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# GLOBALIZING GEMBA VISITS FOR MULTINATIONALS

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## ABSTRACT

There are approaches to improving a company's new product development process by improving bits and pieces, but a more thorough impact is accomplished with a chain of well integrated methods in an educational package including certified skill levels. QFD is used by companies to better understand the spoken and unspoken customer needs and their priority, and then translate them into product requirements, assuring quality throughout the design, manufacturing, and after-sales phases. The traditional QFD tool set focuses on time consuming matrices, called houses, but in today's lean businesses, the resources available to do this depth of analysis are reduced. Furthermore the matrices have often overshadowed the true soul of QFD, i.e. drive customer needs through the whole process. More efficient methods have been introduced by the QFD Institute under the guidance of Dr. Yoji Akao, the founder of QFD. For a manufacturer with a worldwide presence, especially, translating the voice of the customer was found to take on cultural in addition to linguistic imperatives. This paper will focus on the going to the customer's gemba (or machine shop in our case), one of the methods in modern Blitz QFD<sup>®</sup> methods and discuss the differences of applying gemba in different cultures where Sandvik Coromant is active.

*Keywords: need finding, QFD, gemba, product development, cutting tools, multinational*

## 1 INTRODUCTION

Sandvik Coromant is a leading manufacturer of metal cutting solutions with worldwide presence. The main products are drills, turning and milling tools with interchangeable coated tungsten carbide inserts. Also tool holding equipment including dampened variants is offered to satisfy demanding customers in a variety of machining applications in different industries. The company has put forward a goal to reduce by half the time from identifying customer needs to achieving peak sales. The company has had a long history of innovative products which has been the key to the firm's success. Shortening the above mentioned lead time while still offering innovative products is seen as the way to increase earnings even more [1]. Blitz QFD<sup>®</sup> from the QFD institute has been used in two development projects to see if there is evidence that the method can be a part of the solution to making Sandvik Coromant achieve this goal. An earlier paper by the two authors introduces some of the modern Blitz QFD<sup>®</sup> methods and discusses their impact as they have been applied to improve the product development process at Sandvik Coromant [2]. This paper aims to describe how gemba visits to the customers have been performed and the experiences learned in adapting the process to different cultures.

### 1.1 Direct customer contact as a way of bridging a gap

Different product development processes have been suggested such as the classic process by Pahl and Beitz [3] or the development strategy framework of Wheelwright and Clark [4] to mention a few. Pahl and Beitz's process starts with the clarification of tasks which is about finding what customers need. We believe that the transition from what customers really need, to what can be expressed in a document containing tasks to be fulfilled is not at all straightforward; it is easy to lose information about what the customer truly needs. Bringing development and manufacturing engineers in direct contact with end customers is a way of bridging that gap and mitigating information loss.

## 1.2 Relation between QFD and Gemba

The QFD institute, put forward that true QFD, either Blitz QFD<sup>®</sup> or traditional QFD, does not require the use of matrices - it is about driving quality throughout the whole process; with quality defined as providing usefulness to the customer. It is also about aligning the effort of every part of the organization to contribute to satisfying the customer needs. In fact, the Japanese translation of QFD means that quality (as defined by the customer) must be deployed across all relevant business functions. Thus, there can be no QFD without a customer focus. From above reasoning it is evident that it is critical to find and prioritize and create a common understanding of the customer needs throughout the company. This paper describes how this is achieved by using the gemba method.

## 2 RESEARCH AND IMPLEMENTATION METHODOLOGY

Mr. Mazur trainer from the QFD Institute trained two development teams with the other author, Dr. Bylund and Mr. Wolf (mentioned in the acknowledgment section) acting as facilitators helping the teams with applying the Blitz QFD<sup>®</sup> methodology between the two training modules as well as participating in gemba visits throughout the world. The research methodology adopted to perform the study and the change in product development practice was Participatory Action Research (PAR), see [5]. The two facilitators participated as product developers during the implementation of Blitz QFD<sup>®</sup> in two pilot projects while at the same time reflecting on the impact of this implementation and keeping a continuous dialogue both with Mr. Mazur and the team members regarding the content and adaption of Blitz QFD<sup>®</sup>.

### 2.1 Success criteria and measurable criteria

The ultimate goal or success criteria of the change in product development practice is to reduce the lead time from finding customer needs to peak sales and satisfied customers. Furthermore, to stay competitive in the long run, solutions that satisfy customers should be innovative and patentable. To actually measure the impact of a process like Blitz QFD<sup>®</sup> on the above ultimate goal is difficult; first, the time span that should be reduced is long, several years, and second, other factors like business climate and competitor's moves also have a great influence. The concept of measurable criteria from the Design Research Methodology (DRM) proposed by Blessing and Chakrabarti [6] is used here. The idea behind the DRM is to establish a plausible link between success criteria and measurable criteria. The effect of a change on measurable (sensible and proportional to the actual change) criteria can then be seen and conclusions regarding the success criteria drawn at an earlier stage. The measurable criteria in this twin case study consisting of two full size pilot cases are based upon experience from earlier product development projects at the company. The following measurable criteria have had a beneficial effect on lead time and innovative solutions:

1. A shared and deep knowledge of the customer needs and their priority will align the development efforts and reduce wasteful activities (i.e. developers designing to satisfying different needs, designing to fulfill things that are not needed).
2. Shared knowledge throughout the organization of what the customer need and understanding of the conditions of use aligns the development as well as introduction and sales efforts.

## 3 PILOT PROJECTS

Blitz QFD<sup>®</sup> was tested in two full size product development projects at Sandvik Coromant which is needed to see if a new process has the potential to improve practice in a large company [7]. The core project teams for each of these two pilots consisted of eight persons from the product development organization, two from production, one person representing marketing, and one project leader for each project. Each project had an apprentice facilitator under guidance from Japan Business Consultants, for the implementation of Blitz QFD<sup>®</sup>. It is hard to find the perfect timing in an industrial setting - budget for education, available projects, and availability of the facilitators and the trainer all need to coincide. The company decided to run the pilots at a specific moment when these factors seemed to coalesce to an acceptable level for the company. The Alfa project dealt with a hole making solution based on tungsten carbide drills. The project was in its early stages and hence it lent itself very well for being a Blitz QFD<sup>®</sup> pilot. The main focus of Alfa was to find the customer needs and their priorities, hence the first stages of the QFD process were most appropriate. The Beta project was about the design of a threading turning system based on interchangeable coated tungsten carbide inserts. This

project was to adapt an existing system to a smaller insert so the solution was very much decided by the existing system design. Because the status of the project had already been moving forward, it was too late to expect big changes from implementing Blitz QFD® or any new process changes. This late start risked adding bias when gathering customer data visits.

#### 4 INTRODUCING THE CUSTOM TAILORED BLITZ QFD® AND GEMBA PROCESS

As earlier mentioned, Sandvik Coromant has put forward a goal to reduce by half the time from identifying customer needs to achieving peak sales. The author from Japan Business Consultants and the QFD Institute first made a technical diagnosis of our product development process by interview key process owners. These included senior managers from cutting tools development, drilling and boring tools development, insert production prototypes, metal cutting research, product management for drilling and boring, project management office, product application, R&D, cutting tool production technical development, and CAE systems/support. Based on the “voice of the company” a preliminary adaptation of the Blitz QFD® process was custom tailored into a subset of methods that would comprise Sandvik Coromant’s minimum QFD effort. See Figure 1 for a flow chart of this tailored QFD process. One quick reference guide and two extensive course binders with examples from other industries but also with realistic examples from the area of metal cutting was used as materials in the Blitz QFD® training. The training at the company consisted of an orientation QFD Gold Belt® briefing for top management, the basic QFD Green Belt® course for classroom training of the tools, complete with a quick reference guide, and the complete QFD Black Belt® course using the comprehensive body of knowledge binders to develop future facilitators and trainers within the company. A core principle of Blitz QFD® is that there is no one-size-fits-all technique and that the methodology’s tools and flow should be adapted to the needs of each company, much like proposed by Meissner and Blessing [8]. It is typical for an outside trainer to facilitate the first project and simultaneously train dedicated internal people who will continue to apply Blitz QFD® on additional projects.

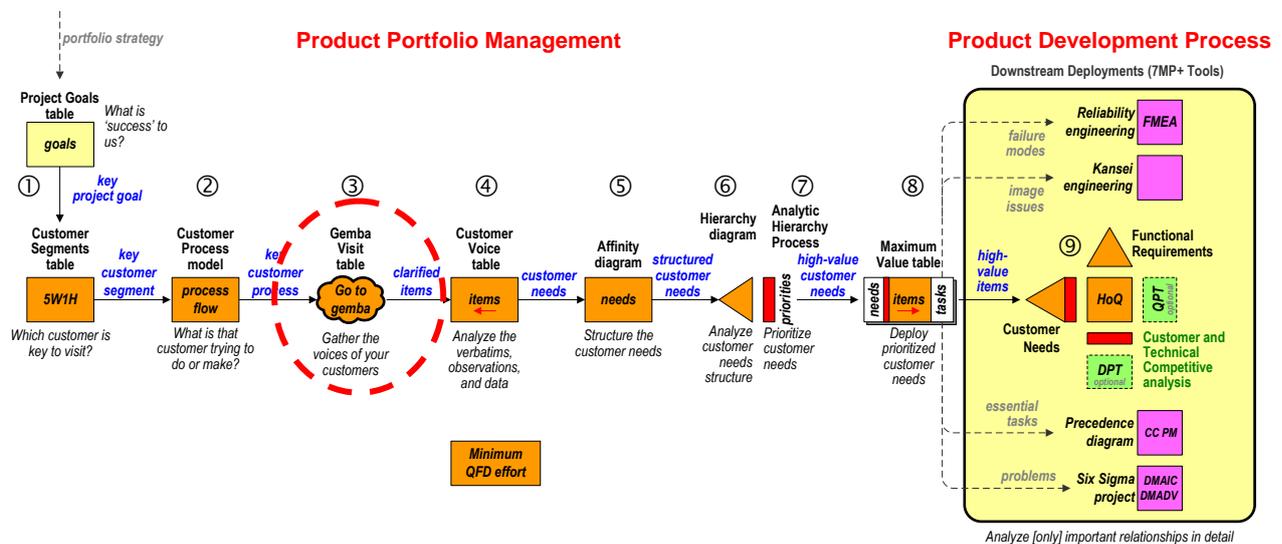


Figure 1. Sandvik Coromant’s custom tailored Blitz QFD® process.

##### 4.1 What is gemba

In the following sections, a brief description of some of the tools in Figure 1 will be described, with particular attention paid to step 3, customer visits. Conducted properly, a customer visit can produce an enormous, though still manageable amount of data. The method unique to Blitz QFD® is called “going to gemba” what the Japanese call the crime scene. To learn how to perform customer gemba visits on safe ground a number of visits were first practiced within the Sandvik group in Sweden with one of the authors’ guidance. This paper will concentrate on the gemba visit; shown in the red dotted circle in Figure 1. One of the principal strengths of the QFD process is that the output of one method is

consistent with the input to the next, hence the information about customer needs found at the *gemba* visit is preserved and becomes the basis for the solutions.

#### 4.2 The *gemba* process

*Gemba* is not unique to QFD in that it is a long-standing kaizen process in Japanese Total Quality Management. [9] This technique is one of the three *gens* shown in Figure 2 that describe how to get facts and data in order to achieve real improvement. In most TQM, six sigma, and lean practice, this is done in our plants or shop floors in order to improve our existing products and processes. That is, traditional *gemba* visits are internally focused on our operations and people.

現場	<i>genba</i>	actual place
現物	<i>genbutsu</i>	actual thing
現実	<i>genjitu</i>	actual fact

Figure 2. The 3 *gens*.

When using QFD to develop new products, however, there is no internal *gemba* at this point because the product has not been designed or developed yet. The functional requirements are not defined, technology is not yet developed, manufacturing steps and materials are not yet determined, so there is no internal *gemba* to see. Thus, in Blitz QFD<sup>®</sup> *gemba* shifts from our internal operations to the customers' operations so we can see what problems and opportunities the new product needs to address. Blitz QFD<sup>®</sup> includes a well developed set of tools and methods to assist in this analysis. A QFD Master Black Belt<sup>®</sup> or QFD Red Belt<sup>®</sup> custom tailoring QFD for an organization should adapt these tools to these needs of the company, the products, and as this paper will explain, the customers themselves. For Sandvik Coromant, the flow of these tailored tools is indicated in steps 2-7 in Figure 1. Examples from the pilot studies will be shown.

#### 4.3 *Gemba*, a different mindset

Traditionally customer visits at Sandvik Coromant have been taken care of by sales personnel and technical specialists, and then later in the project by development engineers bringing samples for field tests. At first there was certainly skepticism among some development engineers to go to the customer without having any prototype to show or test. Since the trial *gemba* visits performed in-house, however, a more positive attitude towards *gemba* has become prevalent. *Gemba* is truly a different way of looking at things. In traditional sales calls, the primary responsibility was to introduce new products, take orders, maintain the relationship between Coromant and its distributors and with their customers' purchasing agents and shop floor operators.

In *gemba*, the sales personnel have to arrange the visits by our product development team members, explain to dealers and customers why we are coming and how this will benefit them when the new products come out, and very importantly, to act as a language and cultural liaison and translator/interpreter during the *gemba* visit. It is critical that sales personnel, who earn their income based on what they sell and instinctively want to turn the *gemba* visit into a sales call, resist this and become a conduit of information from the distributors, purchasers, and operators. Any selling pressure will sour the data gathering purpose of *gemba* and any bias they introduce will reduce the quality of what is learned.

Technical specialists are usually called to the field to address special materials or machining requirements, address problems reported by customers, and to provide training for new products being introduced. In other words, their focus is on applications of existing products to new conditions, rather than new product development. They can be valuable *gemba* players, however, because they can bring back to developers information about trends and changes in materials, metal working machine capabilities, new requirements or tighter specifications demanded by the customer's customers (like automotive

engine manufacturing plants, for example), etc. They should be trained in the *gemba* process for this purpose.

Product development engineers who feel naked without a prototype to show or test must learn how to use all their senses to better understand what customers want before they do design. They must seize the opportunity to learn about the customers operations before dimensional requirements and tool chemistries are set so that prototypes are used to validate that design was done correctly rather than to test for problems before the next prototype is developed. To train these various personnel for *gemba* visits, what was needed was some procedure they and the customers could easily follow – a *gemba* visit guide.

#### 4.2 The *gemba* visit guide

The idea for a guide that anyone regardless of their language or background could understand emerged from the New Lanchester Strategy books introduced to Sandvik by the authors. In this series, the author uses a graphic novel (comic book) format to explain complex business strategy and mathematical formulae so they can be easily learned by front line employees. Sandvik Coromant commissioned an art bureau that specialized in this style (called *manga* in Japanese), which is shown in Figure 3. The aim of the guide is to provide a quick overview and reminders of key activities needed to perform *gemba* visits for development engineers, sales personnel as well as for the customer to be visited. The guide is emailed to the customers to be visited prior to the visit as well as brought in paper format at the visit. The guide was printed in Swedish, English, French, German, Portuguese, and Italian which showed both how serious we were of the initiative as well as improving the communications. Unfortunately, timing did not permit a Chinese version – it would have been invaluable.

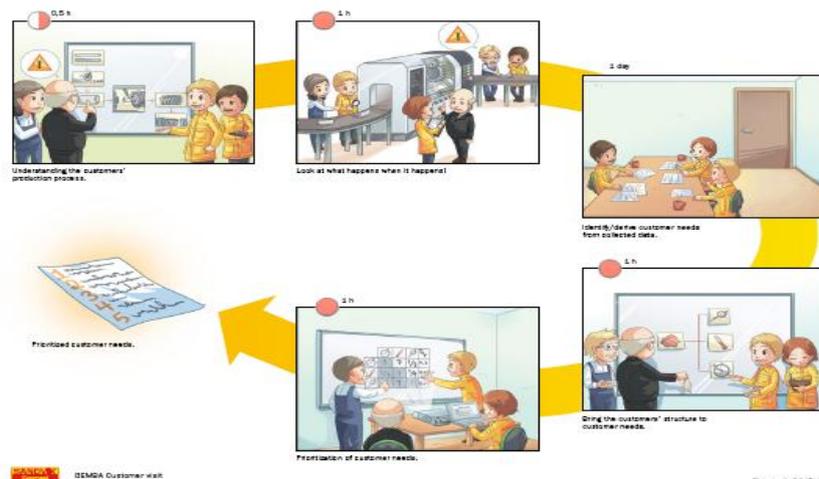


Figure 3. Sandvik Coromant's *gemba* visit guide.

#### 4.3 Customer Process Model and the first steps when going to *Gemba*

Of course having representative customers from key segments willing to accept a visit from the product development team is crucial to performing meaningful QFD. In Sandvik Coromant's case the local sales personnel were the door openers. The *gemba* method has to be sold twice, first to the local sales personnel in the market region and then by them to the end customers or in some cases via a distributor. Before going to *gemba* it is valuable to try to diagram our best hypothesis of the customers' process. This serves several purposes. First, it brings together the varied experiences of the team members. Even those with field experience (they may have been a machinist before coming to work for Sandvik Coromant) may not be up-to-date with the current best practices in the industry. Also, different team members will have familiarity with different parts of the customer's processes; rarely does one team member understand it fully. Second, most customers get impressed that instead of making a traditional sales call, the visitors have actually tried to think about what the customer does in his everyday job [12]. The Customer Process Model (CPM) proposed does not need to perfectly reflect the customers process in the beginning as most customers will, after having said they are impressed by

the effort, immediately start to correct the process. In that way, a lot of valuable information is gathered that might not have been found just by asking straight out questions. In fact, it often makes sense to build some “error” into the hypothetical process model to instigate the customer to jump in and take ownership of the *gemba* visit, rather than remain a passive interviewee. Third, by having a defined process to guide this part of the visit, the risk of getting stuck on a single issue during the entire visit is mitigated. After going through and revising the customer process model (CPM) together with the customer, failure modes (FM) to be prevented and failure effects (FE) to be mitigated can be annotated, since they give valuable information about what to investigate more in detail during the workplace visit.

**4.3.1 Pilot project experiences**

According to the marketing department, to arrange any kind of customer visit, it is mandatory that the responsible salesman make contact with the customer and also participate during the visit, since he or she is the one with the long term relationship with the customer. Each of the pilot projects had slightly different approaches in preparing and going to *gemba*. In the Alfa project, the marketing member of the team needed up to eight weeks to find salesmen to contact representative customers from the different segments and international markets and get them to agree upon a visit. The Alfa team prepared the salesmen that should be involved with a two-day introduction to Blitz QFD<sup>®</sup> which included a “test *gemba*”. The experience of that is that a two-day introduction is short, partly because we were still QFD novices ourselves. There should either be just an explanation of how much time is needed at the customer’s site (taking into account any language barrier), or a QFD Green Belt<sup>®</sup> for salesmen education (when language barriers exist between the team and customers) possibly with an extra day of training on affinity diagrams and hierarchy diagrams (described later). The Customer Process Model was considered easy to do, and it was a good instrument to get the customer to talk. There were exceptions where some sales people had not understood the purpose of getting the customers to talk and instead talked themselves, and it was hard to intervene because it was in a language not understood by the Alfa team members. The Beta team decided not to invite the salesmen in beforehand. A clear advantage for the Beta team was that their facilitator was multilingual and could speak directly to the customer in the visited markets without any bias from translation. By going step by step through the process, unexpected findings were made which might not have been found if the focus had been immediately put on the cutting tool, e.g. the uneven quality of raw materials. See Figure 4 for an example of the Beta team CPM.

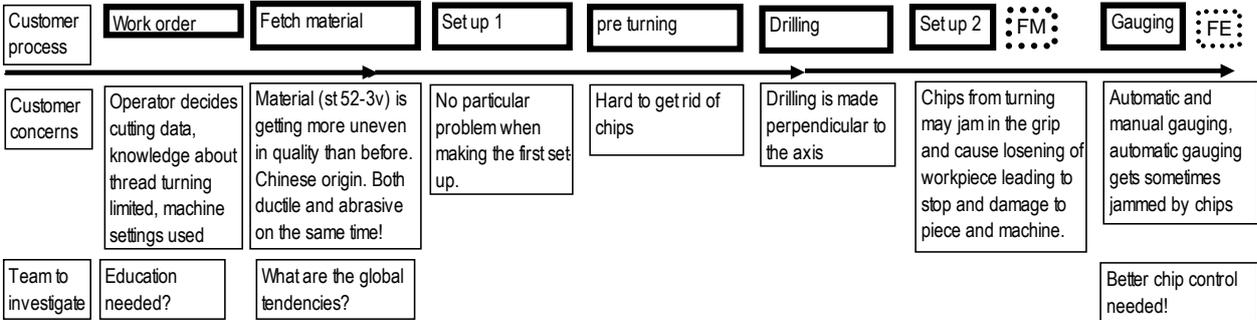


Figure 4. Example of Customer Process Model from the Beta pilot.

**4.4 Gemba Visit Table**

When the Customer Process Model has been gone through, it is time to visit the actual workplace of the customer to see where his most critical jobs gets done. These are usually associated with the customer’s failure modes [FM] or effects [FE] shown in the CPM, but they could also be upstream, downstream, or even on some parallel process. Usually in the review of the CPM, the customer can explain where in their process they are having the most difficulties in quality, cost, or delivery commitments. All sources of data are to be considered: visual observations can help identify workarounds and anomalies, touch can detect vibration, variations in surfaces, deformations, etc., sound can include direct utterances by the operator (complaints, wishes) and indirect utterances (cursing at a problem) as well as abnormal sounds indicating machining or processing problems, etc., smell can direct attention to unsafe conditions, improper cooling fluids or other materials, etc., and even taste can be included in

some types of products such as foods. Be sure to look for things that do not belong as well as what is not there, too. To capture this wide array of data the Gemba Visit Table (GVT) is helpful. Its purpose is to annotate observations, refer to relevant documents or manuals used at the workplace, note physical specimens provided by the customer, write down verbatim i.e. comments from the customers visited. All this data is then to be translated into measurable, clarified items. The clarified items are single-issue statements to clearly reduce complex data gathered during the visit. Team interpretations can be confirmed with customers and included, as well. It is beneficial if the customer is able to give their way of measurement and a desired target value to these items since that would make later evaluations of design solution easier. If the customer allows filming or recording at the customer's workplace is a good complement to the GVT. Nondisclosure concerns (from both sides) can be agreed upon, visual recordings can be left behind, and other techniques can be employed since a picture or video can be viewed by others, slowed down, etc. to reveal things missed the first time.

#### 4.4.1 Pilot project experiences

The GVT was printed out on several A3 size sheets for the team to take notes down on during the workshop visit. It was an effective way to collect verbatim and observations when voice recording was forbidden. The GVT worked as a guide during the visit, was found to be really an easy tool to use, see Figure 5 for an excerpt showing just one row of notes to demonstrate what data goes in what column.

Gemba Visit Table					
<b>Interviewee:</b> Operators and technicians		<b>Interviewer(s):</b> Mr X and Dr Y			
<b>Place:</b> XXXXX, Sao Paulo, Brasil		<b>Date and Time:</b> May 14, 2008 , 12pm-16pm			
<b>Contact info:</b> through Mr Z at Sandvik do Brasil					
<b>Interviewee Characteristics (*memorable):</b> Very dynamic and outspoken (this is used to make it easier to remember the interviewee)					
<b>Environment:</b> threaded tube production plant					
Process Step	Observations	Verbatims	Documents	Notes	Clarified items
Threadening	Uses uncoated inserts.	Fast delivery of special important!	Drawings on site	Value of tube very high in comparison to insert.	Fast delivery of special essential (weeks)

Figure 5. Example of Gemba Visit Table from the beta pilot.

#### 4.5 Customer Voice Table

What customers tell during the visit is called a verbatim in the GVT and is often a mix of benefits and product features. As pointed out by Ulwick in [12], what customers really need is “a job” to get done; understanding what job is to be done is the basis for understanding what the customer needs from a product or and service. Blindly accepting that a feature or solution a customer mentions is the one that get the job done best, is depriving the development engineers the possibility of finding innovative new solutions that could possibly outperform current ones mentioned by the customer. The Customer Voice Table (CVT) see Figure 6, is used to translate any form of data from the Customer Process Model and the Gemba Visit Table into customer needs. In QFD, customer needs are defined as a customer problem phrased positively, a customer opportunity, or an image issue. Customer needs are independent of our product and solution. This step is best performed at the customer's site; it is beneficial if the customer can offer an office for one to two hours for the visiting team. Don't underestimate the power of image related needs in today's competitive environment. How something looks or feels may be the deciding factor when performance and function are equal among competitors. Another Japanese tool, *kansei* engineering, can be integrated into Blitz QFD<sup>®</sup> to provide even more detail fulfilling about image needs. [13]

#### 4.5.1 Pilot project experiences

Extracting customer needs with the help of the CVT started out a little slow; most Alfa team members found the Customer Voice Table (CVT) tricky to use at first. At first, it was not intuitive how all the data gathered from the *gemba* recorded in the Customer Process Model (CPM) and the Gemba Visit Table (GVT) should be deployed in the CVT to yield the customer needs. The heuristics to do this are subtle and definitions are subjective. When done well, the CVT helps overcome cognitive errors that are common among technical specialists. These errors have been well developed in the psychology of economic risk by Kahneman and Tversky and have been applied even to medical diagnostic procedures. [14] Errors and bias can occur because the questions we choose to ask will shape the answers

we get and affect our thinking. That is why in the *gemba* it is so important to get the customer to do the talking and to capture all data as purely and unvarnished as possible. This helps the team members who bring different perspectives according to their experience and job function, to circulate ideas and arrive at better understanding. Among the cognitive errors that we must watch for are:

- *affective errors* where solutions we wish to implement become truths
- *attribute errors* where stereotypes and bias can lead to negatives
- *availability errors* where an interpretation based on recent experiences (good or bad) becomes the most likely
- *confirmation bias* where we cherry pick facts that agree and rationalize contradictions (see only what we expect to see)
- *anchoring* where we latch onto the first possibility and don't see multiple options
- *ecology* where relationships with colleagues and customers interfere with our judgment.

By having the details of the customer segment and their characteristics as well as the machining conditions together with the *gemba* data, the Beta team worked to avoid these errors and biases. For example, in Figure 6, the Swedish repair shop machining stainless steel heard directly that the “insert should not move under load” and that the operator would use a stop and go gauge to check for this after the machining was complete. An example of an attribute error we avoided was when the machinist was only able to tell us that “insert movement” was a problem. The anchoring was that if there was no movement, than the threading operation would be high quality. In the CVT, we translated these clarified items “high quality of the thread.” In other words, the true customer need is not to prevent insert movement but to produce high quality threads. This is useful to know later during design because a) some innovation may be able to deliver a high quality thread even when there is insert movement, or b) there may be other highly correlated causal factors to high quality threads in addition to no insert movement, and just preventing movement may not be sufficient. Thus, by using the CVT to translate what we see and hear in the *gemba* into product independent customer needs, we open our eyes to greater innovation possibilities as well as other product characteristics needed to assure quality.

Customer Benefits					
Customer (product independent)					
segment	segment characteristics	machining conditions	clarified items from Gemba or Inquiry Form	needs	customer measures
Maintenance shop in Sweden	Repair of machine parts	SS2172,SS2541 and stainless steel	Insert should not move (mm/N)	High quality of the thread	Threads checked by stop and go gauge
	Manufacturing of spare parts	Numerical controlled machine	Easy to chose correct insert and shim (seconds)	availability	Are there the necessary inserts in stock (yes / no)
		manual lathes	No need for tightening hard (Nm) / (Female operators)	productivity	Short time to reapiir component critical to main plant (hours)
			Easy to put correct in place (indexing) (mm)	Good ergonomoy	Easy to fasten insert for female operator
			Right cutting data		Fast programming of machine (minutes)

Figure 6. Example of Customer Voice Table from the beta pilot.

#### 4.6 Affinity Diagram and Hierarchy diagram

Customer needs relate to each other and it is thus possible for customers to make a structure out of their needs listed in the Customer Voice Table. This is the purpose of the Affinity Diagram (not shown here) and subsequent Hierarchy Diagram, shown in Figure 7. The diagrams are created using the KJ Method™, a technique developed by Dr. Kawakita Jiro, a Japanese cultural anthropologist. It is included as one of the 7 Management and Planning Tools [15] and used extensively in quality methods like QFD. The process begins with writing only the customer needs from the CVT on Post-It™ notes and letting the customers, under team guidance, group the notes together according to some shared affinity. The reason customers create the Affinity Diagram of customer needs is that the method purposely reveals the underlying thought structure of the people who do it. If the QFD does it, than we get the team's structure, not the customers. Since these are customer needs, we want to understand their thinking. The Affinity Diagram is commonly followed by the Hierarchy Diagram, a type of tree dia-

gram specifically used in QFD to prepare the customer needs for later prioritization by the Analytic Hierarchy Process, which will be discussed next.

The Hierarchy Diagram begins by displaying the Affinity Diagram in a left-to-right format with the most abstract level to the left. It is then analyzed to correct violations in the Affinity Diagram of the MECE (mutually exclusive and collectively exhaustive) principle. Essentially this means that data at each level of abstraction should not overlap and there should be no gaps. For example, in a hierarchy of food types, a grouping that includes apples, bananas, cherries, and fruit is a violation because “fruit” overlaps with apples, bananas, and cherries. If fact, it should be elevated to the grouping’s parent name. Then, to be collectively exhaustive, check if there are missing items within the fruit category – are apples, bananas, and cherries the only fruits? Of course not, so missing items such as pears, oranges, etc. would be added. This process aids QFD in two important ways. First, in the later math procedures in QFD, overlapping could result in double counting some data. Second, missing customer needs could be revealed that customers give a high priority. If these are latent needs that neither the customer nor competitors have considered, it could lead to an exciting and differentiating product.

#### 4.6.1 Pilot project experiences

The Alfa team found using the KJ Method™ to create the Affinity Diagrams to be fun and easy for customers, but the creation of the Hierarchy Diagram, either worked by itself or not at all. It seemed that some customers were able to think in abstractions and could naturally organize and then analyze groups, subgroups, and build a hierarchy with almost no help from the QFD team members. However, there were other customers who were not used to thinking in abstractions and although they made some basic groupings, they then started to ask “How should I think now?” Here it was important that the team members supported the customer with questions whose answers created subgroups and then a hierarchy. That is the major reason why it is an advantage to send the sales persons to a tailored QFD Green Belt® class to understand the process in order to lead *gembas* in countries where none of the team members speak the language. We look to add these learning to our QFD Black Belt® training to standardize how to ask the right questions to guide these less abstract thinking customers. While most recommend that the hierarchy is better done left to right than top down, during our foreign *gemba* visits, the Beta team found that many customers found it natural to do it top down. Furthermore, first grouping needs into Affinity Diagrams was seen as extra work by some customers who could immediately organize their needs into a hierarchy. We were also quite relieved that when the team members met again and shared and discussed their hierarchies from different customers they had worked with in smaller groups, they were able to create a common hierarchy diagram for all customers and hence this process step strongly contributed to criteria #1 and criteria #2, in section 2.1.

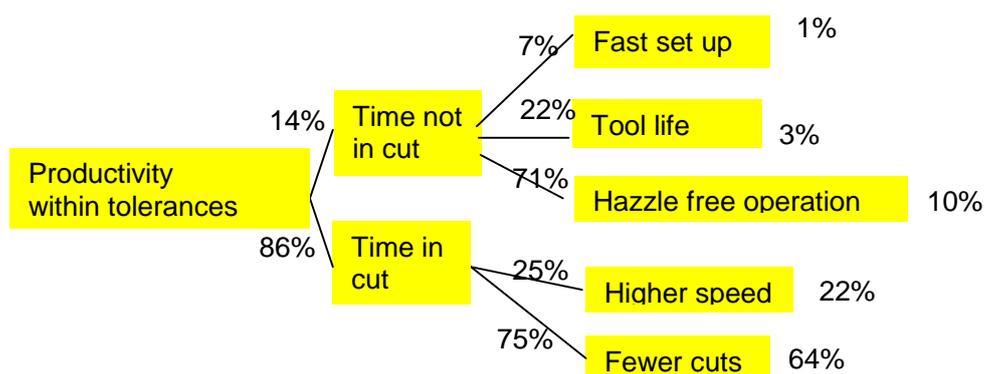


Figure 7. Example of hierarchy from the beta pilot.

#### 4.7 Analytical Hierarchy Process

The Analytical Hierarchy Process is a method developed by Dr. Thomas Saaty to prioritize and select alternatives [16]. The AHP produces ratio scale numbers from paired comparisons (here, between needs but can also be applied to technical concepts and other data). The advantage of ratio scale numbers is that these can be multiplied and summed and hence used as weights. This is not possible with ordinal numbers which are sometimes erroneously used in selection and ranking methods. This

weighting math problem is why early QFD methods using e.g. 1,3 and 9 as weights often gives counterintuitive results. The limitation of ordinal scales is that the numbers only imply order not the actual distance between the items. For example, being second in a game does not say how much slower or worse than the winner the second is, only that it is worse than the winner but better than number three. For an explanation about the scalar properties of numbers, the authors recommend the seminal paper by Stevens on the theory of scales [17]. In Blitz QFD<sup>®</sup>, we use AHP to let the customer compare the importance of his needs with each other, pair by pair, using a verbal ordinal scale, such as equal (1), moderate (3), strong (5), very strong (7) and extreme (9), and even intermediate judgments are allowed, such as a response between moderate and strong (4). This number of levels allows customer to identify discernable differences among their needs. [18] AHP is applied top down to the customer needs hierarchy with local priorities of a single branch able to be multiplied by “parent” weights to give global priorities. In the example in Figure 7, “time in cut” was considered more important than “time not in cut” by the customer. At the next level, “fewer cuts” was more important than “the speed of cut.” The global weight of “fewer cuts” is the weight of “time in cut” multiplied by the weight of “fewer cuts.” If there are several people at customers and they have different opinions, it is desirable to average their votes by taking the geometrical mean of their votes. Furthermore, AHP can identify inconsistency in the decisions. A logical inconsistency would exist, for example, if need A is more important than need B, and B is more important than C, but the customer votes that C is more important than A. When multiple inconsistencies occur, AHP can even identify the most inconsistent pair. Several studies have shown that informed users can make a very precise weighting of a range of different phenomena such as size or volume of objects, light intensity, GNP of different countries, etc. by judging with pair wise comparisons using AHP [16]. Pair wise comparisons thus yield a better result than directly trying to rank the entire list of items at the same time. This makes AHP a good candidate for customers to prioritize their needs.

#### 4.7.1 Pilot project experiences

To get the customer to prioritize their needs, the AHP activity was done during the gemba visit. To simplify this, we developed a system where the customer had just two cards in front of him with just two needs at a time to compare. This reduced the time it took to do AHP by approximately 50% compared to looking at the entire matrix. In the cases where a hierarchy had been developed, the AHP was easy and fast. It was not possible to do an AHP if no hierarchy was created, we learned, hence making the hierarchy became essential. The experience from the pilots was that customers agree with the numbers coming out of the AHP and they do not want to go back to “fix” decisions to alter the results. Table 8 shows the AHP made for part of the hierarchy in Figure 7. Here, for example, the customer has judged “hassle free operation” to be extremely more important than a “fast set up”.

	Fast set up	Tool life	Hassle free				sum	row avg
Fast set up	1	1/4	1/9	0,071	0,048	0,082	0,201	<b>0,067</b>
Tool life	4	1	1/4	0,286	0,190	0,184	0,660	<b>0,220</b>
Hassle free	9	4	1	0,643	0,762	0,735	2,139	<b>0,713</b>
	14,000	5,250	1,361	1,000	1,000	1,000	3,000	1,000
							<b>Inconsistency</b>	<b>0,03</b>

Table 8. Example of AHP from the beta pilot.

#### 4.8 Gemba is not the last step in Blitz QFD<sup>®</sup>

Our training eliminated a lot of earlier confusion that QFD was just a House of Quality to relate customer needs to technical requirements. However, new misunderstandings started to appear instead. Many in management positions assumed Blitz QFD<sup>®</sup> to be a shortcut that could be used now and then, mainly on bigger projects just to find customer needs. Others thought Blitz QFD<sup>®</sup> was limited just to gemba visits. While using just one or two methods will give partial benefit, for an organization to fully reap the full benefits of Blitz QFD<sup>®</sup>, a clear understanding of both the overall process shown in Figure 1, and each of the individual methods and tools is needed. We now see the half-day QFD Gold Belt<sup>®</sup> orientation for management was not enough to get the level of understanding necessary to sustain the QFD effort and we will work to improve their understanding by completing the second part of the management orientation as recommended by the authors.

## 5 MULTI-CULTURAL DIFFERENCES IN *GEMBAS*

How *gembas* are perceived and the difficulty in perform them depends on the culture in which they are performed. What is culture? One definition by given by Dr. Geert Hofstede of Maastricht University [19] is “Culture is the collective mental programming of the people in an environment” and more explicitly, “Culture is the collective programming of the mind that distinguishes the members of one group or category of people from others.” It is important to recognize that the variability among individuals within the same culture can be vast. To Hofstede, if variability among individuals within a culture is likened to a bell curve, then the differences between cultures is like a shift of the bell curve. This variability among individuals means that the use of generalizations regarding cultural dimensions needs to be made with great caution and not applied to individuals. It can be assumed that the smaller the set of generalization the safer it is to apply, i.e. there can be a small set of basic cultural habits that most individuals within a culture share. An example would be the way people greet when meeting, the way time and deadlines are respected, meeting manners. While more personal traits like outspokenness, shyness, drive and stamina could be assumed to vary more among individuals.

In order to classify cultures several criteria or dimensions have been proposed throughout the years by Parson and Shils [20], Kluckhohn and Strodtbeck [21], and Hall [22] as well as the aforementioned Hofstede among others. Hofstede’s work is seen as seminal by De Cieri and Dowling: “The seminal work by Hofstede has inspired much of the cross-cultural research activity since 1980 and has been the dominant research paradigm in cross-cultural studies of national attitudes for some time.” Hofstede’s work originates in a study made from data from IBM and has been validated in various studies. Originally, Hofstedes identified four dimensions but after research by Michael Harris Bond a fifth dimension was added, the LTO (long-time orientation). LTO indices are not available for all countries but are shown at the webpage: [http://www.geert-hofstede.com/hofstede\\_dimensions.php](http://www.geert-hofstede.com/hofstede_dimensions.php). Asian countries have the highest LTOs while the U.S. and some African countries have the lowest LTOs. European countries score in the middle. Hofstede’s dimensions are:

1. Power Distance Index (PDI), this reflects the unequal distribution of power in society and how tolerated it is by subordinates
2. Individualism (IDV), are people acting mostly for their own sake or is collectivism valued
3. Masculinity (MAS), this deals with the distribution of roles between the sexes
4. Uncertainty Avoidance Index (UAI), relates to the tolerance for uncertainty and ambiguity
5. Long-Term Orientation (LTO), is long time or short time thinking valued.

While, the values should be used with great care, they can serve as a first indication before going to *gemba* and a reminder that the reactions to *gemba* can differ between cultures. They can guide us when establishing the first contact with the sales personnel who are essential for introducing the team to any company that will be visited. As Hofstede suggests the dimensions are constructs developed for “handling the complex reality of our social world” and can act as a framework to look at cultural differences for comparing the *gemba* experiences in different cultures.

Hofstede was introduced to the QFD community by Dr. Georg Herzworm in his keynote presentation at the 2008 North American Symposium on QFD in Santa Fe New Mexico. While Herzworm explained the implications of how QFD teams would interact internally in different cultures, the authors felt there was value in applying Hofstede’s indices to external interactions with customers in the *gemba*. Our experience in the various *gembas* was that that the PDI (power distance) and the UAI (uncertainty avoidance) had the largest influence, and to a lesser extent also the LTO (long term thinking). We believe that the PDI can influence the way visited customers behave during a visit. In a culture with a high PDI it is suggested that subordinates would avoid expressing an opinion that differs from

their superiors. To successfully perform a *gemba* visit in a high PDI culture it is important to show integrity and in at least part of the visit, speak to different hierarchical levels separately. When we practiced a test *gemba* at Sandvik, we had one of our team speak to the machine operator while the other spoke to the technician out of hearing range from the former. PDI does not only depend on hierarchical level but also age or time with the company. A young recently employed operator might not want to speak openly in front of an older machine operator in a culture where respect for the older and more experienced is important. As with hierarchical levels, careful conduct during the visit can mitigate these effects and better information can be gathered.

The UAI can also influence the way a *gemba* visit should be conducted. A culture where UAI is high is often run by rules and regulations and traditions can be very important; unorthodox behavior is to be avoided. A customer accustomed to a regular sales call or a field test of new products can feel insecure when asked to take part in a new kind of visit such as the *gemba* visit. Cultures high on the UAI not only are more bound by tradition, they also avoid ambivalence of any kind. When performing *gemba* visits in such a culture, the *gemba* team must express full confidence and show that they are in full command of how to conduct the visit in a professional way. They must exude confidence that while this might be new to the visited company, it is a well established method. A culture high on both PDI and UAI is thus bound by tradition and hierarchy and may present a barrier to *gemba* visits. In such a case, perhaps it is better to have only one or two QFD team members join in a “traditional” sales call in order to build a long-term relationship more conducive for a future *gemba* visit.

LTO also affects *gemba* practice but the authors believe somewhat less. If the LTO is very low there is an expectation of rapid payback to every activity. A *gemba* with the purpose of gathering customer needs for next generation products is a long term activity, so a company in a culture with very low LTO might think it is not worth the effort to think in such a long time span and hence refuse to host a *gemba* visit. Possibly companies in such a culture could be better visited for product updates or improvements to current products. Efficiently ran *gemba* with clear objectives would be important in this case as well as being able to offer quick fixes should the customers raise any current product or process related problems. In this study, we did not encounter any concerns that the *gemba* was seen as too long range, whether the U.S. with the lowest LTO or China with the highest.

In our examination of the countries where we performed *gemba* visits, the following tendencies seen by the authors are presented. In addition to the cultural variations, there were also variations between companies within the same culture. The ownership of a company also has an impact on its culture. If the ownership is total and there is active management by the owners, cultural differences might affect the *gemba* visit differently.

There are also similarities. Regardless of the culture, the sales representative should always participate in the *gemba* visit since they are the person with the long term relation with the customer, and will be there both before and after the visit. It should be noted that the Hofstede's indices were researched after the initial *gembas* were visited and are now being examined as beneficial to future visits.

### **5.1 Germany**

According to Hofstede, Germany's indices compared to world averages are: PDI (35/54) and UAI (65/62). Compared with US indices, Germany has a slightly lower PDI but a clearly higher UAI (65) than the U.S.'s (46). With respect to Sweden where Sandvik has its main office, the German PDI (35) is slightly higher than the Swedish PDI (31) and the German UAI (65) is much higher than the Swedish UAI (29). The indices are a relative measure which means that the difficulty in performing a *gemba* visit relates to the difference in the index score. As mentioned earlier, a high UAI implies that the professionalism of the *gemba* team is key, i.e. the way the *gemba* is performed needs to be without hesitation and the team well focused and trained. Our visits in Germany corroborate these indications. Sales personnel showed concerns about team member conduct since we were new to the Blitz QFD® process. They cautioned that their customers expect the manufacturer to be expert and any ambivalence or uncertainty about the product should be avoided. It is therefore important to be very clear when explaining the purpose of the *gemba* visit - that while Sandvik Coromant has the expertise in developing tools, the customer has the expertise in their process and needs. The German PDI being

slightly higher than the Swedish would imply that there is a German preponderance for hierarchies and a higher reliance on authority than what the Swedes are accustomed to. This was corroborated although our experience was that the difference in power distance is much higher than the indices indicates.

Another example of how tricky intercultural communication can be is that when speaking their mother tongue, Germans in a professional setting almost exclusively, sometimes even after years of knowing each other, continue to use the title of their colleagues such as Herr or Frau, or Herr Doktor if the person holds a PhD, followed by the family name. Swedes speaking their mother tongue uses first names and no titles regardless of hierarchical level, education or situation. People from U.S. use titles but quickly switch to first names. This meant that when communicating with Germans in English, should we adopt the American style and use first names, or retain the German style of titles and family names? Swedes, having no tradition of titles to fall back on, quickly started using first names. The high UAI of Germany would suggest that if the *gemba* is not being run in German, the best thing is to sort this issue out at the beginning of the *gemba* visit by just asking “titles or first name” hence avoiding uncertainty!

The differences in how the *gemba* visit was performed differed a lot between companies visited. In a medium sized company more guidance was needed while in well known multinationals, challenging questions regarding the detailed definitions of customer needs in the hierarchy were frequently raised. We also noted that the English language skills varied even at big companies, so being able to perform the *gemba* visits in German would be a big advantage. While Hofstede does not directly address the issue of punctuality, our experience was that even being a few minutes late is unacceptable. Lead times to secure an invitation for a *gemba* visit should also be planned with adequate notice.

## **5.2 Brazil**

Hofstede's index for Brazil with respect to world averages are PDI (69/54) and UAI (76/62) implying that the reactions encountered in Brazil would mimic or even exceed the experiences encountered in Germany, especially regarding PDI. However, we found the local personnel quite open. At the visited companies, the *gemba* team felt no signs of skepticism or fear of the unknown which the indices would indicate. Even during large meetings views were exchanged very openly even by personnel at different hierarchical levels. The discrepancy between Hofstede's indices and the actual experience could have several explanations. First, the *gemba* team failed to see the skepticism and fear of the unknown due to politeness by the members of the visited companies and the local Sandvik sales personnel. Second, Hofstede's indices do not adequately explain the Brazilian cultural reactions when faced with a new experience. Third, the local sales personnel felt a power distance between themselves and the visiting *gemba* team from the head office and the high PDI meant they behaved accordingly. Similarly, the visited companies may have felt honored by the visit from people coming such a long way, especially from a supposedly highly industrialized Sweden. Thus, the high Brazilian PDI makes them accept the *gemba* visit because it comes from highly regarded suppliers (high rank). Fourth, when Hofstede is applied to a small population such as a group of employees at a supplier, the variance between individuals makes the use of the indices unreliable. The authors believe the discrepancy might come from some combination of explanations one, three and four. Experience showed that the local subsidiary felt important when receiving visits from the head office and want to be gracious hosts. Experience also showed that it is sometimes harder to be “prophet” in the one's own country than abroad, which would be closer to explanation three. As indicated earlier in the paper the variance within a culture regarding personal traits such as shyness, openness and such are believed to be large enough that a particular setting with a small group can deviate well from a larger sample. Nonetheless, using Hofstede's indices even cautiously when preparing for visits to a culture different from one's own is probably better than just going clueless into a *gemba*.

In Brazil, we also noted a tendency that the number of participants during the *gemba* visits could grow fast. One visit started with just a local salesman, a local technical specialist, and two Swedish representatives from Sandvik Coromant meeting one or two people from the visited company, and ended with over ten people involved. The meeting facilities were sometimes very noisy. Under such circumstances, the Customer Process Model was very valuable in helping to keep things moving in the right

direction. The ability to perform the *gemba* in the local language was valuable as it then was easier to track and mitigate too many side discussions as the group grew. The author's recommendation is to keep a professional attitude and keep an eye on the interpersonal relations at the visited companies to see if someone is refraining from speaking due to a subordinate relationship. They may have something valuable to add and we do not want intimidation or a fear of something new to get in the way. Prompt appointment start times and durations are not strict in Brazil – allow for late starts and extensions to accomplish the visit.

### **5.3 Sweden**

According to Hofstede, Sweden is below the world average regarding both PDI (31/54) and UAI (29/62). The low PDI would indicate that employees at visited companies would speak freely even in the presence of a superior or older employee. However, during the actual visits a discrepancy could on occasion be seen between what employees said when their boss was out of sight and what their boss said in the presence of the employees. This does not suggest however that the low PDI is false but that firstly Hofstede's indices are relative and should be used when comparing between cultures not used as an absolute measure, and that the indices should be used on large populations not on individuals or small groups. What it means is that the low PDI suggest that compared to cultures with higher PDI on average Swedish employees will speak more openly even in the presence of a power figure. More troublesome on the other hand, is that among Swedes themselves, there is an impression that Swedes complain about authorities at home or at the coffee break but do not show this in public gatherings or in meetings. To mitigate the effect of this contradiction between what PDI is showing about openness and the actual beliefs among Swedes, the authors suggest that an informal atmosphere should be aimed for at the visit i.e. the *gemba* should continue from the shop floor to the coffee break room. The low UAI indicates that there is comfort even in the presence of ambivalence and that there is a curiosity with respect to the new and unproven. This is corroborated by the ease in contact with sales personnel when asking to arrange *gemba* visits, and the openness among companies to agree to be the subject of, for them, a new method of conducting a customer visit.

As the team consisted of Swedes no language barrier existed. The familiarity with the culture might bias the judgment and even the discussion even though the findings partially corroborate Hofstedes at least for UAI. This bias might cause difficulties encountered by foreigners not to be reported here. The discrepancy between the Hofstede's PDI index and the impression among Swedes that they express much more in private or unofficial settings should be kept in mind. Swedes are generally punctual so visits should be arranged in advance and kept on schedule. Facts, even discrepancies, are open for discussion.

### **5.4 England**

Hofstede's indices for England are PDI (35/54) and UAI (35/62). The low PDI numbers clearly go against the picture of the English as a class society where family background and a prestigious education have a large influence on life. Also the low UAI does not correlate with the picture of England as bound to traditions and being conservative. The *gemba* visits generally were quite open and engaging with personnel willing to share their experiences and to make suggestions. This also corroborates their high IDV index of 90. Discussions tended towards details but we learned to be careful of directly challenging opinions as our position as experts did not necessarily mean to them that we knew everything, again in accord with the low PDI (our roles as experts did not make us prophets) and low UAI (speaking the truth was highly valued). Generally, politeness ruled the *gemba*, such that while direct confrontations were to be avoided, the facts were not. Visits generally started on time and stayed on schedule.

### **5.5 China**

Hofstede's indices for PDI (80/54) and UAI (30/62) respectively, suggests that hierarchy is important and that the acceptance for ambivalence and the unproven is high. The team was received with great openness at the companies, typical of low UAI. The team did not report any signs of the high PDI this might be because it was masked by other cultural differences. That is, signs of hierarchy might not be that easy to spot in a different culture. However, other experiences suggest that workers were apt to behave differently when supervisors were present, and so future visits will keep this in mind. This is because decisions tend to be made within the context of a hierarchical decision and so contradictory

opinions might imply that the personnel might not be in sync with decisions they were expected to support. Conflicting data might tend to be hidden or ignored, and so the *gemba* team should make note of observed anomalies and investigate them in the context of seeking to understand rather than challenging individuals.

As no one on the team spoke the Chinese, translation had to be made by the local sales representative. The *gemba* team reports that what struck them the most was the lack of industrial know-how at the companies visited. By just looking at the shop several signs of this lack of know-how could be detected, such as idle machines, awkward fixturing practices, etc. Higher cutting speeds, better tolerances, longer tool life and a low purchase price were however put forward as the most important requirements by the customers despite huge production problems, such as poor tolerances, piles of unfinished work in process between machines due to improper machining practices, and poor production planning respectively. In conversation, the customers expressed potential solutions not needs. Furthermore despite the customer's interest in shorter machining time little concern was showed for the overall manufacturing throughput.

One of our *gemba* team members put it this way, "It felt like they had put modern machines in an ancient workshop and never taught workers how to use them, instead just letting the employees run them as they could." It could be that these companies are not at all representative, but as in other cases, they were chosen by the local sales representative. Further, one of the companies was owned by a well known Japanese manufacturing company where the use of lean principles could be expected, however what the team witnessed was quite different. Another company was a state owned manufacturing component in the wind energy sector, i.e. supposedly a "leading edge business." Strangely, the *gemba* team did not find unmet customer needs. While many ideas were discussed, it could have been the lack of machining know-how and manufacturing experience that made the customer suggest solutions they thought might increase production (tool speed and feed) but that since they worked in an already well managed plant would have only minor impact. System level improvements such as overall production time and production rate were thought by the *gemba* team to be more important, so the true needs were believed to be increasing technical know-how by more informative documentation and education. In other words, since operators were only responsible for machine level settings such as tool speed and feed, overall process improvements and planning issues (management responsibility) rarely came up in the *gemba* visits. Visits tended to follow the predetermined schedule.

### **5.6 Italy**

Hofstede's index for Italy was close to world averages at PDI (50/54) and UAI (75/62) indicating an average hierarchical society with fairly high uncertainty avoidance. During some company visits in Italy, the local sales personnel present during the *gemba* visits "took over" the visit and went out of scope by talking up their personal agenda in Italian and generally blew the *gemba* protocols. This could have been both a sign of lack of direction from the *gemba* team to the local representatives regarding the purpose and technique in how to conduct a *gemba* visit, such that without specific instructions to the contrary, they did what seemed logical to them. But the high UAI of the culture could also suggest that by taking over the visit, the sales person stayed in their comfort zone to avoid the inherent uncertainty of a new setting such as *gemba*. The probability of the latter, of course, increases if the sales person from a high UAI culture is not well taught about *gemba* visit. Language barriers are not to be overlooked either. Fluency in Italian would have been invaluable to steering the *gemba* visit properly. The representative, notwithstanding, other technical levels and the willingness to express their needs was deemed high. But while discussions were lively and opinions freely given, those of superiors were eventually deferred to. Punctuality was adhered to unless immediate attention to another issue drew attention away from our visit, so allow for extra time to complete the *gemba*.

### **5.7 U.S.A.**

Hofstede's indices for the U.S. with respect to world averages are PDI (40/54) and UAI (46/62). These figures suggest that the importance of hierarchy is slightly higher than for Sweden and Germany, but because the UAI is much lower than Germany's (65) and Brazil's (76), although higher than Sweden's (29), this indicates that in the U.S. there is a higher than average openness to the new and unproven. The *gemba* visits in US passed without problems, the participants we met showed a genuine interest in

sharing their thoughts, as is consistent with the low UAI. The *gemba* visits in U.S. were facilitated by the fact that the *gemba* team all spoke English.

U.S. workers were eager to show their work process and to discuss concerns. They would identify extreme, even if rare, conditions to make a point. While supervisors could dampen some conversations, generally contradictory opinions would be offered either under the guise of humor or as individual experiences rather than as universal truths. This could make it difficult to know if something was truly a problem or just an unusual occurrence. Data was usually shown if available, although record keeping could vary in terms of completeness or in being current. Follow-up communications through supervisors was not discouraged should the team have later questions. Analytic work such as with the Hierarchy Diagram and AHP required minimal explanation and employees willingly participated.

## **6 CONCLUSION**

As seen from the experiences above it is hard to make firm predictions regarding cultural differences and their importance to conducting Blitz QFD<sup>®</sup> *gemba* visits. Tools like the Hofstede indices may be frequently cited by researchers of intercultural relations, but our conclusion is that at a person-to-person level, the best way to connect to customers both culturally and linguistically is to pass through your local sales representatives and local technical specialists when they are available. However, how the QFD team addresses their local representatives is critical, and Hofstede's indices can be of help. In the case of cultures having a high PDI also the relative position between the visiting and the visited culture is important. When visiting a high PDI culture, it is important that hierarchies among visitors and from whom the visit is requested as well as the meeting's importance is clear. High UAI stresses the need for very professional behavior in order to avoid feelings of ambivalence. In the end, however, the local representative's judgment will be needed on how to best approach customers in practice.

Language barriers are not to be overlooked. In a semi-structured situation like the *gemba* where the goal is to find out as much as possible from the customers about their spoken and unspoken needs by being present in the workplace and observing activities formulating questions depends on what the situations evolve, so standard questions prepared before the visit do not work well. Furthermore, the ability to detect nuances and discrete utterances is highly dependent on language proficiency. English is not sufficient as the lingua franca during a *gemba* unless all participants including the customer and at least one of the *gemba* team has a high command of the language. The ability to speak the local language permits a freer exchange of ideas, even if the *gemba* team members do not speak the language perfectly. If it is possible to run the *gemba* completely in the local language, the local sales representative if trained in QFD and in how to conduct *gemba* visits can take a dominant role with the *gemba* team listening in and guiding him. If no one on the team has mastered the local language, then hiring a professional interpreter to translate is an option to keep the *gemba* team in charge of the visit. Letting the local sales representative run the *gemba* visit without direction will easily lead to deviations from *gemba* thinking (needs identification and prioritization). To get a short statement at the end of a long discussion will not have anywhere near the same value as directly participating in the discussion that led to that statement.

Effective prioritization with AHP at the end of the visit requires that the hierarchy be complete and well constructed by the customer or by the team. Flaws can corrupt the validity of the results, otherwise. Without the prioritization, the *gemba* visits can add some value, but not direction for the team to take back to the home office, however, so every attempt must be made to complete all the steps in the Blitz QFD<sup>®</sup> through the AHP. The subsequent Maximum Value Table (not discussed here) will be that much more focused, and the developed new product that much more successful.

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## REFERENCES

- [1] Schilling M.A. *Strategic Management of Technological Innovation*, 2<sup>nd</sup> edition, McGraw-Hill, International Edition
- [2] Bylund N, Wolf M and Mazur G. Reducing Lead Time In Cutting Tool Development By Implementing Blitz QFD. In *International Conference on Engineering Design, ICED'09*, Stanford, August 2009, ISBN 978-1-904670-16-2, complete CD-ROM in the cover (more info at: [www.designsociety.org](http://www.designsociety.org))
- [3] Pahl G. and Beitz W. *Engineering Design, A Systematic Approach*, 1993 (Springer Verlag, Berlin)
- [4] Wheelwright S.C. and Clark K.B. *Revolutionizing Product Development, Quantum Leaps in Speed, Efficiency, and Quality*, 1992 (The Free Press, New York)
- [5] Narayan D. What is Participatory Research? *Toward Participatory Research*, 1996, pp.17-30.
- [6] Blessing L.T.M. and Chakrabarti A. DRM: a Design Research Methodology, In *proceedings of Les Sciences de la Conception, INSA de Lyon*, Lyon, March 2002, CD-ROM
- [7] Bylund N., Grante C. and Lopez-Mesa B. Usability in Industry of Methods from Design Research. In *International Conference on Engineering Design, ICED'03*, Stockholm, August 2003, abstract pp.631-632, complete in CD-ROM in the cover (The Design Society)
- [8] Meissner M. and Blessing L. Defining an Adaptive Product Development Methodology. In *International Design Conference, Design 2006*, Vol. 1, Cavtat, May 2001, pp.69-78 (Published by Faculty of Mechanical and Naval Architecture, University of Zagreb)
- [9] Imai, Masaaki. *Kaizen: The Key To Japan's Competitive Success*. 1986. McGraw-Hill ISBN:007554332X
- [11] Yano, Shinichi. *New Lanchester Strategy Volume 1*. 1995. Lanchester Press. ISBN 1573210005
- [12] Ulwick A.W. *What Customer want, using Outcome-Driven Innovation to Create Breakthrough Products and Services*, 2005 (McGraw-Hill, International Edition)
- [13] Guerin, Jeanne. "Kansei Engineering for Commercial Airplane Interior Architecture." 2004. *Transactions of the 16<sup>th</sup> Symposium on QFD*. [www.qfdi.org/workshop\\_kansei\\_files/kansei\\_engineering\\_for\\_boeing\\_7e7.pdf](http://www.qfdi.org/workshop_kansei_files/kansei_engineering_for_boeing_7e7.pdf)
- [14] Groopman, Jerome. *How Doctors Think*. 2007. Houghton Mifflin/Mariner Books. ISBN 0547053649
- [15] Brassard Michael and Diane Ritter. *The Memory Jogger™ II*. 1994. GOAL/QPC.
- [16] Saaty T.L. The Analytic Hierarchy Process: How to Measure Intangibles in a Meaningful Way Side by Side with Tangibles. In *International Symposium on QFD, ISQFD'07*, Williamsburg, September 2007, pp 113-135 (The QFD Institute)
- [17] Stevens S.S. On the Theory Scales of Measurements. *Science*, 1946, 103(2684), 677-680.
- [18] Miller, George A. "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." *The Psychological Review*, 1956, vol. 63, pp. 81-97
- [19] Hofstede 1980. <http://www.ac.wvu.edu/~culture/hofstede.htm>
- [20] Parsons, T. & Shils, E.A. (1951). *Toward a General Theory of Action*. Cambridge MA: Harvard

University Press

- [21] Kluckhohn, C. (1962 [1952]). "Universal categories of culture." In S. Tax (Ed.), *Anthropology Today: Selections* (pp. 304-20). Chicago: University of Chicago Press.
- [22] Hall, E.T. (1976) *Beyond Culture*. Garden City NY: Anchor Press.
- [23] De Cieri, H. and Dowling, P. J. (1995). "Cross-cultural issues in organizational behavior." In Cooper, C. L. and Rousseau, D. M. (Eds.), *Trends in organizational behavior*. West Sussex, England: John Wiley & Sons.