



Crossroads of America

## Chapter Meeting

6:00 PM, Tuesday March 10, 2020 [www.incose-coa.org](http://www.incose-coa.org)

### **Program:**

#### **A Methodology to Predict the Impact of Additive Manufacturing on the Aerospace Supply Chain**

Metal additive manufacturing (AM) has shown great potential to disrupt various industries. Perhaps the most illustrious commercial example is provided by General Electric, which created a completely new business unit, GE Additive, in 2016. Much of additive manufacturing's allure is its ability to produce structurally efficient parts, expeditiously. Aerospace is one of the key target markets given its extensive focus on lightweight designs. This novel technology is particularly well suited to create strong lightweight parts, as reflected by the common notion that, for AM, "complexity is free."

Nevertheless, there are drawbacks as with any burgeoning technology. The principle concern is part quality – there is a lack of consistency of the mechanical properties for final AM parts. In light of this uncertainty, most research focuses on the physical build process; accordingly, this constitutes a large majority of the academic publications. Very little effort has been made to investigate the implications downstream, such as that of the requisite ecosystem.

This dissertation provides a novel methodology to study the impact of additive manufacturing on the aerospace supply chain. The focus is serialized production of structural parts for the aeroengine. This methodology has three fundamental steps. First, a screening heuristic is used to identify which parts-assemblies that would be candidates for AM displacement. Secondly, the production line is characterized and evaluated to understand how these changes in the bill of material might impact plant workflow, and ultimately, part cost. Finally, the third step employs an integer linear program (ILP) to predict the impact on the supply chain network.

It was determined that additive manufacturing can be used to displace certain conventional manufacturing parts as the technology readiness level (TRL) increases. This is particularly powerful if adopted by the legal design authority (usually the original equipment manufacturer) as it can then print its own parts on demand. Given this sourcing flexibility, these entities can in turn apply pricing pressure on its suppliers. This phenomenon has been seen anecdotally.

#### **Speaker: Bill Bihlman, President, Aerolytics LLC**

Bill Bihlman founded Aerolytics - a management consultancy - in 2012. Its focus is marketing strategy for aerospace materials, structures and component manufacturing firms. He is a regular conference speaker, including North America, Europe, Asia and the Middle East. Bill started his career in 1995 as an engineer with Raytheon Aircraft. Subsequently, he was Senior Consultant with AeroStrategy.

He is currently a PhD candidate in Industrial Engineering at Purdue University. His research focus is additive manufacturing and the aerospace supply chain. Bill holds a BS and MS in Mechanical Engineering from Purdue University, and an MBA and MPA from Cornell University. He holds a Green Belt in Six Sigma and is a licensed private pilot.



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**Meeting Location / Host Site (see included directions and map to host site and parking)**

SAIC  
4422 Bragdon Street  
Indianapolis, IN 46202  
Host: Freddy Rastede <[FREDERICK.W.RASTEDE@saic.com](mailto:FREDERICK.W.RASTEDE@saic.com)>

**Satellite Site**

No satellite site this month

**Remote Access: If you cannot attend at the host location, join us remotely:**

Web Address: [https://incose.pgimeet.com/INCOSE\\_GMTwo](https://incose.pgimeet.com/INCOSE_GMTwo)  
Access Number: 1-719-457-6209  
Guest Passcode: 519 731 6920  
**Dial In Numbers (if you don't use Computer VOIP):**  
USA : 1-605-475-5604  
USA : 1-719-457-6209

**Meeting RSVP**

To assure we have a (complementary) meal and seat reserved for you, please email your plan to attend to Chris Hoffman at [diesel\\_chris@me.com](mailto:diesel_chris@me.com). You do not need to be an INCOSE member to attend!

Along with your RSVP, please provide the following so that our host (SAIC) can enter you into their system prior to your arrival:

- 1) Name
- 2) Company or affiliation
- 3) Are you a U.S. citizen?

**Event Schedule**

6:00 – 6:10	Arrival, Security Check In
6:10 – 6:30	Light Meal, Informal Networking
6:30 – 7:00	Business Meeting
7:00 – 8:00	Program
8:00 PM	Adjourn

**Business Meeting:**

- Call to Order
- Approve/update minutes from previous Chapter meeting. (Attached)
- Announcements
- Treasurer's Report
- Old Business
- New Business



**Directions to Host Meeting Site: (Indianapolis)**

SAIC is located on the east side of Indianapolis, off Pendleton Pike, at 4422 Bragdon Street.

Note that if traffic is heavy and you can't turn left off of highway 36 (Pendleton Pike) onto Bragdon Street, you can turn left at the next traffic light onto N Franklin Rd and take back streets to SAIC.

