

**Mr. Katsuya Jibiki** spent 38 years with Toyota Motor Corporation in production working entirely in the Honsha press shop. During this time he was a key figure who was highly involved in the actual reduction of set-up time and die exchange times on stamping presses at Toyota in the late 1950's and beyond on a daily basis. He is as close to the source of actual set-up reduction efforts in Toyota that I can find. As a favor I asked him to spend some time with me and explain the history of various activities and personnel involved in set-up reduction work at Toyota.

## Summary Notes from Interview with Mr. Katsuya Jibiki

**TOPIC:** History of set-up reduction efforts in Toyota - July 31, 2006

*Art:*

Thank you for agreeing to spend some time together and answer some questions about the history of set-up reduction in Toyota.

*Mr. Jibiki:*

My pleasure. I hope I can answer some of your questions and clear up any confusion.

*Question:* First can you tell me about your background?

*Mr. Jibiki:*

I started working for Toyota right out of high school in 1958. I was assigned to the stamping press department of Honsha plant. For the first couple of years I operated a production machine. After three years however I was moved to a special die set up and prep team. I showed some good initiative and was fortunate to be in the company during a major growth period. I was able to progress through the levels of Team Leader, Group Leader, Foreman, Manager, all the way up to Division Manager of the press shop. In the mid 1990's I

transferred to a Toyota supplier Toyota Tekko and worked there as a General Manager and Consulting Director for a few more years before retiring for good. I basically spent my career working and managing operations in the area of stamping operations for Toyota in some fashion.

*Question: That is a very impressive resume. You are just the sort of person I have been looking for. Can you tell me a little about the background of set-up reduction and TPS overall in the press shops?*

*Mr. Jibiki:*

Well as you probably know TPS really started out in the engine machine shops where Mr. Ohno was first manager after World War II over a decade before I joined the company. Mr. Ohno was always looking for ways to make improvements and eliminate waste where ever he was in charge. Machine shops are an equipment intensive environment and he looked at different ways to improve the overall efficiency including equipment related aspects.

Under his direction the supervisors reduced the time to sharpen and set tools and improved machine uptime in the late 1940's and early 1950's for example. He also emphasized multi-process handling, lot size reduction, inventory reduction and many other things. Set-up reduction is really just one technique that is a subset of improving operational efficiency and availability on equipment.

Mr. Ohno's area of control and influence increasingly expanded in the 1950's with his success and resulting promotions. This eventually led to the introduction of various TPS topics such as equipment efficiency improvement efforts, set up reduction activities, pull systems and many other items into the press department and other areas of the company.

*Question: When did set-up reduction actually start in press shops?*

*Mr. Jibiki:*

It was ongoing quite a while before I joined the company. I don't think it was any magical insight by anyone. It doesn't take a lot of analysis to figure out that a long set up time reduces the time available for machine operation. And we could not afford a lot of new machines in the beginning. The press department frequently did not have the right stamped parts available in inventory for the body shop to weld back in those days. Everyone knew this problem existed and since we were a poor company we had to improve both machine efficiency and set up time as best we could. We worked on all aspects of stamping efficiency though such as increasing strokes per hour, eliminating downtime, reducing defects, and not just reducing set up time. Of course this was done in conjunction with the setting up pull systems to enable more timely delivery of material to the downstream departments. I can't say there was a specific date when it started but the ongoing improvements started a decade or more before I joined the company.

*Question: Is it historically correct that Toyota achieved a 15 minute average changeover time in 1962 in the stamping press shops?*

*Mr. Jibiki:*

Yes that is about right but first you have to understand and sort out the effects of two different activities that were occurring at that point in time. First I think that Mr. Ohno observed some new quick die change stamping technology in the U.S. in the mid 1950's from Danly Corporation. By 1960 quite a few of these style machines were purchased and installed in places. For example a lot of them went in for two brand new lines created in Motomachi Plant's stamping department. These machines all had moving bolster mechanisms, roller mechanisms, quick clamps, and other revolutionary features built in already and thus had rapid changeover times when we purchased them. They gave us lots of ideas. The term used to describe this feature by the equipment manufacturer was Quick Die Change or QDC. This group of new machines brought down the average changeover time in the late 1950's and early 1960's quite a lot just by their installation. They were influential in their design and you can see one of them on display in the Toyota Commemorative Museum of Industry and Technology located in Nagoya even today because of this advantage they brought to the company. *(Note: Several pictures of one of these machines and the display are included at the end of the interview).*

*Question: What about other machines?*

*Mr. Jibiki:*

That is the second category of machines that I was getting too. When I joined the Honsha press shop there were around 50 older domestic stamping machines that ranged in size from very small 70 ton machines to quite large ones over 1000 tons. They were not very good machines and were quite worn down. As was normal at that time we had to use forklifts, extensive rigging, and skidding methods to exchange the dies on all of these machines in the beginning. Then a lot of adjustment work still had to be conducted to make a good part. In the 1950's changeover time took anywhere from one hour to four hours on some of these machines depending upon the size as they sometimes had multiple stations and dies. Even if one die could be changed in 10 minutes there might be six stations on that particular line and thus it would take an hour to do the total changeover. The old presses had a variety of other problems as well but we had to use them at the time due to our financial condition.

*Question: So it is mainly on this latter group of machines that set up efforts were focused upon at Honsha?*

*Mr. Jibiki:*

Yes. There was work done on the other machines as well of course to improve efficiency but it was not as focused on the set up reduction angle. Other areas on these machines still had to be improved such as downtime, quality, or strokes per hour.

*Question: What can you tell me about your set-up reduction work experience?*

*Mr. Jibiki:*

As I mentioned I actually started in the company by operating a machine in the department. After three years around 1961 though I was put on a set up preparation team. Everyone knew that the first key to reduce set-up time was to prepare properly. The department had separated this preparation work from the job of running the press and we focused initially on reducing the wasted time up front in preparation. It was just pretty common sense at the time given our situation.

*Question: How did you analyze press machines for set up reduction?*

*Mr. Jibiki:*

There were a couple of different things we did early on. First we wrote down very detailed operation instruction sheets that spelled out the exact contents of the work. This gave us lots of ideas for improvement as we studied and debated how the work was actually done and why we did it that way. Also we did some time studies to measure the length of different aspects of the work. We also took ideas from the Danly machines as well. From this analysis we came up with hundreds of small improvement ideas to eliminate waste such as using carts, creating locating pins, eliminating bolts, improving hoist related operations, standardizing die height, visual markings, and using cylinders in certain locations. A big focus was just on task simplification, standardization, and safety for example. It was quite a lot of work.

*Question: When was all this occurring and what types of results were generated on the old machines?*

*Mr. Jibiki:*

On the old machines it was a long slow battle. It was not accomplished in one night by any means since there were so many. Throughout the 1960's we worked almost continually on all the old machines I mentioned in the department making numerous improvements. The level of success depended greatly upon the size of the machine. A small 70 ton press with a 4 ton die was reduced from 30 minutes to a mere eight seconds. 250-300 ton presses were cut from around an hour to 8 minutes. An 800 ton old press with a 15 ton die was reduced from over

one hour to less than 20 minutes. Larger presses were reduced from a couple of hours to 20 minutes as well in the mid 1960's. The "average" change over time was indeed lowered to 10 minutes or less by the end of the decade due to both the new machines with the moving bolsters and other built in quick die change features as well as the success we had in reducing set up time on the smaller old press machines. Some larger machines like 3,000 ton transfer machines with 35 ton dies were much, much more difficult and were still in the 20 minute changeover range into the 1970's and 1980's. I'm not sure if such machines are under 10 minutes even today on the newest large transfer presses to be honest but I suspect they are close.

*Question: Were you doing all this work yourself at Honsha plant?*

*Mr. Jibiki:*

Oh no. Absolutely not at all. I was right in the center of it all during my career especially while I was a leader of the set-up preparation team in the 1960's but many people were involved and deserve more credit. I don't think you'll find anyone in Toyota that would dare claim credit for all this work. There were a couple of different groups involved and lots of different people. First production management starting with Mr. Ohno applied continual pressure from the top and set out strict improvement targets for the shop managers to achieve in each department. Then there was a lot of work that only the manufacturing engineers could do as it involved making drawings, changing features on the die design or the machine, ordering parts, coordinating with maintenance, suppliers, and other tasks that production employees could simply not perform. Then there were many people in production executing the work and thinking of many small ways to make things easier, more visual, and timelier. It was a department wide improvement effort that involved many people and over a decade of hard work on many machines.

*Question: Who were some of the key people involved?*

*Mr. Jibiki:*

If I had to list names I'd have to mention Mr. Nakano, Mr. Matsushima, and Mr. Ikebuchi, from the manufacturing engineering side of things in stamping. Managers involved in the 1960's were Mr. Takuro Harada, Mr. Ota, and Mr. Kiyoka in the press department. Then you can honestly list almost everyone in production from the shop floor for contributing in some manner. So many different ideas came from so many different people off the shop floor that it is impossible to summarize who did what in hindsight machine by machine. It was just a logical extension of operation availability improvement efforts and set-up reduction work ongoing through out the 1960's.

*Question: I have read Mr. Ohno state that the average set-up and die exchange time in stamping was a mere 3 minutes in 1971?*

*Mr. Jibiki:*

Yes that is so. However as I stated previously that does not mean every single machine was 3 minutes just the *average* machine in the department. Smaller machines were taking well under a single minute in many cases, a few larger machines still over ten minutes. Gradually, thanks to our production engineers newer machines were also slowly brought in from other equipment manufacturers like Komatsu that had improved upon the quick die change features as well. They were all very short changeover machines. A very select few of the larger old machines however were still taking around 20 minutes even then.

*Question: Okay...now the most confusing part for me. What was Mr. Shigeo Shingo's role in all of this? He wrote a book that was initially published in Japan in 1983 and then translated into English in 1985 called "SMED A Revolution in Manufacturing". In the book he recites a story where he reduced a 1,000 ton stamping press in 1969 from four hours to 3 minutes in a couple of months in a workshop with a couple of people in the Honsha press shop. And he states that from this event SMED was invented and then adopted by all Toyota plants and then spread to companies throughout Japan as well as around the world. Can you comment on this and clear anything up for me?*

*Mr. Jibiki:*

I'm afraid that you would have to get Mr. Shingo to make some clarifications on this passage. I have heard of the account he depicts. The book however is not even available in Japan due to a lack of sales. When it was first published though Mr. Suzumura who a manufacturing executive and TPS leader in charge of manufacturing became very quite angry and wanted to know how this type of summary depiction and claim could be made by him. He was not the only person upset as I recall.

*Question: What is incorrect with the account from your internal point of view?*

*Mr. Jibiki:*

First of all I honestly do not even recall any such workshop ever taking place in my department. Then there are a few things that just do not match up very well with the actual sequence of events at the time. First for example 1,000 ton press stamping machines were not taking four hours to changeover in 1969. Only a few of the larger machines even as far back as 1955 were taking that long on average. Second set-up reduction efforts as I explained earlier were going on long before 1969 without Mr. Shingo or any such workshop he mentions. So the timeline and sequence of events is considerably off regarding the first sub

10 minute press changeover. Third I know for certain that we not were able to reduce a 1,000 ton press in the stamping department from four hours to three minutes in a couple of months on any of the old domestic machines. I had to do a lot of this type of work and it took longer to complete that amount of conversion on the large older machines. Fourth it is just not correct to imply the notion of set-up reduction somehow was created in 1969. Many people contributed to the improvement effort and many small improvements were involved. It was just not a simple kaizen event depiction like you mention from his account at all. Lastly set-up reduction did not start spreading beyond the press department in Toyota after 1969. Actual changeover performance was already highly developed and under 10 minutes in the department on average by then. It was on going and spreading well over a decade earlier and the machines from Danly Corporation for example were a large impact. Other companies such as Nissan were doing set-up reduction as well at the same time not just Toyota.

*Question: Can you clarify for me what interaction you had with Mr. Shingo in the 1960's.*

*Mr. Jibiki:*

I took one of his P-courses at the education and training center just like many people did. I took other training courses internally as well of course. I never worked with him on the shop floor however. He certainly was not directly involved in our daily set up reduction efforts in the press shop in the 1960's.

*Question: In the same SMED book there is a truncated passage though where Mr. Ohno in a 1976 speech gives some credit to Mr. Shingo for advocating set-up reduction. Any insights there?*

*Mr. Jibiki:*

Well he easily could have been verbally “advocating” set up reduction in discussions. He was not the only one talking about it though and he certainly was not doing any of the actual work. I do believe that he did coin the terms “SMED” as well as “internal” versus “external” set-up work. We did not use those exact words at the time so those are his indeed. That is what Mr. Ohno is probably referring to. And if Mr. Shingo wants to take some credit for creating some words and definitions or verbally advocating the importance of set up reduction then I do not mind in the least.

However verbally advocating the idea of set-up reduction and actually conducting all the detailed work inside Toyota are completely different things. Mr. Shingo never spent more than a brief period of time on the shop floor for any one visit and he rarely came to the stamping department at all for that matter. He was usually in the training center teaching his P-course. It was a big deal when any external visitor came around and there was always advance notification if the shop floor observation part of the P-course or any visit would be

going on in our area. The company was still fairly small back then and there was only Honsha plant and then the newer Motomachi plant in terms of stamping.

*Question: So we have a mystery here as to what exactly he was describing?*

*Mr. Jibiki:*

I'm afraid that I can not explain his account. It does not add up on several dimensions and I think there are some errors based upon what you are telling me. He must be summarizing a passing conversations with someone or something else in hindsight and got the events confused. Maybe you can check with others but I would know as well as anyone since I was the supervisor in the area in question then and personally working on the actual reduction efforts.

From my perspective though I can honestly state that Mr. Shingo's actual involvement in set-up reduction work at Toyota Motor Corporation was very limited. I think he did some of this type of work with some of our suppliers in the 1970's. Even if the 1969 event occurred exactly as described somehow unbeknownst to me it is so late in the course of actual set-up reduction history at Toyota that it is not all that significant. The whole description you mentioned just sounds confused with respect to the actual improvement progress made in the company.

*Question: Okay, Mr. Ohno also describes another source for set-up reduction in the Japanese edition of his book "Genba Keiei – Workplace Management". He says that Toyota's Brazil plant that launched in 1958-59 had only one forging press and that machine had to make 60 different part numbers. Land Cruiser production there was 2-3 cars per day so large lot production was out of the question. This launched the need for frequent changeovers and at team got a machine to less than 10 minute set-up reduction in forging operations and implied it spread from there to other locations.*

*Mr. Jibiki:*

I have heard that story too. I don't know about the details of the exact timing however, I think the set-up work you mention was much later than 1958-59. Each shop in Toyota has its own favorite story of how it developed something or some small part of TPS. Necessity is usually the mother of every invention so I suppose there is probably some truth to the story. I was not involved in the described effort in any way since I was not in forging operations. In general however set up reduction techniques flowed from stamping presses to the forging shops. The reason is because forging press shops have more difficult changeovers then we did due to the material thickness, size of the press, die size, and the high temperatures involved. Hence in general they usually lagged behind our set up reduction performance and efforts by several years.



*(Interviewer Note: Later in an exchange with Gilberto Kosaka a retired manager from Toyota of Brazil I did confirm the events of the Brazil set-up reduction story mentioned above. The events are all true as described by Mr. Ohno. However as Mr. Jibiki correctly surmised the date was later and was probably around 1970. It still may have very well been Toyota's first sub 10 minute changeover in forging operations.)*

*Question: So in hindsight what do you make of the passage in Shingo's book on SMED versus what transpired from your own experience and point of view?*

*Mr. Jibiki:*

Well I'd like to ask him a few questions myself as would a few others I suspect. The passage you mention is unclear and does not accurately portray what was occurring at the time from a contributor point of view at all. I'm not sure just what he is trying to take credit for. It did not sit well with many people inside the company either when we heard of it. The passage you mentioned is far too superficial to depict the reality of all the different work that actually went on at the time to get to the single minute level in the department on all the different machines.

In hindsight I think he should have been much clearer about the history and actual contributions made by different parties in Toyota over the many years. Also the role of technology and advances in engineering by various equipment manufacturers in the U.S. and also Japan should have been made much more clear as well to avoid any misunderstandings.

I'm sure that he helped a lot of companies on this topic in the 1970's and 1980's including some of our suppliers and later on in the U.S. But I will also tell you that on this concept of set-up reduction he took far more out of Toyota Motor Corporation than he ever put into the company. That conclusion is based upon my own work effort, management experience, and first hand knowledge of the actual improvement sequence in the Honsha press shop.

*Art: Thank you for your time and cooperation.*

*Note: I took Mr. Jibiki up on his suggestion and visited Toyota's Commemorative Museum of Industry and Technology in Nagoya, Japan. The museum contains several exhibits that depict the development of the Toyota Production System and production technology. One corner of the Toyota museum describes the introduction of Quick Die Change technology to the company on stamping presses in 1960. This development is also verified in the official company history books as well as in several documented interviews by Japanese authors with former manufacturing executives such as both Mr. Ohno and Mr. Suzumura.*

**Pictures from the Toyota Commemorative Museum of Industry & Technology – Nagoya, Japan.**



**Actual Danly press from Toyota’s Motomachi Stamping Department in 1960.**

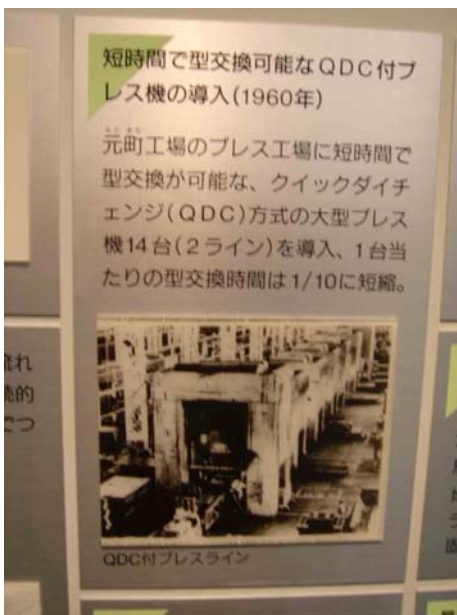


**Same 1960 Danly press with moving bolster mechanism side view.**



### Plaque explaining the Quick Die Change function on the 1960 Danly machine

Note: The smaller pictures depict the moving bolster mechanism, and some other QDC features and how it differed from traditional stamping press exchange techniques.



### Additional QDC explanation plaque on the Danly machine

Translation: Introduction of Quick Die Change type stamping presses enabled more rapid exchange of dies (1960).

14 of these large press machines were installed on two lines in the Motomachi stamping department with quick die change (QDC) function that enabled set-up times to be cut to 1/10<sup>th</sup> the previous level per machine.