Masatoshi Miyazaki spent 35 years with Toyota Motor Corporation in the prestigious Production Engineering Department #1. This group is responsible for the production process planning, equipment specification, tooling, gauging, and line layout planning for all engine, transmission, and chassis related machining and assembly lines in Toyota. This group forms a vital link between product development and manufacturing in Toyota. This relatively small and highly selective department is kept centralized in Japan in order to maintain a high degree of control and standardization over production processes worldwide. Different from many companies these PE groups in Toyota specify in great detail the type of process they want equipment suppliers to build for Toyota's system in machining and assembly plants. Similar other PE departments play the same role for other shops such as stamping, body weld, paint, plastics, and assembly. Many insiders consider this discreet group to be a huge factor in the overall success of Toyota's vaunted production system. Consistently they launch production line after production line on-time, within budget, and with a very short ramp up to levels of high operational availability and quality. After working for Toyota in this capacity for over 35 years Mr. Miyazaki transferred to Aishin Corporation an $18 Billion dollar tier one supplier to Toyota as a special technical director in the area of machining and assembly.

Summary Notes from Art Smalley Interview with Mr. Miyazaki

TOPIC: Aishin Fire Tragedy and the Strength of TPS

Art:

Thanks for spending some more time with me to discuss this topic. I understand that you had quite an amazing background experience with Aishin Corporation?

Mr. Miyazaki

You are referring to the fire at the Aishin Kariya Plant a few years ago?

Art:

Yes I was hoping that you'd share that story with me so I could summarize it for our on-line readers. I think it is a good story that relates Toyota's strength and ability in a crisis situation. Can you give us the background and talk about your role?

Mr. Miyazaki:

Well it was February the 1st back in 1997 almost ten years ago from today and I still remember it very well. In fact it was a Saturday and I was at home and received a call from my boss a general manager at Toyota. He informed me there had been a large fire at Aishin's Kariya Plant and several machining and assembly lines had been wiped out. I was to report to Aishin's head office and go to room 306 right away.

Art:

Why were you selected?

Mr. Miyazaki:

I have a special expertise in planning machining and assembly processes for Toyota and had almost 30 years experience at the time. I was just one of several on the short list of people with the right skills to help out.

Art:

How urgent was the situation?

Mr. Miyazaki:

It turns out it was very urgent. This particular plant was a sole source supplier for Toyota on several different product lines. Volumes were in the hundreds of thousands of annual units for these lines. There was no immediate back up supplier to switch over to. Aishin had quickly counted inventory and including what was saved, what was in storage, in transportation, and at Toyota there was only about 4-5 days of running stock. Then vehicle assembly lines would start shutting down left and right. So it was a big deal. Idling a couple of plants would mean tens of thousand of people standing around and thousands of units of production per day would be lost. It was looking like a disaster. It was not just

Toyota either. The facility supplied Mitsubishi, Hino, Dahatsu, and other companies as well.

Art:

That would be expensive and problematic to say the least. I remember reading initial reports of this in the newspapers even in the United States. There was a real big fuss about this at the time.

Mr. Miyazaki:

Oh yes. The press was all over this accident. Immediately the "weakness" of Toyota's Just-in-Time system was criticized as the topic of the news for several days. Experts from industry and other media people talked about what a set back this was for Toyota and how long this was going to take for the company to recover.

Art:

What were some of the estimates like?

Mr. Miyazaki:

Various people in the press put out comments that it would take months for Toyota to recover and tremendous amounts of sales volume would be lost.

Art:

But that did not happened?

Mr. Miyazaki:

No. They did not understand the real strength of Toyota, the degree of cooperation we would provide, and our overall ability to react in a crisis.

Art:

By the way. What was the cause of the fire?

Mr. Miyazaki:

It was never exactly figured out. The best guess was that a motor that pulled a chain conveyor for a cutting chip pit over heated. Heat built up and then a rag or something probably caught on fire. Then since this was a quite old plant there were some wooden platforms for the workers to stand on in front of many of the machining lines. Once just one of those caught on fire it was all over and spread quickly through the entire plant.

Art:

How does Toyota then get involved?

Mr. Miyazaki:

Well Aishin is a part of the Toyota Group even though it is a separate company. Toyota owns about 23% of the company and Aishin has supplied Toyota with products of some sort for over 60 years. It was once a small part of Toyota Motor Company at one time and still has close ties.

Art:

So an executive from Aishin calls Toyota to report the fire and the extent of the damage right away. And they probably make some comment about the likely time to re-establish production?

Mr. Miyazaki:

Something like that. I was not privy to that communication. Anyway the response given for the time estimate to rebuild the line was not acceptable so Toyota made the decision to organize certain support resources.

Art:

Which eventually lead to your phone call on a Saturday at home. Then what happened?

Mr. Miyazaki:

Well I reported to Aishin as soon as I could get there. I walked into room 306 and there on the whiteboard was written “PV Line” “Responsibility Miyazaki”.

Art:

What is a PV?

Mr. Miyazaki:

Laughs. That is what I thought at the time too – what is a PV? I had never seen or made one before. It stands for proportioning valve and it is used in disc brake applications to provide the correct pressure for front and rear drums.

Art:

So what did you do?

Mr. Miyazaki:

Well first you have to assess the situation and get the initial facts clear. It turns out that the assembly line equipment was miraculously spared any damage and could be salvaged. Aishin's Handa Plant also had just enough open plant floor space for the needed production lines. And of course supplier parts could be immediately reordered and directed to the new location. The real problem was the machining lines. You can't just make precision components used in items like proportioning valves by hand. You need machine tools, jigs, fixtures, gauges, tools, etc. or you can't make a part.

Art:

And this is just what you and your group do so well for Toyota world wide.

Mr. Miyazaki:

Yes we are experts in "mono-zukuri" (making things). Product development gives us a document that we call the "Seihin-zu" (final product drawing) and from there we break the components down in operational steps and details in order to make it in the most efficient way possible with low cost, high quality, and high equipment reliability.

Art:

Doesn't every company do this?

Mr. Miyazaki:

Yes in some fashion. Anyone can do it but I bet we do it better, faster, cheaper, and with higher quality. This is the real strength of TPS as I was telling you earlier. No matter how good you do superficial stuff like flow, kanban, takt time, standardized work etc. you won't have an advantage if you are taking 14 steps to make a product and I am only taking 8 steps to make that same item. There is a "science" and an "art" to making things in the

best way possible. And if I have less capital investment, higher uptime, higher quality, and require fewer operators than your line you can't compete with me. TPS *methods* work on top of an highly efficient set of *production process* in Toyota. Put TPS elements for example on top of a bad production process and it just won't help you as much. So we have been making and improving production processes for decades. This is a real hidden strength of Toyota – process planning, gauge planning, fixture devices, process capability, etc.

Art:

I see what you mean and agree 100%. A pull system across a poorly designed set of operations is not going to save you much money or gain efficiency. So what were your first concrete steps to move forward making proportioning valves after the initial assessment of the damage?

Mr. Miyazaki:

By the afternoon of the first day I started collecting drawings to make a product and process complexity matrix. Just about all the documentation for the production process and tooling, etc. was lost in the fire. It was an old line to tell you the truth and poor documentation management practices were in effect. All I was able to obtain were copies from the design department of the 25 final product drawing used to make 60 different part numbers.

Art:

So you had almost nothing to start with – all the key documentation was destroyed as well?

Mr. Miyazaki:

Yes and that is why I was probably called. A lot of things needed to be made from scratch in a hurry and only a few people really have this skill to do it both correctly and quickly.

Art:

What were some of your next steps:

Mr. Miyazaki:

I quickly checked to see if the 60 parts could be standardized and reduced somehow. Not much luck though as I could only squeeze it down to 58 part numbers. However I quickly realized that the dimensions on a large portion of these parts could be run down a single machining line but it would mean some complex fixture design.

Art:

Why just one big line for the majority of the items?

Mr. Miyazaki:

Speed. In reality on a lot of these parts there was enough volume to justify dedicated transfer style machining lines. However those machines are long lead-time items and would take a month or more to procure. That was just not an option in this case. We had to make due with general purpose machining centers. I called every machine tool maker in Japan on my list of contacts and begged, borrowed, and stole every machine I could get my hands on. I rounded up about 100 machines from show rooms, development labs, demonstration machines, old idle machines, etc. We did not use them all but we initially took whatever we could get and had it shipped to Aishin. Some was purchased and some was just borrowed on loan.

Art:

Then what?

Mr. Miyazaki:

I was working on the PV line which was the most complex item to produce. There were other Toyota and Aishin people working on other component lines as well. But even for the PV line after studying the product drawings I knew I would need some help in terms of technical resources similar to my own.

I explained to my boss that I would need 3-4 more people if were going to do this quickly and we plucked some managers out of Toyota with the experience and skill set to do this as well.

Art:

Please continue:

Mr. Miyazaki:

Well then on Monday or so we had to break down the product drawings into what we call "Kosaku-zu" or operation drawings product by product. They are numbered operation 10, operation 20, operation 30, etc. indicating the machining steps to make the part. Once we have operation drawing we can best determine exactly how we are going to machine the parts most efficiently step by step. Also we need this to determine fixture details, clamp details, part datum and location details, tooling and which machine tools would be needed

at which step of the production line. Given timing we could only use off the shelf standard tooling and nothing special. It was a huge technical undertaking but one that we have done hundreds of time before in process planning. This time there was just the incredible time pressure urgency on top of everything.

Art:

So how long did this take?

Mr. Miyazaki:

We were working almost around the clock the first few days just catching a couple hours of sleep here and there when we could no longer think straight. After a couple days of making the drawings and figuring out the fixture needs, etc. we began turning over requests to make fixtures and gauges, etc. over to Toyoda Machine Works one of the largest machine tool builders in Japan. They too are a Toyota company and immediately we were given priority on their machines to start building parts for the special fixtures we would need on the general purpose machining centers.

Art:

Then you could relax a little?

Mr. Miyazaki:

No, then there was still figuring out the line layout at the factory and where to put machines etc. I had to explain to facilities and engineers where we would need electricity, air, hydraulics, coolant lines run, etc. and get them working in advance on that. Then as the machine tools started coming into the factory we were drawing spaces on the floor to mark where they would go and get people working on hooking them up for us. The machines needed to be programmed as well. Other people were working on getting the assembly line moved in and ready to run as well. Then slowly day by day the tooling we ordered, the tooling holders, the quality gauges, and fixture parts began arriving as well. It was a chaotic frantic scene around the clock and people worked in shifts to get things ready.

Art:

When did it finally all this finally come together?

Mr. Miyazaki:

Believe it or not on February 14th the machining lines for the PV line actually started cutting chips and making parts on the main high volume machining line we planned. The

lower volume lines were a day or two behind and the other component machining lines a day or two beyond that as I recall. Anyway, my line started cutting chips and making parts first I still recall with pride. We had a formal "line off" event on the 24th to mark the start up of all lines and full volume production.

Art:

You were able to go from zero to production ready parts to in about 14 days? And all lines were back running at full speed in less than 24 days?

Mr. Miyazaki:

Yes. I had never done anything so fast in all my life. The normal span would have probably three months for most companies. We increased the production amount daily after the 14th and ran three shifts around the clock seven days a week in the beginning but we kept Toyota's assembly lines running. There was more scrap and downtime especially in the beginning than we would have liked of course but we maintained quality in stating and no problems got through the assembly line to Toyota.

Art:

There was no stoppage at all?

Mr. Miyazaki:

I think some of Toyota's lines stopped for four days. Production Control in Toyota had to switch to run types that did not require some of these items and they ran reduced schedules for a few days. But in reality there was quite minimal stoppage of Toyota's lines. And in reality since there is inventory in the field outside of Toyota at the dealers, in stock yards, and in transit etc. there was basically no effect to the customer, sales, or the quarterly financial results.

Art:

How long did you have to stick around to direct traffic?

Mr. Miyazaki:

I think it was close to two months but the intense part was the first three to four weeks. After that I was able to make assignments, direct others, and act as more of a coordinator and less of an hands on engineer. Aishin took control from there and made further improvements and ran it as a regular production line. It worked out quite well.

Art:

What stands out the most to you about whole episode?

Mr. Miyazaki:

Several things. First I guess just the cooperation and coordination across so many different companies and groups. The common thread was that most were part of the Toyota Group. Second was the sheer speed at which we could move in an emergency. When there is a crisis it is amazing how much you can suddenly focus and get things done. Third was the reaction from the media I guess. After all the dire predictions they swung around 180 degrees when it became know that we would continue manufacturing with no effect on production despite the large damage to Aishin's Kariya facility. Suddenly then we were heroes and people were writing about the strength of Toyota's system again.

Art:

So what is the strength of the Toyota in your opinion?

Mr. Miyazaki:

I maintain that it is efficiently making things or "mono-zukuri" in Japanese. From the time of Sakichi Toyoda the company has always been very strong in terms of being inventive, creative, and productive. I will put our collective ability to make things in our industry against anyone. We are good at studying a process and breaking it down and making things better. We practice kaizen on the production process and production planning process itself. I do think this little episode showed just how fast we can respond in such a difficult situation. Other companies would have been down for a longer time I suspect.

Art:

I have to say this is very impressive. I can't imaging the speed and sheer quantity of effort that was involved in this little crisis project you were handed. So what are you doing at Aishin now?

Mr. Miyazaki:

Well I had no contact with Aishin for quite a long time after things quieted down. Then one day a director at Aishin and a director at Toyota were discussing affairs and there was recognition on the part of Aishin that they needed to developed stronger production process planning skills. I was selected as a key person to transfer more of this type of knowledge that we have in Toyota to Aishin and try to level up skills sets in this area. My job is to teach now what I do best to the engineers here at Aishin.

Art:

That in hindsight may be the most amazing thing about Toyota. They'll dispatch experts such as yourself to help affiliated companies out in both normal and abnormal times. Thank you for your time and cooperation.