegas, NV, May 7-9, 2014.

Baykal D, Rau AC, Underwood RJ, Siskey RS, Kurtz SM. Frictional heating of PEEK-UHMWPE bearing couple on pin-on-disk tester. Presented at the First International PEEK Meeting, Philadelphia, PA, April 25-26, 2013.

Rau A, Zhao T, Arjunon S. Verification and validation methodologies for prosthetic heart valves: review and considerations. Presented at the ASME Verification and Validation Symposium, Las Vegas, NV, May 2-4, 2012.

Briant P, Siskey R, Rau AC, Easley S, James B. Effect of strain rate on nitinol constitutive modeling in the clinically relevant strain range. Proceedings, 2011 ASM Materials and Processes for Medical Devices, Minneapolis, MN, August 8-10, 2011.

Rau AC, Frecker MI, Mathew A, Pauli E. Design of a multifunctional forceps for use in endoscopic surgery. Proceedings, 2010 Design of Medical Devices Conference, Minneapolis, MN, April 13-15, 2010.

Niebel C, Frecker M, Rau AC, Hayes G, Mathew A. Design of an endoscopic biopsy needle. Proceedings, 2010 Design of Medical Devices Conference, Minneapolis, MN, April 13-15, 2010.

Rau AC, Frecker MI. A review of scaling and performance considerations for articulating technologies. Proceedings, ASME 2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Oxnard, CA, September 21-23, 2009.

Rau AC, Frecker MI, Mathew A. Design of a multifunctional tissue grasper and spreader for use in incisionless surgery. Presented at the ASME 2009 International Design Engineering Technical Conferences, ASME Student Mechanism and Robot Design Competition-Graduate Level Mechanisms Division, San Diego, CA, August 30-September 2, 2009.

Rossmann JS, Rau AC, Utela B. Experimental determination of elastomechanical properties of bovine veins. Proceedings, 2nd International Conference on Mechanics of Biomaterials and Tissues, Elsevier, Kauai, HI, December 9-13, 2007.