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Vulcanus in Japan 2011-2012
Final Report

Introduction

After one year of living and working in Japan, it is difficult to sum up the impressions and experiences that make up such an experience. In the following pages I will attempt to summarize at least a part of this year as Vulcanus participant focusing on different aspects, starting with some experiences with the Japanese language and leading a life in the country, both in the megacity Tokyo as well as life in the "countryside" during the industrial placement at Hitachi Kasado. I will then move on to describing the company and the contents of my internship in rough terms, followed by some impressions after having worked in a Japanese company for a few months and a finishing comment.

Japanese language

Coming to Japan, I soon realized that, although I had studied the language for three years while in university in Germany, really nothing can prepare you for an extended stay in the country beforehand. One must really live in Japan and immerse oneself in everyday culture to be able to communicate with people in a natural way. While I had some knowledge of vocabulary and grammar before arriving, it was very hard to lead a longer, coherent conversation with anyone in Japanese. Throughout these twelve months, however, this changed and I gradually developed the fluency to talk to people about many different subjects, be it a technical conversation or just everyday chitchat, without having to stop and think every sentence over and hesitate while searching for the correct words to use. The course at Naganuma School was excellent in assisting each Vulcanus participant in improving their Japanese level, mainly focusing on the conversation aspect to be able to get by in both casual and formal situations through a very practice-oriented study program, characterized by exercises such as making a phone call to inquire information or making short presentations on various topics to learn how to convey a message clearly and use graphs and data to support one's point.
At the same time, I feel that my handwriting proficiency improved immensely. An interesting thing I came to realize is that in learning kanji, there seem to be two phases. At first, one is overwhelmed by the amount of them, and by the fact that in the beginning, they all look alike. It feels like just beginning to study them would take a lot of effort; one feels comfortable reading and writing in only kana, and whenever the furigana reading aids are missing in a text, panic breaks out.
After a while, though, this notion switches, and (at least in my case) one finds himself in the immediate need to learn the characters along with any new piece of vocabulary that appears. Once one knows a sufficient number of kanji, it is easier to guess the meaning of a new word just by looking at how it is written.

This helps in remembering a concept more easily and makes reading much easier as well, because instead of slowly reading through a never-ending string of kana, as in とうきょうえきのかいさつぐち, the phrase 東京駅の改札口* is not only shorter, but also easier on the eyes and faster to understand at first glance.

Following the superb language training received at Naganuma School during the first four months of the Programme, I was among the Vulcanus students who opted to take the Japanese Language Proficiency Test (JLPT) to receive a certification of the language level. So far, I passed the N3 level in December 2011, the results of the N2 exam taken in July are still pending at the time of writing. These examinations' results might prove useful in the future, should I consider working at a Japanese company or continuing my studies at a university in the country later on.

I found the way of teaching and the materials used at Naganuma School to be very interesting and effective. The book employed provided a lot of vocabulary to talk about more advanced subjects (politics, energy, society in general) as well as a lot of grammar which proved extremely useful for developing the conversation, expressing one's opinion, disagreeing with someone, making requests, etc. Moreover, the homeworks involving research and presentation on various topics were a great training for explaining complicated concepts, trends and graphs. The language course also gave me the ability to explain and introduce new words by explaining them with already existing vocabulary and in a coherent way, without resorting to another language.

Life in Japan

Takadanobaba – In the megacity

Life in Tokyo is relatively easy even for a foreigner, and the reports are numerous, so this section will be kept short. Due to the remote placement of our internship company (and other Hitachi branches), five of us Vulcanus participants were lucky to be placed in small one-room apartments in the Takadanobaba area, well within reach of all places in central Tokyo and well connected to the mass transit network. The commute to the school was probably among the shortest and cheapest among our group, at the same time allowing us to experience Tokyo's most representative way of transport when it comes to crowded trains during rush hour: the Yamanote line.
Meeting people at every opportunity enriched the experience, especially when encountering previous years' participants in the "Vulcanus in Europe" program, Japanese people our age fascinated by European culture and eager to welcome us and show us their own city and country.

* Meaning: "The ticket gates at Tokyo Station"

With the incredible convenience and service-oriented society (in some areas, over four different convenience stores can be found within a 100m range), innumerable entertainment and culture offers and many opportunities for education and employment, Tokyo is definitely a place I would like to return to should the opportunity present itself.

Life in the Japanese countryside

Compared to the four months spent in Tokyo during the Language course, the time in Kudamatsu has allowed us (hereafter meaning James and me) to experience a side of life in Japan that is not visible to a temporary visitor, or even to the Vulcanus Interns working in or near big cities.

With fewer of the possibilities than a big city like Tokyo offers, and with longer working hours than what I was used to as a university student, there is less free time and not as many distractions in an average workday, which led to a relatively regular everyday schedule. I feel this has helped me in being more productive, setting up a routine of working, swimming, Japanese self-study and free time, making me accomplish more in the time I have available than if I had a full free day at my disposal.

The fact that the train only stops at the only station in the city between one and two times an hour is in stark contrast with the constant mobility one is used in the big city. However, using the bicycle as a means of commuting and transportation has been good for both our health and our wallet, although slightly uncomfortable during the rainy 梅雨 season.

The コンビニ (Convenience store) establishments so ubiquitous in Tokyo are few and spread unevenly and far from our dormitory. Some of them are not even open 24 hours, which is why sometimes the term "inconvenience store" might be more suitable.

Due to our lodging in a company-run dormitory, we have been able to see the life many young new Hitachi employees lead when starting their careers. The rooms are simple six-mat Japanese style rooms with little in them other than some closets and a desk built into the wall. In general, this has been enough to get by since we have used the room for little more than sleeping. Even though I have gotten very much used to sleeping in a futon, I could not do this longer than a few months and would definitely never trade away a bed and mattress for extended stays.

Monday through Saturday there is meal service served in the dorm's dining room. While most of the food is reasonably good, we have resorted to eating out more and more often each month due to the slightly repetitive nature of the meals. There is a fridge, microwave oven and toaster provided in the dining room, but this only allows for limited creativity when preparing one's own food. Therefore, a fully equipped kitchen is one of the things I have missed most

during my stay at the dorm; even though I am a big fan of most of Japan's cuisine, the time inevitably comes when one just wants to bake some Lasagna, grill a juicy steak or make other European food instead of the stream of fish, rice and other standard local meals. For the limited time of the internship, however, the services and accommodation provided were absolutely sufficient.

While in Tokyo I got the feeling that Japanese people in general are extremely friendly and generous, this trait becomes more and more apparent as one gets further away from the metropolis. Granted, this view might be biased owing to the fact that we as foreigners are viewed as "special" and unconventional visitors, and thus treated differently.

The positive side of us being among the few 外人(foreigners) in our town has been the curiosity and friendliness with which we have been approached most of the time. Many people seem very glad to meet and talk to us. We have received various warm invitations, such as the owner of the local swimming pool inviting us out for dinner, drinks and karaoke together with a few members of the staff (of course, treating us to the entire meal), or a Hitachi employee inviting us to a gathering of family and friends at their house in the midst of the fields off a town even smaller than Kudamatsu for their grill party, giving us the chance to see true family life and the inside of a typical countryside house.

The flip side to being "different" is a sense of being constantly looked at by bystanders when walking on the street or going to the local mall, to name a few examples. Whereas in Tokyo, the sight of a foreigner is not something to be very surprised at, living in Kudamatsu it seems that some people have never seen a non-Japanese person in their lifetime, and are unsure how to react to our presence.

Groups of kids would often stare at us in awe, but shy away if we decide to greet them. Some might even usher a "ハロー(Hello)" before running away giggling. Since generally people would at first assume we do not understand Japanese, anytime we started speaking (even the simplest phrases), amazement ensued, not mentioning times we began reading or writing some kanji. While it is nice to get some recognition for the effort we put into learning, getting massive stares and a big "日本語がすごく上手ですね(Your Japanese is excellent)!" for saying "ありがとう(Thank you)" or other simple things just made the awe seem a bit ridiculous. I am not sure how much of the amazement is out of politeness and how much just stems from the fact that they have actually might never have met a foreigner that speaks their language before.

In some (though few) cases it has gone all the way to people being so fascinated by us that they want to introduce us to their acquaintances, only for the fact that we are foreigners or speak Japanese, as if we were a kind of "attraction" to show off and impress their friends. While they might not necessarily notice it, this has sometimes put us in slightly awkward and

uncomfortable situations, and I highly doubt the same would ever happen in Europe the other way around.

All this being said, I must say I am very glad I was not the only Vulcanus participant to go down to Kudamatsu. Spending most of the free time together with James made the stay a lot more bearable. Even though we both could probably manage on our own in an all-Japanese environment, it has helped to have another European during the stay, discussing encountered cultural differences, helping each other out when dealing with difficulties and occasionally having a laugh together about those situations we just did not understand.

The company

Hitachi Ltd. is an international company offering services and products on many technological fields, such as telecommunications, power systems, industrial and consumer electronics, etc. Activities at Hitachi Kasado Works in Kudamatsu, Yamaguchi Prefecture however, revolve mainly around the three topics of train rolling stock, industrial plants and semiconductor manufacturing. Out of these, the Vulcanus Internship was located in the rolling stock manufacturing division.
Hitachi Rail has a history of over 100 years, beginning with the production of induction motors and producing its first steam locomotive in 1920. It soon moved on to the segment of electric trains and pioneered the development of the Shinkansen Bullet Train in time for the 1964 Tokyo Olympics. Since then, Hitachi has produced a broad range of trainsets and complete transport solutions ranging from subways, commuter and express lines to monorails and bullet trains. Many overseas projects also exist, notably the CTRL (Channel Tunnel Rail Link) manufactured for the UK.
Simply put, the production of rolling stock at Hitachi is divided into four main sections:
Of course, everything starts at the design level. While some trains manufactured at Kasado are 100% Hitachi designed, there are also cases, most notably the Shinkansen, where most of the design process takes place at another company, and only the actual manufacturing work is delegated to companies such as Hitachi and others.
After the Design Department has defined every last detail of the product and produced the necessary shop drawings, the Manufacturing Section goes into action. Manufacturing Section 1 is in charge of fusing and machining the 20-something-meter-long panels that make up the floor, roof and sides of the car body and welding them together into the shape it will retain once it is finished.
The "skeleton" of the car is then passed on to Manufacturing Section 2, which was the location of my internship. The work here involves everything needed to get from what is basically a massive six-sided aluminum box to a completely finished train car. This includes painting and coating, installing the wiring and piping on the roof, inside the cab and underneath the floor, mounting elements

such as panels, lighting, instrumentation, windows and doors, rigging the car with transformers and compressors but also toilets and rows of seats, and generally outfitting each cab with everything it needs to perform on the track. The production of the bogies (wheel bases) is handled in a separate section.
Even though the production process is rigorously checked at every step by means of debris inspections, checklists, etc. (also involving the final buyers of the trains), the finished cars then undergo the strict eyes of the Quality Assurance department before being delivered to their final destination.
An interesting point regarding the delivery, is that especially the Shinkansen is quite literally "shipped" to it's destination: Despite the closest Shinkansen station being just a few kilometers north of Kudamatsu, the cars are always lifted onto a special ship waiting at the factory's dock via a gigantic crane and then transported elsewhere to be coupled together and undergo further testing at a separate site. Other train models are hauled along the railroad tracks, sometimes over the span of a few days if they need to reach places as far as Tokyo or beyond.

Work contents

My work in the Manufacturing Department 2 involved various tasks mostly regarding the improvement of the rolling stock production process in one way or another.
Unlike the work at, for example, an automobile factory, where many tasks are partially or completely automated and a lot of the employed parts are designed to "snap into place" easily as complete modules, the vast majority of tasks involving the outfitting of a train car are performed by hand and often require a considerable amount of adjusting and fine tuning of positions, distances, angles etc. of parts relative to one another. One of the first assignments I was given was thus to help create small tools or "jigs" to aid the process and assist workers to improve accuracy and efficiency. This is where my skills in handling 3D CAD applications acquired in university came in extremely handy, as –being in charge of manufacturing and not design- my colleagues were only accustomed to dealing with two-dimensional drawings. It was highly interesting to be assigned a specific problem and develop a solution starting with observing the current state in the actual train cars and then come up with sketches, concretizing them by modeling the solution in software and finally creating shop drawings to get the parts made out of plastic and aluminum. Getting a tangible result was very rewarding.
I further helped out by creating so-called "PC (Process Control) Forms" which act as both instructions for workers on how to perform a specific task, as well as checklists to later make sure the step was completed properly. This includes acts such as cleaning critical areas of swarf from previous operations, aligning security cameras or making sure all labels and stickers inside a train car are in the right place. This gave me some insight into all that goes into seemingly menial tasks and ensuring an error-free workflow.

Possibly the biggest contribution I was able to make to the company, however, was the introduction of a new technology to enable workers to easily prototype objects and even create new jigs in no time without relying on external companies for manufacturing: 3D printing.
What started off as a simple conversation between me and my supervisor about new manufacturing technologies resulted in my department ordering a small but powerful do-it-yourself kit for assembling a machine which, using a coil of thin plastic filament as the raw material and a heated nozzle to melt and extrude it, can print (almost) any desired shape onto a table below, layer by layer, building up a three-dimensional object as it progresses. While it cannot replace traditional metal machining, it is useful to quickly print "prototypes" to visualize an object better than just on the screen, and oftentimes is even useful to create actual usable parts where plastic is sufficient or metal would be overkill.
I was put in charge of the entire project from the start, from the assembly of the machine itself, getting acquainted with the control software, running tests and calibrating the various necessary parameters until usable parts could be printed. With the need for external makers (and the ensuing costs and hassle until the finished product) eliminated, we were now able to print many useful objects in a frame of minutes or hours compared to the days or weeks it would have taken via the traditional route.
However, since all this time I was the only person actually able to operate the machine, a need for training of other employees arose to ensure it could still be used after my return to Europe. A Japanese language operation manual was also missing completely. This represented a good opportunity to put my Japanese skills to use, both verbally while demonstrating the way to use the printer, and in written form for the manual.
Within the frame of a company training for selected employees I was asked to assist a fellow coworker during a half-day lecture on material mechanics, the idea being that I should explain the concepts of a script (handed to me beforehand) in English, to be followed by the same contents being repeated in Japanese to make sure everything was clear to the listeners. While the goal of this was for the "students" to hear the contents in two languages and help improve their English skills, it also served me to dive a bit deeper into technical Japanese and learn many new expressions and vocabulary one does not encounter in a regular language school. At the same time it helped me refresh my English knowledge as well, since all my mechanics courses in university had been in German. This short experience as a teacher also made me realize that simply understanding a concept does not automatically mean one will be able to explain and share this knowledge in a coherent manner, any language barriers aside. Teaching is also a skill that needs to be learned and developed through time and experience.
Even though the work at Hitachi was not exactly related to my specialization in university (robotics/mechatronics), it helped strengthen the basic skills every engineer requires and gave me a good feeling of applying knowledge in a practical way.

Work style and atmosphere

Getting the chance to work at Hitachi Kasado has given me the opportunity to gain a very good insight into how a Japanese company operates, how the employees work together to solve arising problems and how the quality of their product is ensured.

I felt very welcome immediately upon entering the Manufacturing Department, and the general atmosphere within the company and even within the office as always very good. My supervisor and everyone I met and talked to were willing to explain every aspect of their work, show me around and help me in any way possible. Upon learning about my studies and interests, my superiors tried their best to match the contents of the internship as good as possible to the needs and requirements set by my university.
Especially in the first weeks it was made sure that I got to visit every step in the production process so I had a better feeling of how the different parts came together. While most of the internship took place in the office, sometimes I was also allowed to join the blue-collar workers and (most often symbolically) participate and help out with a few chores to get a hands-on experience. This included tasks such as unrolling the arm-thick high voltage cables from their spool, fastening and checking a few bolts, or assisting my supervisor in performing checks in the half-finished cars looking for leftover debris from drilling operations, which might later damage other parts or cause trouble if it got into the electrical systems if not removed properly. I also participated in some exercises new employees have to go through to be allowed to perform certain work on the train, e.g. some basic training in soldering, wire cutting, crimping and routing.
Getting time to put on a helmet, visit the factories and walk underneath, inside or on top of the train cars in production was extremely helpful in later understanding topics discussed in conversations or meetings. Also, it made reading technical drawings much easier, since looking at them with an untrained eye revealed little more than a maze of lines and circles, but having seen the represented parts with my own eyes, the meaning of the diagrams was suddenly apparent.

As I continued to develop a better feeling of what goes on in the factory, I gained some sort of intuition on various topics that got discussed every day, like train models, specific work steps or technologies, and knew who to turn to in different situations such as borrowing a digital camera, receiving software assistance, getting parts made through cutting or welding, etc. This meant I gradually became less and less dependent on my supervisor, trying to limit inquiries as much as possible, so as not to cause too much trouble interrupting his busy work schedule.

A point that amazed me is the amount of time and effort that is put into ensuring an error-free production process. Every drawing and document includes multiple spaces for different parties to check, recheck and approve each action. There are gigantic stacks of folders documenting every single action performed on each train. And even relatively simple documents such as my weekly reports on the progress of my internship made a big loop inside the company, going from my immediate supervisor to the section manager, and then to at least two people in the HR department before taking the same path back to me, with the characteristic top row of red はんこ seals from everyone involved. Having never worked in a similar establishment in Europe though, it is not possible for me to compare between countries regarding the amount or importance of such checks.

Perhaps partly related to this custom is the feeling I had about most of the workers: Everyone at the factory seems to be very aware of how his or her work affects the complete manufacturing process, and it appeared as though everybody was well informed about what was going on in other areas as well.
Every time I was walking over the factory grounds with my supervisor, almost without fail people would approach him concerning all kinds of different information, questions or requests, and in the majority of cases he knew exactly what to do, who to refer to or when a specific thing would take place.

Each morning, before the start of work, the company anthem (この木何の木, also heard in TV commercials) would sound across the factory and through all offices via intercom, followed by a traditional piece of piano music to which all workers do a specific morning workout to stretch, bend and move the body and which lasts for approximately two minutes. Many Japanese companies appear to follow this practice, and everybody knows the song and exercise routine since childhood because it is also played at schools and other places. While I can imagine it being sort of frustrating to hear the same company song every morning (probably over the course forty years plus for some employees), I did like the idea of radio workout ラジオ体操 to wake up and do a bit of exercise before work.
After the workout, all Manufacturing Department workers would assemble in groups according to their teams and discuss the plans and announcements for the day. This was followed by a series of safety checks and motivational phrases (May this be another day withou 今日も０災で行こうヨシ！) and I believe this further strengthens the sense of responsibility and unitedness of the group.

Occasionally, I have also had the chance to deal with my colleagues outside the office environment. Every time a new employee entered our department, or someone changed their workplace to somewhere else, a welcome/farewell party was organized. This consisted of going to a nice restaurant or Izakaya 居酒屋 for dinner and a few drinks, and was usually followed by a more informal afterparty 二次会

where the people who did not have to return home too early spent a few more hours (and a few more yen) having beers or singing at a local カラオケ(karaoke).
During these 飲み会(drinking parties), I felt a strong feeling of companionship between everybody involved. The new people were warmly welcomed, and on at least one occasion the person who was leaving shed a tear recalling the time he had spent at our department, showing how much the experience had meant to him. It seems that, as the night progresses, the importance of rank vanishes and everyone has fun in a very relaxed and casual atmosphere. I enjoyed this kind of experience very much, however I believe that going out drinking with one's superiors in Europe is something pretty much unheard of and many people might consider it awkward or even inappropriate or risky.
Before coming to Japan, I had often heard that whatever happened at these gatherings was not mentioned again during work hours, but in my own experience the relationship between people in the office did change slightly for the better after each time, and I could joke and talk to people on a more personal level afterwards.

Conclusion

Even though this past year definitely had its ups and downs, and not every day during the internship held the same excitement as the one before, I will remember the time as a Vulcanus participant as a purely positive experience. I am truly thankful for having been given the opportunity to come in contact with a different culture so intimately. I am not yet decided as to what I will do after I graduate from university approximately a year from now, whether it might be a continuation of my studies in the form of a PhD or a jump into the job market. Whichever it may be, Vulcanus has opened up Japan as a realistic and exciting possibility for either, and I can picture myself returning to this country in the future in one way or another.
頑張ります！