## Day: 22\textsuperscript{nd} October 2019, Tuesday  
### Venues: NUHS Tower Block (AM Session) Level 11  
Faculty of Engineering – E1-06-09 (PM Session)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker / Event</th>
<th>Title / Venue</th>
</tr>
</thead>
</table>
| 7.15 – 8.15am | Speaker: Dr. Alan Dang, MD       | **The Length, Breadth and Depth of 3D Printing in Orthopaedics**  
Venue: NUHS Tower Block #11-02/03 |
| 8.20 – 9.30am | Breakfast and Coffee break       | Venue: NUHS Tower Block #11-02/03                                           |
| 9.35am – 12.05pm | Facility tour of Orthopaedics | Venue: NUHS                                                               |
| 12.30 – 2.00pm | Lunch Break and Rest            | **Venue: NUS Staff Recreation Club**  
(By Invitation only) |
| 2.15 – 3.15pm | Q & A with Dr. Alan Dang         | Venue: E1-06-09 Engineering Block                                           |
| 3:30 – 4:00pm | Speaker: Dr Mohsen Seifi         | **Introduction to ASTM International Standards Development and ASTM Additive Manufacturing (AM) Center of Excellence (CoE)** |
| 4.00 – 4.30pm | Speaker: Prof. Nima Shamsaei     | **Investigation into Specimen Property to Part Performances Relationships for LB-PBF, an ASTM Standard Development Activity:**  
Measurement of Orientation and Location Dependence Mechanical Properties in Additive Manufacturing  
Venue: E1-06-09 Engineering Block |
| 4.30 – 5.00pm | Q & A / Open Discussion          | Venue: E1-06-09 Engineering Block                                           |
| 5.00 – 5.30 pm | Lab visit @ NUS 3DP Center       | Venue: E1-06-09 Engineering Block                                           |
About the Speakers:

1. **Dr. Alan Dang, MD** is CMO at PrinterPrezz, a leader in manufacturing Orthopaedic implants and Tissue Composites for ACL reconstruction. He is a Board Certified Orthopaedic Surgeon in the United States. He has subspecialty training in Spine Surgery. He has extensive technical experience in 3D printing and patient specific models. He shares patents with Dr. Alexis Dang through the University California (San Francisco) for 3D Printed Lattice Designs. He also has experience with Finite Element Analysis (FEA) modelling of anatomic structures and spinal motion using total human body models.

2. **Dr Mohsen Seifi, Director** of Global Additive Manufacturing Programs at ASTM International

   Dr. Mohsen Seifi is global director of AM programs at ASTM International responsible for ASTM AM center of excellence (CoE) and various AM programs. Dr. Mohsen is also an Adjunct Assistant Professor, Case Western Reserve University. At ASTM, he brings technical leadership to accelerate standardization activities across all ASTM AM related technical committees and building new partnerships/initiatives as well as development of new AM standards related programs within diverse ASTM portfolios. He has also appointment as an adjunct faculty at Case Western Reserve University in OH, USA. His Phd work focused on rapid qualification methods for metal additive manufacturing. He has co-authored more than 30 peer reviewed publications and has presented more than 60 invited and keynote lectures at various technical meetings, industries and government agencies while also receiving various technical society honors and awards.

3. **Professor Nima Shamsaei**, Director of National Center for Additive Manufacturing Excellence (NCAME), Auburn University.

   Prof. Nima Shamsaei currently holds the Philpott-WestPoint Stevens Distinguished Professorship in the Department of Mechanical Engineering at Auburn University, where he is also the founding director of the National Center for Additive Manufacturing Excellence (NCAME). NCAME, a partnership among Auburn University, National Aeronautic and Space Administration (NASA), ASTM International, and National Institute of Standards and Technology (NIST) aims to conduct fundamental and applied additive manufacturing (AM) research in order to advance AM technology for faster industrial adoption. NCAME later also became one of the founding partners of the ASTM CoE with the goal to contribute to the standardization and workforce gaps in AM. Prior to joining academia, Dr. Shamsaei spent many years in industry, including leadership positions, most recently at Fiat Chrysler Automobiles (FCA). During his time with FCA, he specialized in fatigue analysis and durability test development. Dr. Shamsaei then took his skillset to Mississippi State University in 2013 and initiated a research track in the AM field. The focus of his research was on the structural integrity of AM metals, which is his continued primary area of interest at Auburn University. The U.S. Department of Defense (DoD), Navy, Army, Air Force, Department of Energy (DoE), NIST, NASA, National Science Foundation (NSF), America Makes, ASTM International, and several private companies sponsor many of his research projects. He has over 150 scholarly publications and has served as the guest editor for the International Journal of Fatigue 1st and 2nd special issues on Additive Manufacturing in 2017 and 2019 and continues to organize multiple AM-related symposia in ASTM, TMS, and ASME. He is the recipient of multiple awards including Auburn University Research Award of Excellence in 2019, ASTM International
Emerging Professional Award in 2016, Schillig Special Teaching Award in 2015, and SAE International’s Henry O. Fuchs Fatigue Award in 2010

Abstract of the Talks:

1. **Dr Mohsen Seifi**
   
   **Title:** “Introduction to ASTM International Standards Development and ASTM Additive Manufacturing (AM) Center of Excellence (CoE)”
   
   Abstract: As the Additive Manufacturing (AM) industry moves towards series industrial production, the need for standards covering all aspects of the technology value chain becomes ever more prevalent. While standards and specifications for the various aspects of the AM materials and process chain continue to evolve, many such standards still need to be matured or are under consideration/development within standards development organizations (SDOs). In particular, materials feedstock, process qualification, testing, evaluation and structural integrity issues continue to be the main focus of on-going efforts in the standardization community. This presentation will discuss the state of the metal AM standardization including gaps, challenges, opportunities, and insight based on a recent initiative to establish a global center of excellence to support standard related research and development to be able to close the standardization gaps.

2. **Professor Nima Shamsaei**
   
   **Title:** “Investigation into Specimen Property to Part Performances Relationships for LB-PBF, an ASTM Standard Development Activity: Measurement of Orientation and Location Dependence Mechanical Properties in Additive Manufacturing”
   
   Abstract: The booming interest in additive manufacturing (AM) and its great potential has spurred industry to adopt this advanced technology. AM can produce net-shaped parts with complex geometries that are often impossible to fabricate through traditional subtractive means. Additionally, AM has introduced the ability to fabricate internal geometries, functionally graded materials, and can generate assembled moving parts in one step. However, due to variations in geometries, and therefore, thermal histories experienced, the mechanical properties of witness coupons may not be representative of the critical location of additively manufactured (AMed) parts. Differences in thermal history can influence the microstructure and porosity level in the material, thus affecting the specimen property to part performance relationships. This presentation provides an overview on the challenges in generating fatigue properties and design allowable for AMed materials. Results show that the process parameters can be adjusted to fabricate specimens with the same thermal history, microstructure and defect level as the material at the critical location of the part in service. It will be argued that property-performance relationships, i.e. specimen property to part performance, can be further established by fully understanding the process-structure relationships for AMed materials/parts.
Location Map of E1-06-09 (Red Star) Guests can choose to park at Carpark 2 / 2A