

Interview Assessment 4

Name of Professional: Pat Kocurek

Profession/Title: Process Engineer

Business/Company name: Raytheon

Date of Interview: December 18th, 2017

Assessment:

Earlier this week, I met with Mr. Kocurek, a process engineer specializing in micro-electronics assembly at Raytheon. I reached out to Mr. Kocurek through advice from Mr. Mueggenborg at a previous interview who said that Mr. Kocurek did more specific work on 3D printing technologies than he did. Prior to this interview, I prepared several questions pertaining to 3D printing specifically which I wanted to ask such as what types of applications could be found in 3D printing as well as the various different types of 3D printing available today. I also hoped that he would provide possibly contact info to people who did work with CNC machining as I still needed to learn more about that side of mechanical engineering.

During the interview Mr. Kocurek and I first discussed his primary roles at Raytheon which included having to design radar systems and microelectronics for manufacture with the use of 3D printing. He explained how the typical 3D printing used at Raytheon was called needle-tip printing which deposited a conductive-paste or fluid which cured under heat after printing and could be used to create circuits. He also explained how 3D printing could be used to make printed wiring boards which were similar to printed circuit boards as found in household electronics but were more durable. With 3D printing he explained how boards could be manufactured with much less material cost since circuits could use a technique called bridging

which allowed a circuit to essentially “bridge” over another circuit without having to create a new layer on the circuit board. During the interview he also mentioned how with the addition of nano-materials, as mentioned by Dr. Choi in a previous interview, the conductive paste which was extruded out of the needle tip could exhibit properties of high-conductivity metals such as silver without having to be extruded at an extremely high temp which could damage the board. We discussed how regular methods of circuit board manufacturing with heat-curing in an oven was often time-consuming and costed more than the 3D printing method he was researching and testing. Mr. Kocurek also explained how as the technology of needle-dispense printing improves, the number of materials available and connectivity are sure to improve.

During the interview Mr. Kocurek did mention some information about CNC machining such as how CNC machines used a platform also used on 3D printers called a cartesian platform which is basically a 3-axis box. He explained how while CNC is much older, several developments are still taking place such as incorporating the additive processes of 3D printing into CNC machining which would allow for the creation of much more complex structures as well as the incorporation of newer materials which could soon be milled in CNC machines. He also explained that a simultaneous process of additive and subtractive manufacturing would also reduce material cost as well as time used to manufacture parts. However, he still mentioned that each process has its own specific roles in manufacturing even as they slowly become more advanced and upgraded. We also discussed how parts have to be designed differently for each manufacturing process with certain features such as hollow areas and overhangs being a primary area of focus in the design stage.

Overall, from this interview, I learned quite a lot about some of the more groundbreaking developments in 3D printing which I had not done much research on in the past, but were still not very related to my primary topic of FDM printing and CNC machining. Some of these developments of 3D printing included needle-dispense printing which was the type he was most familiar with as well as jetting 3D printing which he mentioned was similar to inkjet printers, but did not have much information on the subject. Upon further research, I found that the process was actually called “binder jetting” printing which allowed for metallic printing and could possibly be a field of research when considering my final product. While these topics may seem irrelevant to my topic of FDM printer and CNC machines, Mr. Kocurek did mention how each printing process used the same 3-axis cartesian motion platform which was quite relevant to my topic. However, this interview still did not provide much helpful information on CNC machines or FDM printing and not much closer to finding a mentor. In future interviews, I will be sure to first find people with high expertise in 3D printing, but more specifically FDM printing as well as possibly finding someone who has a history with CNC machining.