*INTERVIEW WITH*

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### Please tell us about the work that you're doing and the type of projects you're working on in the transportation manufacturing sector.

Metal additive manufacturing (industrial 3D printing) continues to see global growth; however, Canadian manufacturers are cautious due to high upfront costs and uncertainty of reliable part production.

At the research level, my team is focused on increasing process reliability and robustness to enable technology adoption across multiple industry sectors.

At the applied level, we are working on projects directly applicable to the transportation sector, from developing process parameters for low-cost steel alloys, to design optimization of structural components for light weighting and manufacturability, as well as tailoring materials and designs for automotive fluid power transmission applications.

### What are some of the key impacts of new technologies on existing manufacturing practices?

Emerging manufacturing technologies are attracting a new generation of engineering talent. The image of manufacturing has changed for the better in the past decade, and Canadian workforce is taking notice. For instance, additive manufacturing processes are compatible with urban production sites, thus access to and retaining of talent may no longer be an impediment.

Mass customization is now an emerging trend. Advanced manufacturing technologies enable up-scaling of personalized or customized part production. This is in line with a new profile of consumer needs.

Standardization of manufacturing practices is lagging compared to the industry uptake, as far as the additive manufacturing processes are concerned. Implementation of standardized safety/production/QA approaches after the fact may be tremendously costly. Being up-to-date with these practices is often challenging.

### What are some of the key considerations for companies managing the shift to Industry 4.0 and intelligent manufacturing practices?

There is a new dynamic in the supply chain ecosystem.

There is a wealth of hype-based media content that may misguide industries in regards to some of the underlying challenges in technology adoption, specifically in additive manufacturing. Informed decision-making in terms of high-cost technology adoption requires some degree of experience and/or alignment with knowledgeable partners.

**In what ways is workforce development becoming a key challenge for the industry at present, and how are companies looking to address these?**

I have noticed that there is a growing interest and excitement from existing workforce to be re-trained on new manufacturing technologies, as opposed to pushback. This interest should be leveraged through mature education programs, which at this time are not available in Canada.

**What do you think enterprise should be doing at present to manage the risk of cybersecurity in increasingly complex manufacturing environments?**

Cybersecurity is an important concern when it comes to digital manufacturing. In additive manufacturing, a large portion of the manufacturing workflow is in the digital domain. Any intentional data disruption/manipulation could result in high losses, as the part quality can be influenced at the micro (material), meso (design feature), and macro (part) scale. Observing such would require expensive non-destructive testing, which is not feasible for all of the parts in production. In addition, reverse engineering and printing of components has increased in popularity. This is becoming a challenge for manufacturers.

Some ways of tackling issues: behavioural best practices are likely the best threat prevention strategy, identifying vulnerability in the manufacturing chain is also important, working with machine manufacturers to schedule and perform OS and firmware updates at pace with the industry standards, implementing production data consolidated visibility strategies to track issues early, adopting emerging standards in the file structure for CAD design in additive manufacturing, file encryption and data transfer best practices.

**What was your motivation for joining this event?**

In my view, meaningful industry engagement has been at the core of driving innovation in the advanced manufacturing sector. My motivation in participating in this event is to understand the industry needs and barriers to adoption of emerging tech in the manufacturing and transportation sector, both from the technical and workforce education level.