UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Abdelgaied, A., Brockett, C.L., Liu, F., Jennings, L.M., Fisher, J., Jin, Z., 2012, Quantification of the effect of crossshear and applied nominal contact pressure on the wear of moderately cross-linked polyethylene, *Proc IMechE Part H: J Engineering in Medicine* **227**(1), 18-26.

Abu Amer, Y., Darwech, I., Clohisy, J.C., 2007, Aseptic loosening of total joint replacements: mechanisms underlying osteolysis and potential therapies, *Arthritis Res Ther*.

Ackerman, I.N., Bohensky, M.A., Zomer, E., Tacey, M., Gorelik, A., Brand, C.A., de Steiger, R., 2019, The projected burden of primary total knee and hip replacement for osteoarthritis in Australia to the year 2030, *BMC musculoskeletal disorders* **20**(1), 90.

Alhassan, S., Goswami, T., 2008, Wear rate model for UHMWPE in total joint applications, *Wear* **265**(1-2), 8-13.

Ali, M., Mao, K., 2014, Contact mechanics and wear simulations of hip resurfacing devices using computational methods, *Acta of Bioengineering and Biomechanics* **16**(2).

Amanatullah, D.F., Sucher, M.G., Bonadurer III, G.F., Pereira, G.C., Taunton, M.J., 2016, Metal in Total Hip Arthroplasty: Wear Particles, Biology, and Diagnosis, *Orthopedics* **39**(6), 371-379.

American Academy of Orthopaedic Surgeons (AAOS), 2018, *Projected volume of primary and revision total joint replacement in the U.S. 2030 to 2060*, https://aaos-annualmeeting-presskit.org/2018/research-news/sloan_tjr/, (online accessed October 25th, 2019).

Analysis of Systems (ANSYS), 2019, About ANSYS, https://www.ansys.com/about-ansys , (online accessed December 5th, 2019).

Anderson, A.E., Ellis, B.J., Maas, S.A., Peters, C.L., Weiss, J.A., 2008, Validation of Finite Element Predictions of Cartilage Contact Pressure in the Human Hip Joint, *ASME. J Biomech Eng.* **130**(5), 051008-051008-10.

Archard, J.F., 1957, Elastic Deformation and the Laws of Friction, Proceedings of the Royal Society of London. Series A, *Mathematical and Physical Sciences* **243**(1233), 190-205.

Avanzini, A., 2008, Mechanical characterization and finite element modelling of cyclic stress–strain behaviour of ultra high molecular weight polyethylene, *Materials & Design* **29**(2), 330-343.

Baena, J.-C., Peng, Z., 2017, Mechanical and tribological performance of UHMWPE influenced by temperature change, *Polymer Testing* **62**.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Bakshi, S.R., Tercero, J.E., Agarwal, A., 2007, Synthesis and characterization of multiwalled carbon nanotube reinforced ultra high molecular weight polyethylene composite by electrostatic spraying technique, *Composites Part A: Applied Science and Manufacturing* **38**, 2495.

Barber, J.R., Ciavarella, M., 2000, Contact mechanics, *International Journal of Solids and Structures* **37**, 29-43.

Barbour, P.S.M., Barton, D.C., Fisher, J., 1995, The influence of contact stress on the wear of UHMWPE for total replacement hip prostheses, *Wear* **181**.

Bartenev, G.M., Lavrentev, V.V., 1981, *Friction and Wear of Polymers*, Elsevier.

Barthel, E., 2008, Adhesive elastic contacts: JKR and more, *Journal of Physics D: Applied Physics* **41**(16), 163001.

Baykal, D., Siskey, R., Haider, H., Saikko, V., Ahlroos, T., Kurtz, S., 2014, Advances in tribological testing of artificial joint biomaterials using multidirectional pin-on-disk testers, *Journal of the Mechanical Behavior of Biomedical Materials* **31**, 117-134.

Bayliss, L.E., Culliford, D., Monk, A.P., Glyn-Jones, S., Prieto-Alhambra, D., Judge, A., Cooper, C., Carr, A.J., Arden, N.K., Beard, D.J., Price, A.J., 2017, The effect of patient age at intervention on risk of implant revision after total replacement of the hip or knee: a population-based cohort study, *The Lancet* **389**(10077), 1424-1430.

Bennett, D., Humphreys, L., O'Brien, S., Kelly, C., Orr, J.F., Beverland, D.E., 2008, Wear paths produced by individual hip replacement patients-A large-scale, long-term follow-up study, *Journal of Biomechanics* **41**(11), 2474-2482.

Benzley, S.E., Perry, E., Merkley, K., Clark, B., Sjaardema, G., 1995, A comparison of all hexagonal and all tetrahedral finite element meshes for elastic and elasto-plastic analysis, *Proceedings of the 4th International Meshing Roundtable*, 179-191.

Bergstrom, J.S., 2015, *Mechanics of solid polymers: theory and computational modeling*, Elsevier, Ltd.

Bern, M., Plassmann, P., 1996, *Mesh generation*, in Sack, J.R., Urrutia, J. (ed.), *Handbook of Computational Geometry*, Elsevier, Ltd., 293.

Besong, A.A., Tipper, J.L., Mathews, B.J., Ingham, E., Stone, M.H., Fisher, J., 1999, The influence of lubricant on the morphology of ultra-high molecular weight polyethylene wear debris generated in laboratory tests, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **213**, 155-158.

Bevill, S.L., Bevill, G.R., Penmetsa, J.R., Petrella, A.J., Rullkoetter, P.J., 2005, Finite element simulation of early creep and wear in total hip arthroplasty, *Journal of Biomechanics* **38**(12), 2365-2374.

UNIVERSITAS
GADJAH MADA
**PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE) UNTUK IMPLAN PANGGUL**
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Bigsby, R.J.A., Hardaker, C.S., Fisher, J., 1997, Wear of ultra-high molecular weight polyethylene acetabular cups in a physiological hip joint simulator in the anatomical position using bovine serum as a lubricant, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **211**(3), 265-269.

Bitar, D., Parvizi, J., 2015, Biological response to prosthetic debris, *World journal of orthopedics* **6**, 172-189.

Bitter, T., Khan, I., Marriott, T., Lovelady, E., Verdonschot, N., Janssen, D., 2018, Finite element wear prediction using adaptive meshing at the modular taper interface of hip implants, *Journal of the Mechanical Behavior of Biomedical Materials* **77**, 616-623.

Boieri, P., Gastaldi, F., Kinderlehrer, D., 1987, Existence, uniqueness, and regularity results for the two-body contact problem, *Applied Mathematics and Optimization* **15**, 251-277.

Bowden, F.P., Tabor, D., 2001, *The friction and lubrication of solids*, Oxford University Press.

Bozic, K.J., Lau, E.C., Ong, K.L., Vail, T.P., Rubash, H.E., Berry, D.J., 2012, Comparative Effectiveness of Metal-On-Metal and Metal-On-Polyethylene Bearings in Medicare Total Hip Arthroplasty Patients, *The Journal of Arthroplasty* **27**(8), Suppl. 1.

Bragdon, C.R., O'Connor, D.O., Lowenstein, J.D., Jasty, M., Biggs, S.A., Harris, W.H., 2001, A new pin-on-disk wear testing method for simulating wear of polyethylene on cobalt-chrome alloy in total hip arthroplasty, *The Journal of Arthroplasty* **16**, 658-665.

Budinski, K.G., Budinski, M.K., Kohler, M.S., 2003, A galling-resistant substitute for silicon nickel, *Wear* **255**, 489-497.

Burger, N., de Vaal, P., Meyer, J., 2007, Failure analysis on retrieved ultra high molecular weight polyethylene (UHMWPE) acetabular cups, *Engineering Failure Analysis* **14**, 1329-1345.

Cai, Z.-B., Shen, M.-X., Qu, S., Zhu, M.H., 2013, Friction and wear behaviour of UHMWPE against titanium alloy ball and alumina femoral head due to torsional fretting, *International Journal of Surface Science and Engineering* **7**, 81-95.

Caicedo, M.S., Solver, E., Coleman, L., Hallab, N.J., 2014, Metal sensitivities among TJA patients with post-operative pain: indications for multi-metal LTT testing, *J Long Term Eff Med Implants* **24**(1), 37-44.

Calonius, O., Saikko, V., 2003, Analysis of relative motion between femoral head and acetabular cup and advances in computational of the wear factor for the prosthetic hip joint, *Acta Polytechnica* **43**(4), 43-54.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Carter, D.R., Vasu, R., Harris, W.H., 1982, Stress distributions in the acetabular region--II. Effects of cement thickness and metal backing of the total hip acetabular component, *Journal of Biomechanics* **15**(3), 165-170.

Catledge, S.A., Thomas, V., Vohra, Y.K., 2013, *Nanostructured diamond coatings for orthopaedic applications*, Woodhead Publ Ser Biomater., 105-150.

Cheng, G., Shan, X., 2012, Dynamics analysis of a parallel hip joint simulator with four degree of freedoms, *Nonlinear Dynamics* **70**, 2475-2486.

Cheng, H.-C., Lee, S.-Y., Chen, C.-C., Shyng, Y.-C., Ou, K.-L., 2006, Titanium nanostructural surface processing for improved biocompatibility, *Applied Physics Letters* **89**(173902), 173902-1-173902-3.

Cheng, J., Yang, X., Dong, L., Yuan, Z., Wang, W., Wu, S., Chen, S., Zheng, G., Zhang, W., Zhang, D., Wang, H., 2017, Effective nondestructive evaluations on UHMWPE/Recycled-PA6 blends using FTIR imaging and dynamic mechanical analysis, *Polymer Testing* **59**.

Cifuentes, A., Kalbag, A., 1992, A performance study of tetrahedral and hexahedral elements in 3-D finite element structural analysis, *Finite Elements in Analysis and Design* **12**, 313-318.

Cilingir, A.C., 2010, Finite element analysis of the contact mechanics of ceramic-on-ceramic hip resurfacing prostheses, *Journal of Bionic Engineering* **7**(3), 244-253.

Clark, G.C.F., Williams, D.F., 1982, The effects of proteins on metallic corrosion, *J. Biomed. Mater. Res.* **16**, 125-134.

Clarke, I.C., 1981, Wear of Artificial Joint Materials IV, *Engineering in Medicine* **10**(4), 189-198.

Clarke, I.C., McKellop, H.A., McGuire, P., Okuda, R., Sarmiento, A., 1983, *Titanium Alloys in Surgical Implants: ASTM STP 796* in Luckey, H.A., Kubli, F. (ed.), ASTM special technical publication, ASTM International.

Committee on Mathematical Foundations of Verification Validation & Quantification, Uncertainty Quantification, National Academy of Sciences, 2012, *Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation, and Uncertainty Quantification*, The-National-Academic-Press, Washington.

Cooper, J.R., Dowson, D., Fisher, J., 1993, Macroscopic and microscopic wear mechanisms in ultra-high molecular weight polyethylene, *Wear* **162-164**, 378-384.

Costa, I., 2019, Oxidation in Prosthetic UHMWPE, in Fu, J., Jin, Z.-M., Wang, J.-W. (ed.), *UHMWPE Biomaterials for Joint Implants: Structures, Properties and Clinical Performance*, Springer Singapore, 69-70.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Culliford, D., Maskell, J., Judge, A., Cooper, C., Prieto-Alhambra, D., Arden, N., 2015, Future projections of total hip and knee arthroplasty in the UK: results from the UK Clinical Practice Research Datalink, *Osteoarthritis and Cartilage* **23**, 594-600.

D'Amelia, R., Gentile, S., Nirode, W., Huang, L., 2016, Quantitative Analysis of Copolymers and Blends of Polyvinyl Acetate (PVAc) Using Fourier Transform Infrared Spectroscopy (FTIR) and Elemental Analysis (EA), *World Journal of Chemical Education* **4**(2), 25-31.

Daniel, J., Kamali, A, 2009, Corrosion and Its Contribution to Metal Release, in McMinn, D.J.W. (ed.), *Modern Hip Resurfacing*, Springer-Verlag, London.

Daniel, J., Ziaee, H, 2009, Metal Ions, in McMinn, D.J.W. (ed.), *Modern Hip Resurfacing*, Springer-Verlag London Ltd.

Dassault Systèmes, 2011, *Abaqus Theory Manual*.

Dassault Systèmes, 2011, *Abaqus User Manual*.

Dassault Systèmes, 2013, *Abaqus/CAE 6.13 User's Guide*.

Davim, J.P., 2011, *Tribology for Engineers: A Practical Guide*, Woodhead.

Del Pozo, J.L., Patel, R., 2009, Clinical practice. Infection associated with prosthetic joints, *New England Journal Med*.

Department of Orthopaedic Surgery, UC Davis, 2011, *Total Hip Replacement: A Patient's Guide, UC Davis Health System*, http://www.ucdmc.ucdavis.edu/orthopaedics/pdfs/newhip_brochure.pdf, (online accessed May 20th, 2015).

Dong, H., Shi, W., Bell, T., 1999, Potential of improving tribological performance of UHMWPE by engineering the Ti6Al4V counterfaces, *Wear* **225-229**, Part 1, 146-153.

Dressler, M.R., dkk., 2011, Predicting wear of UHMWPE: decreasing wear rate following a change in direction, *Wear* **271**(11-12), 2879-2883.

Dumbleton, J.H., 1981, *Tribology of Natural and Artificial Joints*, Elsevier Scientific Publishing Company, 215.

Eddoumy, F., 2012, *Impact of texturing on sliding wear behaviour of UHMWPE*, Thesis, Université de Strasbourg.

Eliaz, N., 2012, *Degradation of Implant Materials*, Springer, New York.

Eliaz, N., 2019, *Corrosion of Metallic Biomaterials: A Review*, Materials **12**(407).

Espallargas, N., Torres, C., Munoz, A., 2015, A metal ion release study of CoCrMo exposed to corrosion and tribocorrosion conditions in simulated body fluids, *Wear* **332-33**3, 669-678.

Fischer-Cripps, A.C., 2007, *Introduction to Contact Mechanics*, 2nd Ed., Springer, New York.

Flores, P., Lankarani, H.M., 2016, *Contact Force Models for Multibody Dynamics*, Springer.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Gao, X., Hao, F., Huang, Z., Fang, D., 2014, Mechanics of adhesive contact at the nanoscale: The effect of surface stress, *International Journal of Solids and Structures* **51**(3), 566-574.

Gabriel, M.C., de M. Carvalho, B., Pinheiro, L.A., Capocchi, J.D.T., Kubaski, E.T., Cintho, O.M., 2010, Structural modifications of ultra-high molecular weight polyethylene (UHMWPE) processed in attritor type mill, *Seventh International Latin American Conference on Powder Technology*.

Ghasemi, H., Thoppey, N., Huang X., Loomis, J., Li, X., Tong, J., Wang, J., Chen, G., 2014, High Thermal Conductivity Ultra-High Molecular Weight Polyethylene (UHMWPE) Films, *14th IEEE ITHERM Conference*.

Ge, S., Kang, X., Zhao, Y., 2011, One-year biodegradation study of UHMWPE as artificial joint materials: Variation of chemical structure and effect on friction and wear behavior, *Wear* **271**(9-10), 2354-2363.

George, P.L., 1996, Automatic Mesh Generation and Finite Element Computation, Elsevier Science B.V.

Geetha, M., Singh, A.K., Asokamani, R., Gogia, A.K., 2009, Ti based biomaterials, the ultimate choice for orthopaedic implants - A review, *Progress in Materials Science* **54**(3), 397-425.

Gilbert, J.L., Mali, S.A., 2012, Medical Implant Corrosion: Electrochemistry at Metallic Biomaterial Surfaces, in Eliaz, N., *Degradation of Implant Materials*, Springer, New York.

Gomes, C.C., Moreira, L.M., Santos, V.J.S.V., Ramos, A.S., Lyon, J.P., Soares, C.P., Santos, F.V., 2011, Assessment of the genetic risks of a metallic alloy used in medical implants Genetics and Molecular Biology, *Sociedade Brasileira de Genética* **34**, 116-121.

González-Mora, V.A., Hoffmann, M., Stroosnijder, R., Gil, F.J., 2009, Wear tests in a hip joint simulator of different CoCrMo counterfaces on UHMWPE, *Materials Science and Engineering: C* **29**(1), 153-158.

Goodman, S.B., Fornasier, V, 2006, Histopathology of Periprosthetic Tissues, in Shanbhag, A., Rubash, H.E., Jacobs, J.J. (ed.), *Joint Replacement and Bone Resorption Pathology, Biomaterials, and Clinical Practice*, Taylor & Francis Group, LLC., 105.

Goreham-Voss, C.M., Hyde, P.J., Hall, R.M., Fisher, J., Brown, T.D., 2010, Cross-shear implementation in sliding-distance-coupled finite element analysis of wear in metal-on-polyethylene total joint arthroplasty: Intervertebral total disc replacement as an illustrative application, *Journal of Biomechanics* **4**, 1674-1681.

Green, G., Khan, M., Haddad, F.S., 2014, Why do total hip replacements fail?, *Orthopaedics and Trauma* **29**(2), pp 79-85.

UNIVERSITAS
GADJAH MADA
**PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE) UNTUK IMPLAN PANGGUL**
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Guezmil, M., Bensalah, W., Mezlini, S., 2016, Tribological behavior of UHMWPE against TiAl6V4 and CoCr28Mo alloys under dry and lubricated conditions, *Journal of Mechanical Behavior of Biomedical Materials* **63**, 375-385.

Hailer, N.P., Weiss, R.J., Stark, A., Karrholm, J., 2012, The risk of revision due to dislocation after total hip arthroplasty depends on surgical approach, femoral head size, sex, and primary diagnosis: An analysis of 78,098 operations in the Swedish Hip Arthroplasty Register, *Acta Orthop*. **83**.

Hallab, N., Merritt, K., Jacobs, J.J., 2001, Metal sensitivity in patients with orthopaedic implants, *The Journal of bone and joint surgery American* **83** A, 428-436.

Hallab, 2004, Lymphocyte transformation testing for quantifying metal-implant-related hypersensitivity responses, Dermatitis **15**(2), 82-90.

Hallab, N., 2017, Diagnosis of Metal Hypersensitivity in Orthopedics, *Operative Techniques in Orthopaedics* **27**, 168-177.

Hamill, J.K., Knutzen, M., Derrick, T.R., 2015, *Biomechanical basis of human movement*, Lippincott Williams & Wilkins.

Hill, M.R., Catledge, S.A., Konovalov, V., Clem, W.C., Chowdhury, S.A., Etheridge, B.S., Stanishevsky, A., Lemons, J.E., Vohra, Y.K., Eberhardt, A.W., 2007, Preliminary tribological evaluation of nanostructured diamond coatings against ultra-high molecular weight polyethylene, *Journal of Biomedical Material Research* **85B**, 140-148.

Hua, Z., Zhang, H., Fan, Y., Jin, Z., 2014, Development of a BiotriboPOD testing methodology for the wear evaluation of orthopaedic biomaterials, *RSC Advances* **4**(38), 19987-19991.

Hua, Z., Dou, P., Jia, H., Tang, F., Wang, X., Xiong, X., Gao, L., Huang, X., Jin, Z., 2019, Wear Test Apparatus for Friction and Wear Evaluation Hip Prostheses, *Frontiers in Mechanical Engineering* **5**(12), 1-5.

Hutchings, I., Shipway, P., 2017*, Tribology: Friction and Wear of Engineering Materials*, 2nd ed., Butterworth-Heinemann.

Israelachvili, J.N., 2011, *Intermolecular and Surface Forces*, 3rd ed., Academic Press.

Jalali-Vahid, D., Jagatia, M., Jin, Z.M., Dowson, D., 2001, Prediction of lubricating film thickness in UHMWPE hip joint replacements, *Journal of Biomechanics* **24**(2), 261-266.

Jamari, Budiwan, I., Ismail, R., Sugiyanto, Tauviqirrahman, M., Saputra, E., 2012, Pengembangan prototipe sambungan tulang panggul produk Indonesia *Prosiding Insinas*.

Jia, J., Paik, J.K., 2018, *Engineering Dynamics and Vibrations*, CRC Press.

UNIVERSITAS
GADJAH MADA
**PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE) UNTUK IMPLAN PANGGUL**
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Jin, Z.M., Heng, S.M., Ng, H.W., Auger, D.D., 1999, An axisymmetric contact model of ultra high molecular weight polyethylene cups against metallic femoral heads for artificial hip joint replacements, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **213**, 317-327.

Johnson, K.L., 1987, *Contact mechanics*, Cambridge University Press.

Joshi, V.A., 2006, *Titanium alloys: An atlas of structures and fracture features*, Taylor & Francis

Jourdan, F., Samida, A., 2009, An implicit numerical method for wear modeling applied to a hip joint prosthesis problem, *Comput. Methods Appl. Mech. Eng.* **198**, 2209-2217.

Kabo, J.M., Gebhard, J.M., Loren, G., Amstutz, H.C., 1993, In vivo wear of polyethylene acetabular components, *Journal of Bone Joint Surgery, Bone and Joint Journal* **75-B**, 254-258.

Kang, L., Galvin, A.L., Brown, T.D., Jin, Z., Fisher, J., 2008, Wear simulation of ultra-high molecular weight polyethylene hip implants by incorporating the effects of cross-shear and contact pressure, *Proceedings of the Institution of Mechanical Engineers, Part H (Journal of Engineering in Medicine)* **222**(7), 1049-1064.

Kang, L., Galvin, A.L., Brown, T.D., Jin, Z., Fisher, J., 2008, Quantification of the effect of cross-shear on the wear of conventional and highly cross-linked UHMWPE, *Journal of Biomechanics* **41**(2), 340-346.

Kang, L., Galvin, A.L., Fisher, J., Jin, Z., 2009, Enhanced computational prediction of polyethylene wear in hip joints by incorporating cross-shear and contact pressure in additional to load and sliding distance: Effect of head diameter, *Journal of Biomechanics* **42**(7), 912-918.

Kang, L., Galvin, A.L., Jin, Z., Fisher, J., 2006, A simple fully integrated contact-coupled wear prediction for ultra-high molecular weight polyethylene hip implants, *Proceedings of the Institution of Mechanical Engineers, Part H (Journal of Engineering in Medicine)* **220**(1), 33-46.

Kang, K.T., Son, J., Kim, H.J., Baek, C., Kwon, O.R., Koh, Y.G., 2017, Wear predictions for UHMWPE material with various surface properties used on the femoral component in total knee arthroplasty: a computational simulation study, *Journal of Materials Science: Materials in Medicine* **28**, 105.

Katti, K.S., 2004, Biomaterials in total joint replacement, *Colloids and Surfaces B: Biointerfaces* **39**, 133-142.

Kaufman, D.M., 2009, *Coupled Principles for Computational Frictional Contact Mechanics*, The State University of New Jersey.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Khosravipour, I., 2015, *Contact stress analysis of Surface guided knee implant using finite element modeling*, Department of Mechanical Engineering, University of Manitoba.

Kim, D.W., Lee, K.Y., Jun, Y., Lee, S.J., Park, C.K., 2011, Friction and wear characteristics of UHMWPE against Co-Cr alloy under the wide range of contact pressures in lumbar total disc replacement, *International Journal of Precision Engineering and Manufacturing* **12**(6), 1111-1118.

Kim, J.W., Lee, J.S., 2017, Effect of Heat Drawing Process on Mechanical Properties of Dry-Jet Wet Spun Fiber of Linear Low Density Polyethylene/Carbon Nanotube Composites, *International Journal of Polymer Science* **2017**.

Kim, H.A., Koh, S.H., Lee, B., Kim, I.J., Seo, Y.I., Song, Y.W., Hunter, D.J., Zhang, Y., 2008, Low rate of total hip replacement as reflected by a low prevalence of hip osteoarthritis in South Korea, *Osteoarthritis and cartilage* **16**, 1572-1575.

Kim, N.H., 2015, *Introduction to Nonlinear Finite Element Analysis*, Springer, New York.

Konyukhov, A., Schweizerhof, K., 2013, *Computational Contact Mechanics: Geometrically Exact Theory for Arbitrary Shaped Bodies*, Springer-Verlag, Berlin.

Konvičková, S., Daniel, M., 2008, Can Mathematical Models be Used to Predict Hip Joint Peak Contact Stress in the Clinical Studies? *4th Kuala Lumpur International Conference on Biomedical Engineering 2008,* 734-737.

Krenn, V., Perino, G., 2017, *Histological Diagnosis of Implant-Associated Pathologies*, Springer-Verlag, Berlin.

Kruger, K.M., 2014, *Computational and experimental biomechanics of total hip wear increase due to femoral head damage*, University of Iowa.

Kumar, A., Abul K., Aster, J.C., 2015, *Robbins & Cotran Pathologic Basis of Disease*, 9th ed., Elsevier Inc., 650.

Kunilets, I., 2015, Biomaterials and their applications in medicine, in Amato, S.F., Ezzell, R.M. (ed.), *Regulatory Affairs for Biomaterials and Medical Devices*, Woodhead Publishing, Cambridge, 1.

Kurtz, S.M., 2016, *UHMWPE Biomaterials Handbook, Third Edition: Ultra High Molecular Weight Polyethylene in Total Joint Replacement and Medical Devices*, William Andrew, Elsevier Inc.

Kustandi, T., Choo, J., Low, H.Y., Sinha, S., 2009, Texturing of UHMWPE surface via NIL for low friction and wear properties, *Journal of Physics D: Applied Physics* **43** (015301).

Lee, K., 1999, *Principles of CAD/CAM/CAE systems*, Addison Wesley Longman.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Leslie, L.J., Williams, S., Isaac, G., Ingham, E., Fisher, J., 2009, High Cup Angle and Microseparation Increase the Wear of Hip Surface Replacements, *Clinical Orthopaedics and Related Research* **467**, 2259-2265.

Liu, F., Fisher, J., Jin, Z., 2012, Computational modelling of polyethylene wear and creep in total hip joint replacements: Effect of the bearing clearance and diameter, *Proceeding of the Institution of Mechanical Engineer, Part J: Journal of Engineering Tribology* **226**, 552-563.

Liu, F., Fisher, J., Jin, Z., 2013, Effect of motion inputs on the wear prediction of artificial hip joints, *Tribology International* **63**, 105-114.

Liu, F., Galvin, A., Jin, Z., Fisher, J., 2011, A new formulation for the prediction of polyethylene wear in artificial hip joints, *Proc. IMechE* **225**: Part H(1), 16-24.

Liu, F., Jin, Z.M., Grigoris, P., Hirt, F., Rieker, C., 2003, Contact mechanics of metal-on-metal hip implants employing a metallic cup with a UHMWPE backing, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **217**(3), 207-213.

Liu, F., Leslie, I., Williams, S., Fisher, J., Jin, Z., 2008, Development of computational wear simulation of metal-on-metal hip resurfacing replacements, *Journal of Biomechanics* **41**(3), 686-694.

Liu, T., Liu, G., Xie, Q., Wang, Q.J., 2014, An EFG-FE coupling method on Micro/Nano scaleadhesive contact problems, in Yao, Z, Yuan, M.W., *Computational Mechanics*, Tsinghua University Press, 132.

Liu, W., Hong, C., Wang, H., Zhang, M., Guo, M., 2016, Enhanced photovoltaic performance of fully flexible dye-sensitized solar cells based on the Nb2O5 coated hierarchical TiO_2 nanowire-nanosheet arrays, *Applied Surface Science* **364**.

Liu, W., Zhang, H., Wang, H., Zhang, M., Guo, M., 2017, Titanium mesh supported TiO_2 nanowire arrays/upconversion luminescence Er^{3+}-Yb^{3+} codoped TiO_2 nanoparticles novel composites for flexible dye-sensitized solar cells, *Applied Surface Science* **422**.

Liu, Y., 2008, ANSYS and LS-DYNA used for structural analysis, International *Journal of Computer Aided Engineering and Technology* **1**(1), 32.

Lo, D.S.H., 2015, *Finite element mesh generation*, CRC Press.

Lozano-Sánchez, L.M., Bagudanch, I., Sustaita, A.O., Iturbe-Ek, J., Elizalde, L.E., Garcia-Romeu, M.L., Elías-Zúñiga, 2018, A. Single-Point Incremental Forming of Two Biocompatible Polymers: An Insight into Their Thermal and Structural Properties, *Polymers* **10**, 1-22.

Lysaght, M., Webster, T.J. (Eds.), 2011, *Biomaterials for artificial organs*, Woodhead Publishing Limited.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

MacNeal, R.H., 1974, Some organizational aspects of NASTRAN, *Nuclear Engineering and Design* **29**(2), 254-265.

Mäkelä, K.T., Matilainen, M., Pulkkinen, P., Fenstad, A.M., Havelin, L.I., Engesaeter, L., Furnes, O., Overgaard, S., Pedersen, A.B., Kärrholm, J., Malchau, H., Garellick, G., Ranstam, J., Eskelinen, A., 2014, Countrywise results of total hip replacement. An analysis of 438,733 hips based on the Nordic Arthroplasty Register Association database, *Acta orthopaedica* **85**, 107-116.

Mak, M.M., Jin, Z.M., 2002, Analysis of contact mechanics in ceramic-on-ceramic hip joint replacements, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **216**(4), 231-236.

Malchau, H., Herberts P., Soderman P., Oden, 2014, *A Prognosis of total hip replacement*, http://www.mcminncentre.co.uk/pdf/updatevalidation-results-from-swedish-hip-arthroplasty-registry.pdf.

Malinov, S., Sha, W., Guo, Z., Tang, C.C., Long, A.E., 2002, Synchrotron X-ray diffraction study of the phase transformations in titanium alloys, *Materials Characterization* **488**(4), 288.

Man, K.W., 1994, *Contact mechanics using boundary elements*, Computational Mechanics Publications, Southampton.

Martinelli, N., Baretta, S., Pagano, J., Bianchi, A., Villa, T., Casaroli, G., Galbusera, F., 2017, Contact stresses, pressure and area in a fixed-bearing total ankle replacement: a finite element analysis, *BMC musculoskeletal disorders, BioMed Central* **18**, 493-493.

Martins, J.A.C., Oden, J.T., 1987, Existence and uniqueness results for dynamic contact problems with nonlinear normal and friction interface laws, *Nonlinear Analysis: Theory, Methods & Applications* **11**(3), 407-428.

Maxian, T.A., 1997, *Development and application of a finite element formulation for estimating sliding wear in total hip arthroplasty*, Ph.D. Thesis, The University of Iowa.

Maxian, T.A., Brown, T.D., Pedersen, D.R., Callaghan, J.J., 1996, A sliding-distance-coupled finite element formulation for polyethylene wear in total hip arthroplasty, *Biomechanic* **29**, 687-692

McMinn, D.J.W., 2009, *Modern Hip Resurfacing*, Springer-Verlag, London.

Medistra, 2019, *Bedah Tulang*, https://www.medistra.com/, (online accessed October 27th, 2019).

Merx, H., Dreinhöfer, K., Schräder, P., Stürmer, T., Puhl, W., Günther, K.-P., Brenner, H., 2003, International variation in hip replacement rates, *Annals of the rheumatic diseases* **62**, 222-226.

Micheli, P.D., Mocellin, K., 2008, Explicit F.E. formulation with modified linear tetrahedral elements applied to high speed forming processes, *11th ESAFORM Conference on Material Forming*, Lyon, **1**(1), 1411-1414.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

MidasFEA, 1989, *Mesh Generation*, MIDAS Information Technology Co., Ltd., http://manual.midasuser.com/EN_Common/FEA/320/FEA/01_Getting_Started/02_Concept/Mesh_Generation.htm, (online accessed Jun 14th, 2020).

Monif, M.M., 2012, Finite element study on the predicted equivalent stresses in the artificial hip joint, *Journal of Biomedical Science and Engineering* **5**, 43-51.

MSC Software, 2011, *MSC Nastran 2012 Demonstration Problems Manual*.

Myant, C., Cann, P., 2014, On the matter of synovial fluid lubrication: Implications for Metal-on-Metal hip tribology, *Journal of the Mechanical Behavior of Biomedical Materials* **34**, 338-348.

National Agency for Finite Element Methods and Standards (NAFEMS), 2018, *Analysis Origins - ABAQUS*, https://www.nafems.org/blog/posts/analysis-origins-abaqus/ , (online accessed December 5th, 2019).

National Institute for Health and Care Excellence (NICE), 2014, *Total hip replacement and resurfacing arthroplasty for endstage arthritis of the hip (review of technology appraisal guidance 2 and 44)*, NICE technology appraisal guidance 304, http://guidance.nice.org.uk/ta304.

Necas, D., Vrbka, M., Krupka, I., Hartl, M., 2018, The Effect of Kinematic Conditions and Synovial Fluid Composition on the Frictional Behaviour of Materials for Artificial Joints, *Materials* **11**(767), 1-12.

Nemes, S., Gordon, M., Rogmark, C., Rolfson, O., 2014, Projections of total hip replacement in Sweden from 2013 to 2030, *Acta orthopaedica* **85**, 238-243.

Niinomi, M., Nakai, M., Hieda, J., 2012, Development of new metallic alloys for biomedical applications, *Acta Biomaterialia* **8**, 3888-3903.

Nine, M.J., Choudhury, D., Hee, A.C., Mootanah, R., Osman, N., 2014, Wear Debris Characterization and Corresponding Biological Response: Artificial Hip and Knee Joints, Materials **7**(2), 980-1016.

Oberkampf, W.L., Barone, M.F., 2006, Measures of agreement between computation and experiment: Validation metrics, *Journal of Computational Physics* **217**(1), 5-36.

OECD, 2017, *Hip and knee replacement, in Health at a Glance 2017: OECD Indicators*, OECD Publishing, Paris.

Oliveira, C.A., Candelária, I.S., Oliveira, P.B., Figueiredo, A., Caseiro-Alves, F., 2015, Metallosis: A diagnosis not only in patients with metal-on-metal prostheses, *European journal of radiology open* **2**, 3-6.

Oparaugo, P.C., Clarke, I.C., Malchau, H., Herberts, P., 2001, Correlation of wear debris-induced osteolysis and revision with volumetric wear-rates of polyethylene: a survey of 8 reports in the literature, *Acta Orthop Scand.* **72**(1), 22-28.

Oshida, Y., 2007, *Bioscience and Bioengineering of Titanium Materials*, Elsevier.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Özkaya, N., Goldsheyder, D., Nordin, M., 2017*, Fundamentals of Biomechanics: Equilibrium, Motion, and Deformation*, 4th ed., Springer.

Paggi, M., Hills, D., 2020, *Modeling and Simulation of Tribological Problems in Technology*, Springer International Publishing.

Pakhaliuk, V., Poliakov, A., Kalinin, M., Pashkov, Y., Gadkov, P., 2016, Modifying and Expanding the Simulation of Wear in the Spherical Joint With a Polymeric Component of the Total Hip Prosthesis, *Facta Universitatis, Series: Mechanical Engineering* **14**(3), 301-312.

Pang, W., Ni, Z., Chen, G., Huang, G., Huang, H., Zhao, Y., 2015, Mechanical and thermal properties of graphene oxide/ultrahigh molecular weight polyethylene nanocomposites, *RSC Advances* **5**, 63063-63072.

Parvizi, J., Gehrke T., Chen A.F., 2013, Proceedings of the international consensus on periprosthetic joint infection, *Bone Joint Journal* **95B**, 1450-1452.

Patten, E.W., 2012, *A Multidirectional Tribo-System: Wear of UHMWPE under Sliding, Rolling, and Rotation*, Thesis, University of California, Berkeley.

Patten, E.W., Van Citters, D., Ries, M.D., Pruitt, L.A., 2013, Wear of UHMWPE from sliding, rolling, and rotation in a multidirectional tribo-system, *Wear* **304**, 60-66.

Paul, J.P., 1966, Forces Transmitted by Joints in the Human Body, *Proceedings of the Institution of Mechanical Engineers* **181**, 8-15.

Persson, B.N.J., 2006, Contact mechanics for randomly rough surfaces, *Surface Science Reports* **61**, 201-227.

Pietrabissa, R., Raimondi, M., Martino, E.D., 1998, Wear of polyethylene cups in total hip arthroplasty: a parametric mathematical model, *Med. Eng. Phys.* **20**, 199-210.

Pilz, V., Hanstein, T., Skripitz, R., 2018, Projections of primary hip arthroplasty in Germany until 2040, *Acta orthopaedica* **89**, 308-313.

Plank, G.R., Estok, D.M., Muratoglu, O.K., O'Connor, D.O., Burroughs, B.R., Harris, W.H., 2005, Contact stress assessment of conventional and highly crosslinked ultra high molecular weight polyethylene acetabular liners with finite element analysis and pressure sensitive film, *J. Biomedical Materials Research Part B: Applied Biomaterials* **80B**, 1-10.

Poceski, A., 1989, A variational approach in the finite element method, *Computers & Structures* **33**(2), 395-402.

Pohrelyuk, I., Sheykin, S., Dub, S., Mamalis, A., Rostotskii, I., Tkachuk, O., Lavrys, S., 2016, Increasing of functionality of c.p. titanium/UHMWPE tribo-pairs by thermodiffusion nitriding of titanium component, *Biotribology* **7**, 38-45.

Popov, V.L., 2010, *Contact Mechanics and Friction: Physical Principles and Applications*, Springer-Verlag Berlin Heidelberg.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Popov, V.L., Heß, M., Willert, E., 2019, *Handbook of Contact Mechanics: Exact Solutions of Axisymmetric Contact Problems*, Springer Berlin Heidelberg.

Puccio, F.D., Mattei, L., 2015, A novel approach to the estimation and application of the wear coefficient of metal-on-metal hip implants, *Tribology International* **83**, 69-76.

Raimondi, M., 1999, *The biomechanical reliability of artificial hip joints*, Thesis, Politecnico di Milano, Italy.

Ratner, B.D., Hoffman, A.S., Schoen, F.J., Lemons, J.E., 1996, *Biomaterials science: an introduction to materials in medicine*, Academic Press.

Rapperport, D.J., Carter, D.R., Schurman, D.J., 1985, Contact finite element stress analysis of the hip joint, *Journal of Orthopaedic Research* **3**, 435-446.

Rapperport, D.J., Carter, D.R., Schurman, D.J., 1987, Contact finite element stress analysis of porous ingrowth acetabular cup implantation, ingrowth, and loosening, *Journal of Orthopaedic Research* **5**, 548-561.

Reifenberger, R., 2016, *Fundamentals of Atomic Force Microscopy: Part I: Foundations*, World Scientific Publishing.

Rocha, M., Mansur, A., Mansur, H., 2009, Characterization and Accelerated Ageing of UHMWPE Used in Orthopedic Prosthesis by Peroxide, *Materials* **2**, 562-576.

Roman, L.C.C., 2016, *Magnesium-based biodegradable materials: from surface functionalization to cellular evaluation*, Thesis, Universidade De Lisboa.

Rose, J., Gamble, J.G., 2006, *Human Walking*, Lippincott Williams & Wilkins, Philadelphia.

Rad, E.M., 2015, *Volumetric Wear Assessment and Characterization of Striated Pattern of Retrieved UHMWPE Tibial Inserts*, Thesis, Graduate College of the University of Illinois at Chicago.

Röstlund, T., Albrektsson, B., Albrektsson, T., McKellop, H., 1989, Wear of ion-implanted pure titanium against UHMWPE, *Biomaterials* **10**, 176-180.

Saad, A.P.M., Syahrom, A., Harun, M.N., Kadir, M.R.A., 2016, *Wear Prediction on Total Ankle Replacement: Effect of Design Parameters*, Springer.

Saikko, V., 1998, A multidirectional motion pin-on-disk wear test method for prosthetic joint materials, *J. Biomed Mater Res* **41**, 58-64.

Saikko, V., 2005, A hip wear simulator with 100 test stations, *Proceedings of the Institution of Mechanical Engineers. Part H: Journal of Engineering in Medicine* **219**, 309-318.

Saikko, V., 2006, Effect of contact pressure on wear and friction of ultra-high molecular weight polyethylene in multidirectional sliding, *Proceedings of the Institution of Mechanical Engineers Part H: Journal of Engineering in Medicine* **220**, 723-731.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Saikko, V., 2015, High frequency circular translation pin-on-disk method for accelerated wear testing of ultrahigh molecular weight polyethylene as a bearing material in total hip arthroplasty, *Journal of Biomechanics* **48**(2), 401-404.

Saikko, V., Ahlroos, T., 1999, Type of motion and lubricant in wear simulation of polyethylene acetabular cup, *Proceedings of the Institution of Mechanical Engineers Part H Journal of Engineering in Medicine* **213**, 301-310.

Saikko, V., Ahlroos, T., 2000, Wear simulation of UHMWPE for total hip replacement with a multidirectional motion pin-on-disk device: Effects of counterface material, contact area, and lubricant, *Journal of Biomedical Materials Research* **49**, 147-154.

Samelko, L., Caicedo, M. S., Lim, S.-J., Della-Valle, C., Jacobs, J., Hallab, N. J., 2013, Cobalt-Alloy Implant Debris Induce HIF-1α Hypoxia Associated Responses: A Mechanism for Metal-Specific Orthopedic Implant Failure PLOS ONE, *Public Library of Science* **8**, 1-7.

Saputra, E., Anwar, I.B., Ismail, R., Jamari, J., van der Heide, E., 2017, Study of Unipolar and Bipolar Hip Prostheses Using Finite Element Simulation: Contact Stress Analysis, *Key Engineering Materials* **739**(96-102).

Savarino, L., Baldini, N., Ciapetti, G., Pellacani, A., Giunti, A., 2009, Is wear debris responsible for failure in alumina-on-alumina implants?, *Acta Orthopaedica* **80**, 162-167.

Sazonov, I., Hassan, O., Morgan, K., Weatherill, N.P., 2008, Comparison of Two Explicit Time Domain Unstructured Mesh Algorithms for Computational Electromagnetics, in Glowinski, R., Neittaanmäki, P., Discontinuous *Galerkin Methods Partial Differential Equations: Modeling and Numerical Simulation*, Springer Science + Business Media B.V., 95.

Schroder, D.T., Kelly, N.H., Wright, T.M., Parks, M.L., 2011, Retrieved highly crosslinked UHMWPE acetabular liners have similar wear damage as conventional UHMWPE, *Clinical Orthopedic Relat. Res.* **469**.

Shaik, S.A., Bose, K., Cherukuri, H.P., 2012, A study of durability of hip implants, *Materials & Design* **42**, 230-237.

Shaik, A.B., Sarkar, D., 2020, Dynamic Analysis and Life Estimation of the Artificial Hip Joint Prosthesis, in Rao, R.V., Taler, J., *Advanced Engineering Optimization Through Intelligent Techniques*, Springer Nature, Singapore, 274.

Shanbhag, A, Rubash, H.E., Jacobs, J.J., 2006, *Joint Replacement and Bone Resorption Pathology, Biomaterials and Clinical Practice*, Taylor & Francis.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Shen, G., Zhang, J.-F., Fang, F.-Z., 2019, In vitro evaluation of artificial joints: a comprehensive review, *Advances in Manufacturing* **7**, 1-14.

Shen, Z., Crotti, T., Mchugh, K., Matsuzaki, K., Gravallese, E., Bierbaum, B., Goldring, S., 2006, The role played by cell-substrate interactions in the pathogenesis of osteoclast-mediated peri-implant osteolysis, *Arthritis research & therapy* **8**, 1-10.

Singh, G., Bajargan, G., Datta, R., 2014, Deformation and strength of Ti–6Al–4V alloyed with B at cryogenic temperatures, *Materials Science and Engineering: A* **611**(45), 6.

Singh, J.A., Yu, S., Chen, L., Cleveland, J. D., 2019, Rates of Total Joint Replacement in the United States: Future Projections to 2020–2040 Using the National Inpatient Sample, *The Journal of Rheumatology* **46**.

Sinha, S.K., 2006, *Scratching of Materials and Application*, Academic Press.

Sinha, S.K., Briscoe, B.J., 2009, *Polymer Tribology*, Imperial College Press.

Strickland, M.A., Dressler, M.R., Taylor, M., 2012, Predicting implant UHMWPE wear in-silico: A robust, adaptable computational–numerical framework for future theoretical models, *Wear* **274-275**, 100-108.

Stachowiak, G.W., 2005, *Wear - materials, mechanisms and practice*, John Wiley & Sons, Ltd., Chichester.

Suhendra, N., Stachowiak, G.W., 2007, Computational model of asperity contact for the prediction of UHMWPE mechanical and wear behaviour in total hip joint replacements, *Tribology Letters* **25**(1), 9-22.

Surat, 2018, What is the difference Between a Phagocyte, Macrophage, Neutrophil and Eosinophil?, https://www.news-medical.net/life-sciences/What-is-the-difference-Between-a-Phagocyte-Macrophage-Neutrophil-and-Eosinophil.aspx, (online accessed October 17th, 2019).

Tadepalli, S.C., Erdemir, A., Cavanagh, P.R., 2010, A Comparison of the Performance of Hexahedral and Tetrahedral Elements in Finite Element Models of the Foot, *ASME 2010 Summer Bioengineering Conference*.

Tadepalli, S.C.; Erdemir, A., Cavanagh, P.R., 2011, Comparison of hexahedral and tetrahedral elements in finite element analysis of the foot and footwear, *Journal of Biomechanics* **44**, 2337-2343.

Tasumi, M., Krimm, S., 1967, Crystal vibration of polyethylene, *The Journal of Chemical Physics* **44**(3), 755-766.

The National Academic Press, 2012, *Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation and Uncertainty Quantification*, National Academy of Sciences.

Thomas, P., Weik, T., Roider, G., Summer, B., Thomsen, M., 2016, Influence of Surface Coating on Metal Ion Release: Evaluation in Patients With Metal Allergy, *Orthopedics* **39**(3), S24-S30.

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Tocks, G.A., 2018, The Challenge of Durability in Hip Replacement, *The Journal of Lancaster General Hospital* **13**(3).

Trebše, R., 2012, *Infected Total Joint Arthroplasty: The Algorithmic Approach*, Springer, London, 13.

Trommer, R.M., Maru, M.M., Filho, W.L.O., Nykanen, V.P.S., Gouvea, C.P., Archanjo, B.S., Ferreira, E.H.M., Silva, R.F., Achete, C.A., 2015, Multi-Scale Evaluation of Wear in UHMWPE-Metal Hip Implants Tested in a hip Joint Simulator, *Biotribology* **4**, 1-11.

Tu, J., Yeoh, G-H., Liu, C., 2019, *Computational Fluid Dynamics: A Practical Approach*, Elsevier Ltd., 140.

Tudor, A., Laurian, T., Popescu, V.M., 2013, The effect of clearance and wear on the contact pressure of metal on polyethylene hip prostheses, *Tribology International* **63**, 158-168.

Turell, M.E., Friedlaender, G.E., Wang, A., Thornhill, T.S., Bellare, A., 2005, The effect of counterface roughness on the wear of UHMWPE for rectangular wear paths, *Wear* **259**(7-12), 984-991.

Turell, M.E., Wang, A., Bellare, A., 2003, Quantification of the effect of cross-path motion on the wear rate of ultra-high molecular weight polyethylene, *Wear* **255**(7-12), 1034-1039.

Uddin, M.S., Zhang, L.C., 2013, Predicting the wear of hard-on-hard hip joint prostheses, *Wear* **301**(1-2), 192-200.

Udofia, I.J., Yew, A., Jin, Z.M., 2004, Contact mechanics analysis of metal-on-metal hip resurfacing prostheses, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **218**(5), 293-305.

Urkaç, S.E.S., 2006, *Characterization of Ultra High Molecular Weight Polyethylene (UHMWPE) modified by metal-gas hybrid ion implantation technique*, Thesis, Izmir Institute of Technology.

Utke, I., Moshkalev, S., Russell, P., 2012, *Nanofabrication Using Focused Ion and Electron Beams: Principles and Applications*, Oxford University Press.

Vasu, R., Carter, D.R., Harris, W.H., 1982, Stress distributions in the acetabular region--I. Before and after total joint replacement, *Journal of Biomechanics* **15**(3), 155-164.

Vaughan, C.L., Davis, B.L., O'Connor, J.C., 1999, *Dynamics of human gait*, 2nd ed., Kiboho Publishers, Cape Town.

VisualFEA, 2000, *Automatic triangulation*, Intuition Software, Inc., http://www.visualfea.com/manual-normal/html/4-1-1.htm, (online accessed June 14th, 2020).

UNIVERSITAS GADJAH MADA
PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE) UNTUK IMPLAN PANGGUL
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

von Schewelov, T., Sanzén, L., 2010, Catastrophic failure due to aggressive metallosis 4 years after hip resurfacing in a woman in her forties-a case report, *Acta Orthopaedica* **81**, 402-404.

Waghmare, A.K., Sahoo, P., 2015, Adhesive friction at the contact between rough surfaces using n-point asperity model, *Engineering Science and Technology, an International Journal* **18**(3), 463-474.

Wang, A., 2001, A unified theory of wear for ultra-high molecular weight polyethylene in multi-directional sliding, *Wear* **248**(1-2), 38-47.

Wang, A., Essner, A., Polineni, V.K., Stark, C., Dumbleton, J.H., 1998, Lubrication and wear of ultra-high molecular weight polyethylene in total joint replacements, *Tribology International* **31**(1-3), 17-33.

Wang, A., Essner, A., Klein, R., 2001, Effect of contact stress on friction and wear of ultra-high molecular weight polyethylene in total hip replacement, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **215**, 133-139.

Wang, A., Lee, R., Herrera, L., Kurdoba, L., 2013, Modeling and verification of ultra-high molecular weight polyethylene wear in multi-directional sliding, *Wear* **301**, 162-167.

Wang, A., Sun, D.C., Stark, C., Dumbleton, J.H., 1995, Wear mechanisms of UHMWPE in total joint replacements, *Wear* **181-183**, 241-249.

Wang, A., Sun, D.C., Yau, S.-S., Edwards, B., Sokol, M., Essner, A., Polineni, V.K., Stark, C., Dumbleton, J.H., 1997, Orientation softening in the deformation and wear of ultra-high molecular weight polyethylene, *Wear* **203**, 230-241.

.Wang, E., Nelson, T., Rauch, R., 2004, Back to Elements - Tetrahedra vs. Hexahedra, *2004 International ANSYS Conference to Highlight Best Practices From Industry Leaders*.

Wang, J., Li, Q., Yang, C., Zhou, C., 2018, Repeated loading model for elastic–plastic contact of geomaterial, *Advances in Mechanical Engineering* **10**(7), 1-15.

Wang, Q., Liu, J., Ge, S., 2009, Study on Biotribological Behavior of the Combined Joint of CoCrMo and UHMWPE/BHA Composite in a Hip Joint Simulator, *Journal of Bionic Engineering* **6**(4), 378-386.

Wang, Q.J., Chung, Y.W., 2013, *Encyclopedia of Tribology*, Springer Science Business Media, New York, 472.

Wang, S., Liu, Y., Zhang, C., Liao, Z., Liu, W., 2014, The improvement of wettability, biotribological behavior and corrosion resistance of titanium alloy pretreated by thermal oxidation, *Tribology International* **79**, 174-182.

UNIVERSITAS
GADJAH MADA
**PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE) UNTUK IMPLAN PANGGUL**
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Watters, T.S., Cardona, D.M., Menon, K.S., Vinson, E.N., Bolognesi, M.P., Dodd, L.G., 2010, Aseptic Lymphocyte-Dominated Vasculitis-Associated Lesion: A Clinicopathologic Review of an Underrecognized Cause of Prosthetic Failure, *American Journal of Clinical Pathology* **134**, 886-893.

Weisse, B., Loher, U., Rieger, W., Weber, W., 1999, FEM simulations of prosthesis hip joint implants, *Transactions on Engineering Sciences* **24**, 321-333.

Wolfarth, D., Filiaggi, M., Ducheyne, P., 1990, Parametric analysis of interfacial stress concentrations in porous coated implants, *Journal of Applied Biomaterials* **1**(1), 3-12.

Woodford, C., Phillips, C., 2011, *Numerical Methods with Worked Examples: Matlab Edition*, Springer Science & Business Media, 58.

Wriggers, P., 2006, *Computational Contact Mechanics*, 2nd Ed., Springer-Verlag.

Wroblewski, B., Siney, P.D., Fleming, P.A., 2016, *Charnley Low-Frictional Torque Arthroplasty of the Hip: Practice and Results*, Springer.

Wu, J.S.-S., Hung, J.-P., Shu, C.-S., Chen, J.-H., 2003, The computer simulation of wear behavior appearing in total hip prosthesis, *Computer Methods and Programs in Biomedicine* **70(**1), 81-91.

Xing, Z., Wang, M., Liu, W., Hu, J., Wu, G., 2013, Crystal structure and mechanical properties of UHMWPE-g-PMA fiber prepared by radiation grafting, *Radiation Physics and Chemistry* **86**, 84-89.

Xiong, D., Gao, Z., Jin, Z., 2007, Friction and wear properties of UHMWPE against ion implanted titanium alloy, *Surface and Coatings Technology* **201**, 6847-6850.

Xiong, D., Yang, Y., Deng, Y., 2013, Bio-tribological properties of UHMWPE against surface modified titanium alloy, *Surface and Coatings Technology* **228**, Supplement 1, S442-S445.

Xu, Y., Li, X., Xiao, M., Xiong, X., 2018, Growth of hierarchical TiO2 flower-like microspheres/oriented nanosheet arrays on a titanium mesh for flexible dye-sensitized solar cells, *The Royal Society of Chemistry* **20**(40), 5.

Yakusheva, D.E., Oshchepkova, T.E., Yakushev, R.M., Strel'nikov, V.N., 2010, Chemical Structure of Fibers of Ultra-High-Molecular-Weight Polyethylene upon Ion-Beam Treatment and Post-Irradiation Grafting of Acrylic Monomers, *Russian Journal of Applied Chemistry* **83**(8), 1403-1407.

Yamaguchi, Y., 1990, *Tribology of Plastic Materials: Their Characteristics and Applications to Sliding Components*, Elsevier Science.

Yamamoto, K., Imakiire, A., Masaoka, T., Shishido, T., Mizoue, T., Clarke, I.C., Shoji, H., Kawanabe, K. dan Tamura, J., 2003, Wear mode and wear mechanism of retrieved acetabular cups, *International Orthopaedics* **27**, 286-290.

UNIVERSITAS
GADJAH MADA
**PREDIKSI KEAUSAN CP Ti (COMMERCIALLY PURE TITANIUM) DAN UHMWPE (ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE) UNTUK IMPLAN PANGGUL**
HANDOKO, Dr. Suyitno, S.T., M.Sc.
Universitas Gadjah Mada, 2020 | Diunduh dari http://etd.repository.ugm.ac.id/

Yang, K., Ma, H., Cao, S., Li, X., Li, A., Cao, Z., 2020, Analysis of friction interfaces with sinusoidal microchannels and the hybrid lubrication mechanisms of a tribo-film, *Applied Surface Science* **525**, 10.

Yang, K., Ren, Y., 2010, Nickel-free austenitic stainless steels for medical applications, *Science and Technology of Advanced Materials* **11**(014105).

Yastrebov, V.A., 2013, *Numerical Methods in Contact Mechanics*, Wiley-ISTE.

Yew, A., Jagatia, M., Ensaff, H., Jin, Z.M., 2003, Analysis of contact mechanics in McKee-Farrar metal-on-metal hip implants, *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* **217**(5), 333-340.

Zeidler, E. 1988, Variational Inequalities and the Signorini Problem for Nonlinear Material, in Zeidler, E., *Nonlinear Functional Analysis and its Applications IV: Applications to Mathematical Physics*, Springer, New York.

Zhang, Y.L., Zhang, X.G., Matsoukas, G., 2015, Numerical study of surface texturing for improving tribological properties of ultra-high molecular weight polyethylene, *Biosurface and Biotribology* **1**(4), 270-277.

Zhao, Y., Wang, M., Tang, Z., Wu, G., 2011, Radiation effects of UHMW-PE fibre on gel fraction and mechanical properties, *Radiation Physics and Chemistry* **80**, 274-277.

Zhong, Z.-H., 1993, *Finite Element Procedures for Contact-Impact Problems*, Oxford University Press.

Zhu, B.-Q., Zhai, W.-j., 2011, Wear analysis of UHMWPE acetabular cup in standard gait, *Proceedings of 2011 International Conference on Electronic & Mechanical Engineering and Information Technology*, 1995-1998.