

## Asst.Prof.Dr.Savas Dilibal

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### RESEARCH INTEREST

*Systematic investigation on manufacturing, processing-structure-property relationships in adaptive structures, particularly NiTi, NiTiHf, NiTiCu, CoNiAl, NiMnGa shape memory alloys (SMAs). Cyclic thermomechanical experiments and multi-scale in-situ and ex-situ material characterization (using digital image correlation (DIC), scanning and transmission electron microscopy (SEM, TEM), X-ray diffraction (XRD) and differential scanning calorimetry (DSC) etc.). Position/force control of SMA based solid-state actuator systems. Soft robotics, grippers, mechatronics, biomedical and biomechatronic applications of shape memory alloys.*

### EDUCATION

**Doctor of Philosophy**, Metallurgical and Materials Engineering

Yildiz Technical University, Istanbul, Turkey

Graduation: Dec 2005

**Master of Engineering**, Mechanical Engineering

Istanbul Technical University, Istanbul, Turkey

Graduation: June 2003

**Bachelors of Engineering**, System Engineering

Army Military Academy, Ankara, Turkey

Graduation: Aug 1995

### WORK EXPERIENCE

- *Assistant Professor, Mechatronics Engineering. Department, Gedik University, Istanbul Jan 2015 -*
- *Adjunct Professor, Mechatronics Eng. Department, Bahcesehir University, Istanbul Sept 2014 - Jan 2015*
  - *Courses Taught:*  
*MCH2011 “Static and strength of Materials”, (Course content: Force Systems, Equilibrium, Strength of Materials, Stress & Strain, Mechanical Properties of Materials, Axial Load, Torsion, Bending, Transverse Shear”*
- *Adjunct Professor, Mechanical Engineering Department, Akron University, Akron, OH Jan 2014 - June 2014*
  - *Courses Taught:*  
*ME 4900- 420 “Object-oriented Design & Material Selection”, (Course content: The course provides the most advanced portion of the systems component of the Aerospace Systems Engineering program. It provides a baseline for engineering practice on aerospace material selection following the co-op experience)*
- *Post-doctoral Research Associate, University of Akron, Akron, OH Jan 2014 - June 2014*  
*NiTi shape memory alloys based solid-state actuators (Experimental investigation on bio-inspired robotics finger, hand and gripper mechanisms and their controlling modes)*
- *Post-doctoral Research Associate, University of Akron, Akron, OH Jan 2013 - Jan 2014*  
*Experiment, modeling and applications of NiTi and NiTiHf shape memory alloys NASA funded project (NASA’s Subsonic Fixed Wing Program - NNX11AI57A)*
- *Post-doctoral Research Associate, University of Illinois at Urbana-Champaign, IL Sept 2009 - Aug 2010*  
*Macro and mesoscale thermomechanical behavior of NiTi, CoNiAl and NiMnGa alloys*

- *Adjunct Professor, Mechanical Engineering Department, Yeditepe University, Istanbul* Sept 2007 - Sept 2009
  - Courses Taught:  
*ME 361 "Engineering Materials", (Course content: Production, processing and heat treatment of steel, aluminum, magnesium, titanium and nickel alloys, temperature-time-transformation diagrams, Metals in biomedical applications, Ceramic materials, Polymeric materials, Composite materials)*
  
  - ME 492 "SMA based robotic actuator system" Senior Mechanical Eng. Design Project
  
- *Logistics/Artillery Officer (NATO, Turkey)* Aug 1995 - Dec 2012
  - As a system engineer, functioned in multiple national and NATO-led multinational Headquarters conducting procurement, supply and contracting processes for Peace Support Exercises and Operations at tactical & operative levels.

### **COMPUTER SKILL**

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**Finite Element Analysis** : ABAQUS® (CAE®/Standard/Explicit) Linear & non-linear, Static & dynamic analyses, UMAT

**Object-oriented Programming** : C# Microsoft Visual Studio

**Mathematical Data Analysis Tools** : Mathematica, MATLAB®, MS - Excel

### **SCI-SCI EXPANDED JOURNAL PUBLICATIONS**

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1. Engeberg E.D, Dilibal S., Vatani M., Choi JW and Lavery J. (2015) Anthropomorphic finger antagonistically actuated by SMA plates, *Bioinspiration & Biomimetics*,; 10 (5): 056002 DOI: 10.1088/1748-3190/10/5/056002.
  
2. Saleeb A.F., Dhakal B., **Dilibal S.**, Owusu-Danquah J.S, Padula II S.A. (2014) On the modeling of the thermo-mechanical responses of four different classes of NiTi-based shape memory materials using a general multi-mechanism framework, *Mechanics of Materials*.
  
3. **Dilibal S.** (2013) "Investigation of Nucleation and Growth of Detwinning Mechanism in Martensitic Single Crystal NiTi Using Digital Image Correlation", *Metallography, Microstructure, and Analysis*, 2,4, 242-248.
  
4. **Dilibal S.**, Sehitoglu H., Hamilton R., Maier H.J., Chumlyakov Y. (2011) "On the Volume Change in Co-Ni-Al during Pseudoelasticity", *Materials Science and Engineering A*, 528,6, 2875-2881.
  
5. Hamilton, R.F., **Dilibal, S.**, Sehitoglu, H., Maier, H.J. (2011) "Underlying Mechanism of Dual Hysteresis in NiMnGa single crystals", *Materials Science and Engineering: A*, 528, 3, 1877-1881.
  
6. **Dilibal S.**, Tabanlı M, Dikicioğlu A. (2004) "Development of shape memory actuated ITU Robot Hand and its mine clearance compatibility", *Journal of Materials Processing Technology*, 1390-1394.
  
7. **Dilibal S.**, Güner E., Aktürk N. (2002) "Three-finger SMA Robot Hand and Its Practical Analysis", *Robotica Journal*, 20,175-180.

## **OUTHER PUBLICATIONS**

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1. Ades, C., **Dilibal S.**, Engeberg ED. (2016) Exoskeleton for Tubular Shape Memory Alloy Finger with Internal Cooling and A Superelastic SMA Spring Return, ASME Florida Conference on Recent Advances in Robotics, Miami, Florida, USA
2. **Dilibal S.**, Engeberg E.D. (2015) Finger-like manipulator driven by antagonistic NiTi shape memory alloy actuators, IEEE Int. Conference on Advanced Robotics, Istanbul
3. Altug G., Ozistek TD., **Dilibal S.**, Ozbek S. (2015) Transparent armour systems and general applications, MSI May,3.
4. Akkus T., **Dilibal S.** (2015) The use of image processing technique on the touchless volume and dimension measurements of passengers luggage and cargo, Automation.
5. **Dilibal S.**, Tansug D., Kocak M. (2015) Operator training on robot, mechanized and orbital welding, IXth National Welding Congress, Ankara.
6. **Dilibal S.**, Tabanlı M, Dikicioglu A. (2003) Development of shape memory actuated ITU Robot Hand and its mine clearance compatibility, Proceeding of AMPT03, 8-11 July 2003, Dublin, Ireland.
7. **Dilibal S.**, Sonmez N, Dilibal H. (2003) Nickel-titanium shape memory alloys and their technological usage, 3rd International Advanced Technology Symposium, 18-20 August, Ankara.
8. **Dilibal S.**, Dilibal H. (2002) ITUHand Robotic Hand and its mine clearance compatibility, pp.31-37, Defense Technology Congress, METU.
9. **Dilibal S.**, Güner E. (2000), Three fingered SMA robotic hand, Dokuz Eylul University, Engineering Journal, 2 :1 pp.159-173.
10. **Dilibal S.**, Güner E., (1999) Three fingered SMA robotic hand, XXth National Operations Research and Industrial Engineering Congress, Army Military Academy, Ankara, June 8-9, pp.98-99.

## **CONFERENCES**

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1. **S. Dilibal**, A. F. Saleeb, B. Dhakal, A.E. Hurley, J. S. Owusu-Danquah, S. A. Padula II, R. D. Noebe and G. S. Bigelow (2013) “Characterization Capabilities of a 3D Multi-mechanism Material Model for the Prediction of the Thermo-mechanical Behavior of Different Classes of Shape Memory Materials”, ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).
2. J.S. Owusu-Danquah, A. F. Saleeb, B. Dhakal, A.E. Hurley, **S. Dilibal**, S. A. Padula II, R. D. Noebe, and G. S. Bigelow (2013) “Large-scale Simulation of a Torque-Tube Actuator Using a 3D Multi-mechanism Material Model: A Comparative Study with Ni<sub>49.9</sub>Ti<sub>50.1</sub> and Ni<sub>50.3</sub>Ti<sub>29.7</sub>Hf<sub>20</sub> Shape Memory Alloys”, ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).
3. A.E. Hurley, A. F. Saleeb, **S. Dilibal**, B. Dhakal, J.S. Owusu-Danquah, and S. A. Padula II (2013) “Finite Element Modeling of NiTi Shape Memory Alloy Stents and Bone Staples for Biomedical Applications”, ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).
4. **S. Dilibal**, H. Sehitoglu, R. Hamilton, H.J.Maier, Y. Chumlyakov (2010) “Detwinning on NiTi SMAs” June 20-24, 2010, Special Workshop on Shape Memory Alloy, Koc University, Istanbul.

5. **S. Dilibal**, N. Cansever (2008) “Material characterization of the manufactured NiTi SMAs”, The International Conference for Shape Memory and Superelastic Technologies (SMST), 21-25 Sept., Stresa, Italy.

### **MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS**

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1. Member, American Society of Mechanical Engineers (**ASME**)
2. Member, The Minerals, Metals and Materials Society (**TMS**)

### **PATENT ISSUED**

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1. Antagonistically actuated shape memory alloy manipulator (15/10/2015 - USPTO: 2015/0289994)
2. Key and safe padlock system using nickel-titanium shape memory alloys (TR 2008 02546 B)

### **REFERENCES**

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#### **Dr. Erik D. Engeberg**

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Ocean and Mechanical Engineering Dept.  
Florida Atlantic University  
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