


Interview with the inventors (Source: ITER Korea)

Interviews were conducted with four main inventors who obtained patents for their inventions while performing their work at the ITER Korea Domestic Agency, concerning the importance of invention and the story behind it.

	<p>Name: Shin Hyun-Kook</p> <p>Team: Power Supply Team, ITER Korea Domestic Agency</p> <p>Title of Invention: Stack Mount Jig</p>
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[Question] Introduction to patented invention (excellence, effectiveness)

- A. The invention is to fabricate the clamping stack mount jig as shown in Figure 1 to assist in assembling a stack including a thyristor, which is a semiconductor element used in a converter, to a bus-bar of a converter. The stack with the thyristor, which used to require three people to be manually assembled on the bus-bar of a converter in the past, now require only one person to be assembled, when Stack Mount Jig is used, reducing the time and manpower for assembly of Stack Mount, which is the important part of the work when it comes to fabrication of converters.

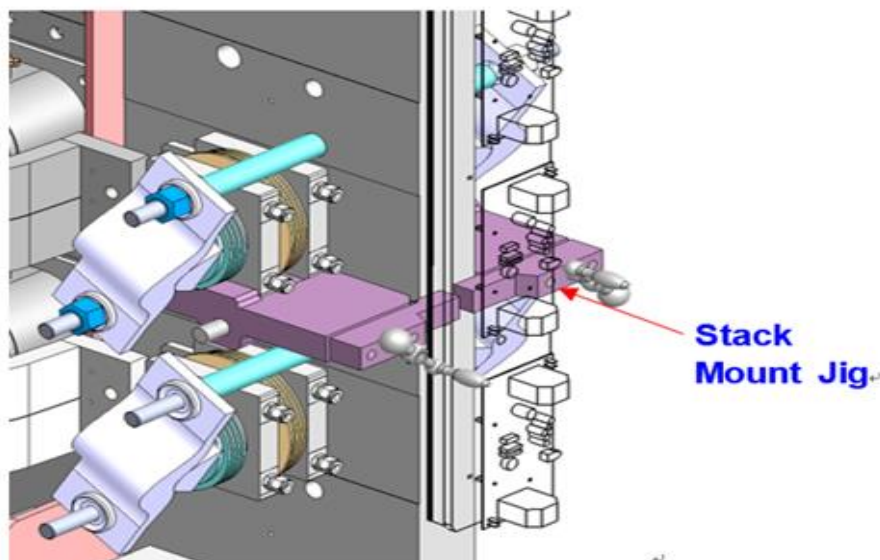


Figure 1. Schematic of using a stack mount jig to assemble a set of stacks onto a bus bar.

[Question] Was there any trigger or motive to start the invention? (Necessity, problem solving, etc.)

A. When assembling a thyristor as a power semiconductor device in a large-capacity power conversion device (Fig. 2), constant pressure must be applied to the aluminum bus bar. It is important that the stack be precisely positioned before it is attached to the bus bar since it is bundled with several components, such as thyristors, heat sinks, insulators, and clamps. However, the stack is composed of several independent heavy parts and the spacing between the stacks is so close that it is difficult to attach them to the correct position of the bus bar. The weight of the stack is about 10 kg per side, therefore, as a result, it took three people and a lot of time to install a set of stacks in front of and behind the bus bar of the converter. The converter of ITER for superconducting power supply is significantly large as shown below and the number of stacks is quite big and in addition, the number of converters to be manufactured has reached several tens of units. For this reason, improvement of the working method was indispensable.

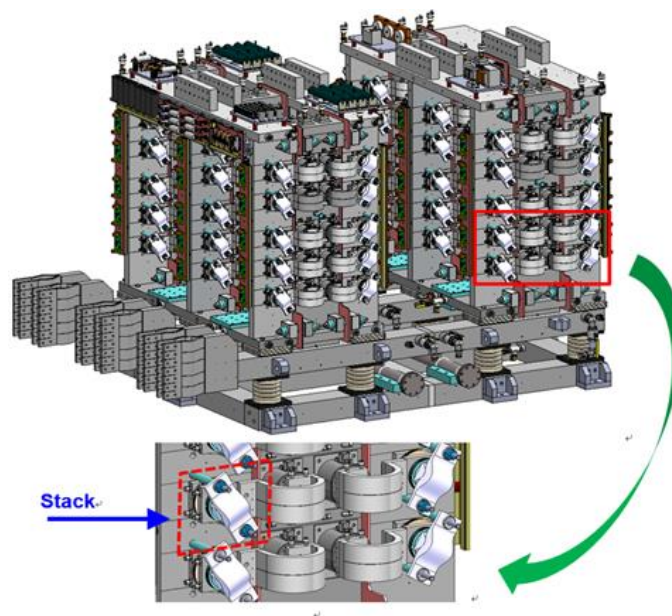


Figure 2. Stack including large-capacity power converter and thyristor

[Question] What inspires your invention and what is your aspiration for the future?

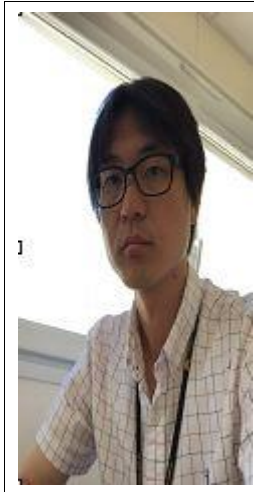
A. The invention was driven by the necessity of developing a tool for reducing the required work force and simplifying the working method.

[Question] What were the challenges (difficulties) or stories behind your invention?

A. Due to lack of experience with the invention of the work tool, I had to go through a lot of revision and improvement processes for representation of my invention or description about the work process.

[Question] Was there compensation for the invention? (If not, what reward would you like?)

A. There was none. Realistic level of encouragement for inventions is needed.

	<p>Name: Cheon Mun-Seong</p> <p>Team: Diagnosis and Control Tech Team, ITER Korea Domestic Agency</p> <p>Title of Invention:</p> <ol style="list-style-type: none"> 1. Carousel-Type Sample Transfer Machine for Pneumatic Transfer System of Neutron Activation System 2. Automatic Sample Loading Machine for Pneumatic Transfer System of Neutron Activation System
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[Question] Introduction to patented invention (excellence, effectiveness)

A. The Neutron Activation System (NAS) is the most direct and accurate diagnostic system for measuring the fusion power of ITER. The device is based on the technology of transferring a light sample of about 1 gram to the irradiation stations adjacent to the plasma using a pneumatic method and then passing the neutron irradiated specimen back to a counting station. The patented invention relates to a technique for allowing a pneumatic transfer system of the NAS to operate efficiently in a special environment of the ITER.

[Question] Was there any trigger or motive to start the invention? (Necessity, problem solving, etc.)

A. Since the tokamak area changes to the high radiation environment during the ITER plasma operation, the NAS specimen transporting device or measuring device must be remotely placed far away from the tokamak. As a result, a high-pneumatic conveying system is required to effectively transfer the specimen to the desired position. (Patent 1) In addition, since the gas itself transporting the specimen may contain a minute amount of radioactive material, a technique was also required to load the specimen from the outside to the transfer device while minimizing leakage of such material. (Patent 2) The patented invention is a technology for solving the above-mentioned two problems.

[Question] What inspires your invention and what is your aspiration for the future?

A. Whenever the inspiration related to the invention comes up, I try to discuss as much as possible with the co-inventors such as fellow researchers. I think the more we discuss, the more refined the simple and coarse idea gets to be formed as a specific technology, and in the following steps, the only way to success is to go through trials and errors through production and experimentation. I am currently working on the ITER NAS design. Our ambition is to derive the most efficient and stable design.

[Question] What were the challenges (difficulties) or stories behind your invention?

A. It was not necessarily a challenge or difficulty, but the most memorable time was when the prototype for KSTAR made using this patented technology successfully operated and obtained the first diagnostic data and I was delighted in the KSTAR main control room.

[Question] Was there compensation for the invention? (If not, what reward would you like?)

A. As I mentioned above, I think that pleasure I obtained through successful acquisition of measurement data was the greatest reward as a diagnostic researcher.



Name: Dang Jeong-Jeung

Affiliation: Seoul National University

Title of Invention: **Pneumatic transfer apparatus providing position tracking function and position tracking method using the same apparatus**

[Question] Introduction to patented invention (excellence, effectiveness)

A. The invention is intended to prevent accidents that might occur during the transportation of the transport apparatus of the ITER NAS diagnostic device, by tracking the location of the transport apparatus at all times and in the event of an accident. Without the need for additional location-tracking equipment, it is a simple and excellent method to analyze the signal of the flowmeter provided in the transfer system and keep track of the position at all times and the location of the accident. I also developed a location tracking method using sound waves in order to cope with situations where highly precise position tracking is required after an accident. This is also a way to increase the precision of location tracking, with the added benefit of dispensing with the need for expensive or complex equipment. These two methods can be used complementarily, and I believe that this invention can effectively track the position of the transport vehicle.

[Question] Was there any trigger or motive to start the invention? (Necessity, problem solving, etc.)

A. While conducting researches on ITER NAS diagnosis device with the ITER KODA, I came to learn that the transport of the transport vehicle and the diagnosis at the correct location shall be confirmed to ensure accuracy of neutron diagnosis and stable operation of the NAS. In this way, I was able to undertake inventions to keep track of the position of the transport vehicle at all times, to confirm the normal operation of the NAS, and to help to cope with accidents properly.

[Question] What inspires your invention and what is your aspiration for the future?

A. I am not involved in any separate activities to inspire inventions. However, I think that interesting results can come out when I try to actively solve engineering problems that may occur while conducting researches. I am currently working at the Korea Atomic Energy Research Institute,


and I would like to make a contribution to the nuclear energy field including fusion, even though it may be small.

[Question] What were the challenges (difficulties) or stories behind your invention?

A. Research on the method of tracking the position of the transport vehicle was very different from the previous researches I had been engaged in at the lab of my graduate school and therefore it was a very interesting topic for our lab members. It was not a textbook-like research based on my knowledge on my major, but rather, it was an interesting study in which everyone from the professor to the youngest members of the lab freely come up with and share ideas. I would like to take this opportunity to thank Professor Hwang Yong-Seok and my colleagues of the lab for helping me, and Dr. Cheon Moon-Seong and Division Director Lee Hyun-Gon of the ITER for sharing my thoughts and challenges.

[Question] Was there compensation for the invention? (If not, what reward would you like?)

A. There was no particular reward for the invention. However, it was a precious experience for me to submit ideas, conduct demonstration tests, apply for a patent, and have it registered as a student at that time. I think that my experience at that time is very important to me as a person having a career as a researcher. I think it's a very good reward for me.

	<p>Name: Suh Jae-Hak</p> <p>Team: Power Supply Team, ITER Korea Domestic Agency</p> <p>Title of Invention: Power convertor</p>
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[Question] Introduction to patented invention (excellence, effectiveness)

A. The present invention relates to a power converter. This includes AC bus bar, DC bus bar, and a number of switching devices mounted on the AC bus bar, the DC bus bar, and the DC bus bar which are fixed on the upper part of the insulators aligned on top of the base frame placed on the ground. It makes it easy to control the current balance between the devices and prevents temperature from rising due to induction phenomenon. Furthermore, it improves resistance and strength of the structure, facilitating cooling, and reducing the required number of parts, and consequently achieving efficient use of space and cost reduction.

[Question] Was there any trigger or motive to start the invention? (Necessity, problem solving, etc.)

A. There has been no case of manufacturing and applying this in the industry and I had to develop this device under the constraint on the space for installation. Because of this, I was able to devise a possible method considering electrical performance, possibility of production, maintenance and reparability.

[Question] What inspires your invention and what is your aspiration for the future?

A. When I look at anything or when I see things made by others, I always think ‘Why did they do like that? Do they have to do like that? Is there any other way? I would do it this way if I did the same thing.’ The invention was possible thanks to this way of thinking.

[Question] What were the challenges (difficulties) or stories behind your invention?

A. I had to take a lot into consideration, thinking for a long time to be convinced that this method is right and there is no other way because it is costly and time consuming to make the device and test it to see if the performance is made as intended. It was made with the efforts of my fellow researchers at the ITER Korea Domestic Agency and Dawonsis who worked together with me, and when I got the results as expected, everyone could have confidence that we can do it.

[Question] Was there compensation for the invention? (If not, what reward would you like?)

A. If the ITER Project turns out to be a success, there is nothing more to be desired and I am satisfied that the ITER Korea Domestic Agency has achieved this result.