



International Workshop on

“Manufacturing for the Future: Towards Competitive Demand-Driven Qatar Industry”

**Hosted by:
Mechanical Engineering Program, Texas A&M University at Qatar**

**Venue: Room 310,
Engineering Building, Texas A&M University at Qatar, Education City**

April 3 – 4, 2018

Organizing Committee

Dr. Satish Bukkapatnam, Texas A&M University

Dr. Mohamed El Mansori, ENSAM

Dr. Marwan Khraisheh, Hamad bin Khalifa University

Dr. Bilal Mansoor, Texas A&M University at Qatar

Dr. Eyad Masad, Texas A&M University at Qatar

Dr. Vasanth C. Shunmugasamy, Technical Program Coordinator, Texas A&M University at Qatar



Summary

The two-day workshop will help identify advanced manufacturing research needs of the State of Qatar from both technological (e.g., 3-D printing, adapting manufacturing, and Smart platforms) as well as systemic (e.g., supply chains and the Internet of Things) fronts. The goal is to help improve the quality and global competitiveness of Qatar industry with focus on smart manufacturing to transform the critical sectors of Qatar including oil and gas (upstream drilling and transport), secondary value-added products (e.g., steel, aluminum, polymer production), and critical supply chains (e.g., food-security initiative).

Workshop Focus

The two-day workshop will feature talks from diverse industry and academic experts. Experts drawn from various industry sectors critical to layout Qatar's will articulate the emerging needs and grand challenges. Academic experts will layout the technology frontiers in the relevant areas to offer a bright future for Qatar manufacturing platforms. Together, they will outline the elements of a research roadmap for Qatar in advanced manufacturing to address these emerging needs.

The workshop will specifically aim to achieve the following objectives:

- Articulate Qatar-specific challenges and opportunities in advanced manufacturing
- Delineate the technologies and systems with the highest potential to address these challenges
- Outline a roadmap to advance smart manufacturing innovations to develop, tailor and demonstrate solutions to the grand challenges

Workshop Themes

The workshop will focus on research and innovations in (1) manufacturing technologies, and (2) manufacturing systems and supply chains.

A new manufacturing paradigm is needed for the following items:

- New models, simulation, big data, cloud and high-performance computing will enable functionally based designs. Thus, a component or system can be designed to meet its functional requirements in an optimal fashion. New designer materials (including non-homogeneous materials) will need to be manufactured to scale, as well as to be incorporated into the design process and design tools.
- Rapid adoption and certification of new processes, technologies and products. How do we move innovations from the laboratory into large-scale production more rapidly so that we can keep up with the pace of technological change?
- New design tools and design philosophy. This is particularly true with additive manufacturing. Finally, from a philosophy/educational perspective, we need to teach our students how to think differently with respect to the new design and manufacturing capabilities. Again, when one thinks of a hole, it no longer has to be a straight circular constant cross section configuration; additive manufacturing can produce many more configurations.

Oil & Gas

Clean oil and gas is likely to remain the largest and the most economical source of energy for a foreseeable future. Collaborative research initiatives are necessary to address key scientific and technological challenges in processing (e.g., drilling, finishing, and coating) of advanced materials, that are sought increasingly for oil and gas core infrastructure. In addition, recent advances in contemporary manufacturing technologies (e.g., additive, nano-manufacturing) offer a mostly untapped opportunity to create high value products (e.g., refractory housings, nanowire thermoelectric) out of oil and gas by-products that are generally treated as waste in the value chains (e.g., steel slag and sulfuric compounds). These technologies thus lead to an exciting possibility of transforming the oil and gas sector into a net-zero material footprint industry. Some possible research areas include Energy efficient technologies and operational procedures for oil and gas production, Smart drilling and well technology, Advanced exploration technologies, Efficient and enhanced oil recovery, Offshore and subsea manufacturing and operations, downstream and secondary industries, Advanced pipeline and transport systems.

Downstream Products

The natural resources as well as its strategic location offer Qatar the potential to be a world leader in primary processing of metals, including Aluminum and Steel. Advent of smart manufacturing is transforming this industry into lean enterprises that can produce alloys on demand at high efficiencies and performance. Challenges inherent to the introduction of smart manufacturing technologies for primary processing of these materials, as well as towards enhancement of metal processing value chains to create high value products of strategic importance to Qatar will be discussed. Here, rapid adoption and certification of new processes, technologies and products will be critical to realizing this vision for Qatar. How do we move innovations from the laboratory into large-scale production more rapidly so that we can keep up with the pace of technological change?

Critical Supply Chains

Qatar relies heavily on expensive desalination processes to produce water for both drinking and agriculture. On the other hand, the cultivation of crops is already a challenging proposition for the State of Qatar due to the lack of arable land. This substantial reliance on foreign food imports, e.g. drinking water, grains and processed food items has made the State of Qatar vulnerable to manufacturing supply chain issues that may arise due to fluctuations in international commodity markets

Workshop Deliverable

In every session of the workshop, at least one organizing committee member will serve as a scribe. The participants will work together at the end of the workshop to utilize the notes and put together a white paper about the future of research and innovation of the manufacturing industry in Qatar.

We hope you enjoy the workshop.

Agenda

Tuesday April 3, 2018

8:00-8:20 AM	Welcome remarks: Dr. César O. Malavé, Dean, Texas A&M University at Qatar. Welcome remarks: Dr. Richard O'Kennedy, Vice President for Research Development and Innovation, Qatar Foundation Welcome and Workshop Agenda by the Organizing Committee
8:20- 8:40 AM	Dr. Satish Bukkapatnam and Dr. Mohamed El Mansori Topic: TEES-ENSAM-FABRE Partnership for Advancing Manufacturing
Session 1:	Strategic Needs and Opportunities in Qatar Manufacturing Chair: Dr. Marwan Khraisheh, Hamad bin Khalifa University
8:40-9:00	Mr. Malike Bouaoud, Research and Development-Qatar Foundation Enabling the Factory of the Future, R&D Strategy and Perspective
9:00-9:20	Mr. Mohammed Al-Jalahma, Export Trade Finance Manage, Qatar Development Bank Strategy of QDB for Manufacturing Sector in Qatar
9:20-9:40	Mr. Nayef M. Al-Ibrahim, Founding Partner and CEO of ibTECHar Digital Solutions Building Local Capacity in Digital Fabrication Through Education, ibTECHar as a case
9:40-10.00	Mr. Sathish Bangera, Qatar Steel Sustainable Steel Making Process at Qatar Steel
10:00-10:30	"Manufacturing Sector in Qatar: Group Discussion Moderated by Dr. Marwan Khraisheh"
10:30-10:45	Break
Session 2:	Industry Global Manufacturing Perspectives Chair: Dr. Mohamed El Mansori, ENSAM
10:45-11:10	Dr. Daniel Lecuru, Airbus Advances in Manufacturing Technologies and Opportunities for the Aerospace Industry
11:10-11:35	Mr. Eduard Meier, ExOne Advances and Emerging Industrial Opportunities in Additive Manufacturing Technologies
11:35-12:00	Open Discussion
12:00-1:00	Lunch
Session 3:	Advances in Manufacturing Technologies Chair: Dr. Satish Bukkapatnam

1:00-1:25	Dr. Ibrahim Jawahir, University of Kentucky Next Generation Manufacturing Technologies for the Energy Industry: Emerging Trends in Smart and Sustainable Manufacturing
1:25-1:45	Dr. Muammer Koc, Hamad bin Khalifa University Advanced Manufacturing Options and Strategy for Economic Diversification in Qatar
1:45-2:05	Dr. Arun Srinivasa, Texas A&M University Simulation and Modeling for Magnetic Slurry for Localized Magnetic Polishing
2:05-2:25	Dr. Said Ahzi, Hamad bin Khalifa University Modeling and Optimization of Manufacturing Processes: Application to Additive Manufacturing - SLS/SLM
2:25-2:30	Break
Session 4:	Roadmap and Summary of Day 1
2:30-4:30	What are the challenges for the Qatar Industry? What are the needed research areas and innovations to address these challenges?

Dinner: 7 pm, @ Yasmine Palace, Pearl Qatar

Wednesday April 4, 2018

Session 4:	Systems and Supply-Chain issues for Critical Sectors of Qatar Chair: Dr. Satish Bukkapatnam
8:30- 8:50	Dr. Laoucine Kerbache, Research and Development-Qatar Foundation Supply Chain Issues and Challenges with a Focus On Qatar
8:50-9:10	Dr. Raka Jovanovic, Qatar Energy and Environment Research Institute Different Methods for Exploiting Truck Appointment Systems at Container Ports for Energy Savings
9:10-9:30	Dr. Abdelaziz Bouras, Qatar University PLM based Industry Information Systems
9:30-9:50	Break
Session 5:	Research and Innovation Roadmap for Qatar Manufacturing Industry
9:50-10:10	Dr. Basel Shadid, GOIC The Strategic Manufacturing Sectors in Qatar and the Role of R&D as Driving Enabler
10:10-10:30	Dr. Bilal Mansoor, Texas A&M University at Qatar Manufacturing Research and Capacity at Texas A&M at Qatar
10:30-11:30	What are the challenges/needs? What are the major opportunities? What are the new technologies? What are the research needs and innovations needed to support Qatar Manufacturing Strategy?
12:00-2:00	Lunch, Discussions and Closing Remarks