



Activity of National Institute of Technology, Fukushima College

Human resources training on the decommissioning of nuclear power plant, based on study for graduation
- Interdisciplinary challenge from Fukushima -

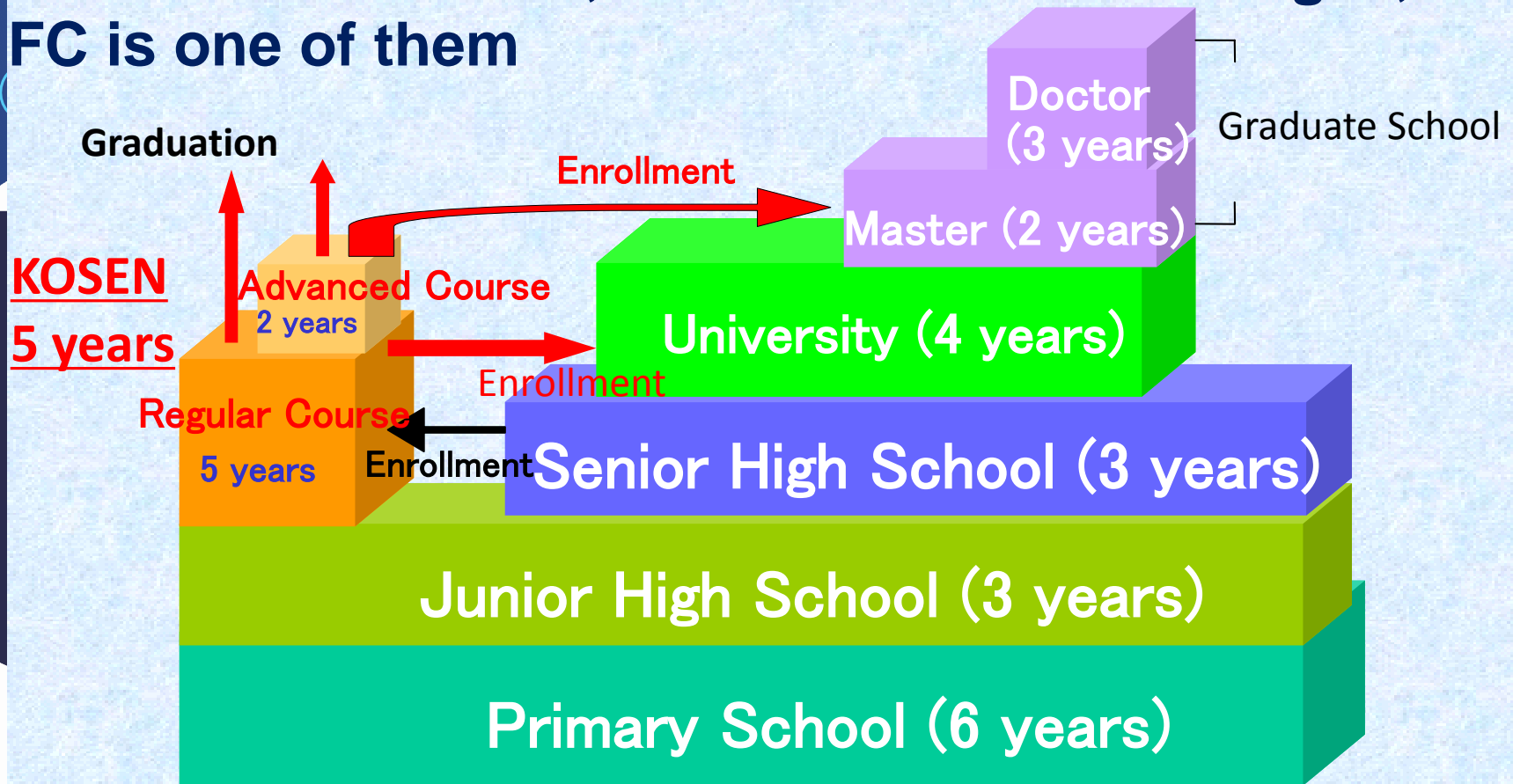
National Institute of Technology, Fukushima College
Shigekazu SUZUKI



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- Nuclear Decommissioning Network of the National Institute of Technology
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National Institute of Technology (KOSEN) was established in 1962, Total number: 51 Colleges, NIT-FC is one of them



Outline of Fukushima KOSEN

Department (Number of Students)

Mechanical Engineering (200) --- 40/each year

Electrical Engineering (200)

Chemistry and Biochemistry (200)

Civil Engineering (200)

Communication and Information Science (200)

Advanced Course (Number of students)

System Engineering for Industrial Technology (32)

Business Communication (8)

Special Course for Regional Rehabilitation (10)

Number of Staffs (As of April 1, 2016)

President	1	Research associate	7
Professors	30	Special appointed professors	4
Associate professors	36	Subtotal of professors	81
Assistant professors	3	Administrative staffs	44
		Total	125

ACADEMIC SUBJECT

Department of Mechanical Engineering

The department of Mechanical Engineering aims to train students to become engineers who will be able to cope with the development of science and technology in the various fields of industry.

The department of Mechanical Engineering welcomes students who:

- ① have strong interest in manufacturing machinery such as robots and automobiles
- ② have a desire to study the mechanisms of machinery and related technologies in great depth
- ③ are interested in technologies that are both useful to humans and environment-friendly



Department of Electrical Engineering

In this department, students study basic subjects essential to electrical, electronics and information engineers. The curriculum is arranged around three major fields of study: electric power systems, electronics, and information processing.

The department of Electrical Engineering welcomes students who:

- ① are capable of engaging in teamwork to undertake experiments related to electricity, electronics and manufacturing
- ② are interested in designing, building and operating electronic circuits and computer programs
- ③ wish to become the kind of engineers that build infrastructure such as electricity, communication and information technology



Department of Chemistry and Biochemistry

The aim of the curriculum of the Department of Chemistry and Biochemistry is the training of materials engineers who will be able to play an active role in a wide range of fields from the chemical, pharmaceutical to food industries, which develop and produce various functional, electrical and electronics industries.

The department of Chemistry and Biochemistry welcomes students who:

- ① wish to become engineers capable of manipulating substances at the molecule-atom level
- ② have a strong interest in new materials and biotechnologies
- ③ wish to contribute to the resolution of environmental problems by applying their knowledge and skills in chemistry



Department of Civil Engineering

The department of Civil Engineering aims to promote 'suitable development' and foundation of infrastructure elements which will allow society to coexist in 'symbiosis' with all living things. A variety of subjects relating to the environment have been newly added to existing civil engineering courses.

The department of Civil Engineering welcomes students who:

- ① are interested in construction technologies for roads, bridges, ports and lifelines
- ② place importance on ensuring harmony between urban planning and natural environment
- ③ wish to contribute to the development of local communities through construction technologies



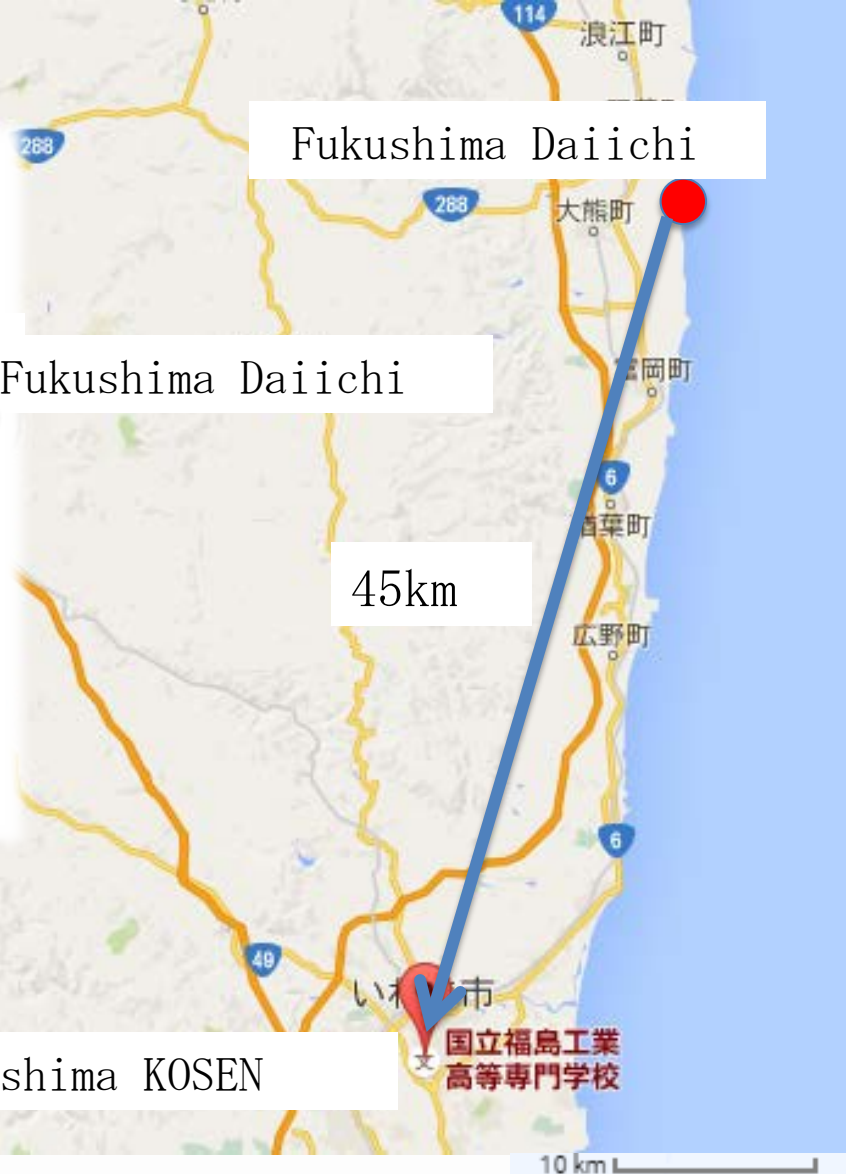
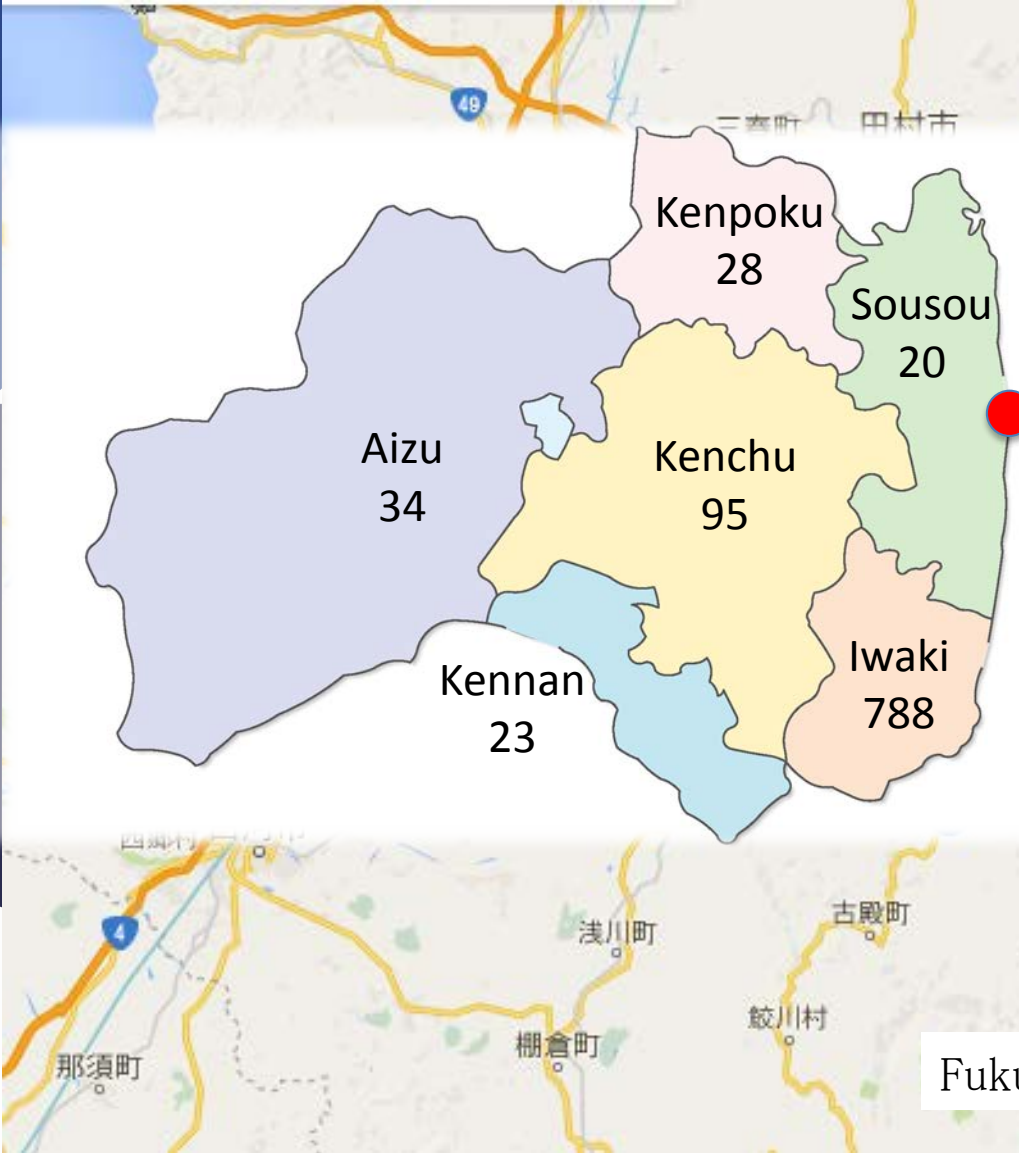
Communication and Information Science


Aspiring to train human resources capable of thriving in the business sector, The Department of Communication and Information Sciences conducts research and provides education in business, English, information and other fields related to communication sciences.

The department of Communication and Information Science welcomes students who:

- ① have a broad interest in the mechanism and movements of society and economy
- ② wish to acquire a higher level of ability in foreign languages to take an active part in international society at large
- ③ wish to acquire information technology and contribute to industrial society





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The Nuclear Decommissioning Network of the KOSEN

The Nuclear Decommissioning Network of KOSEN

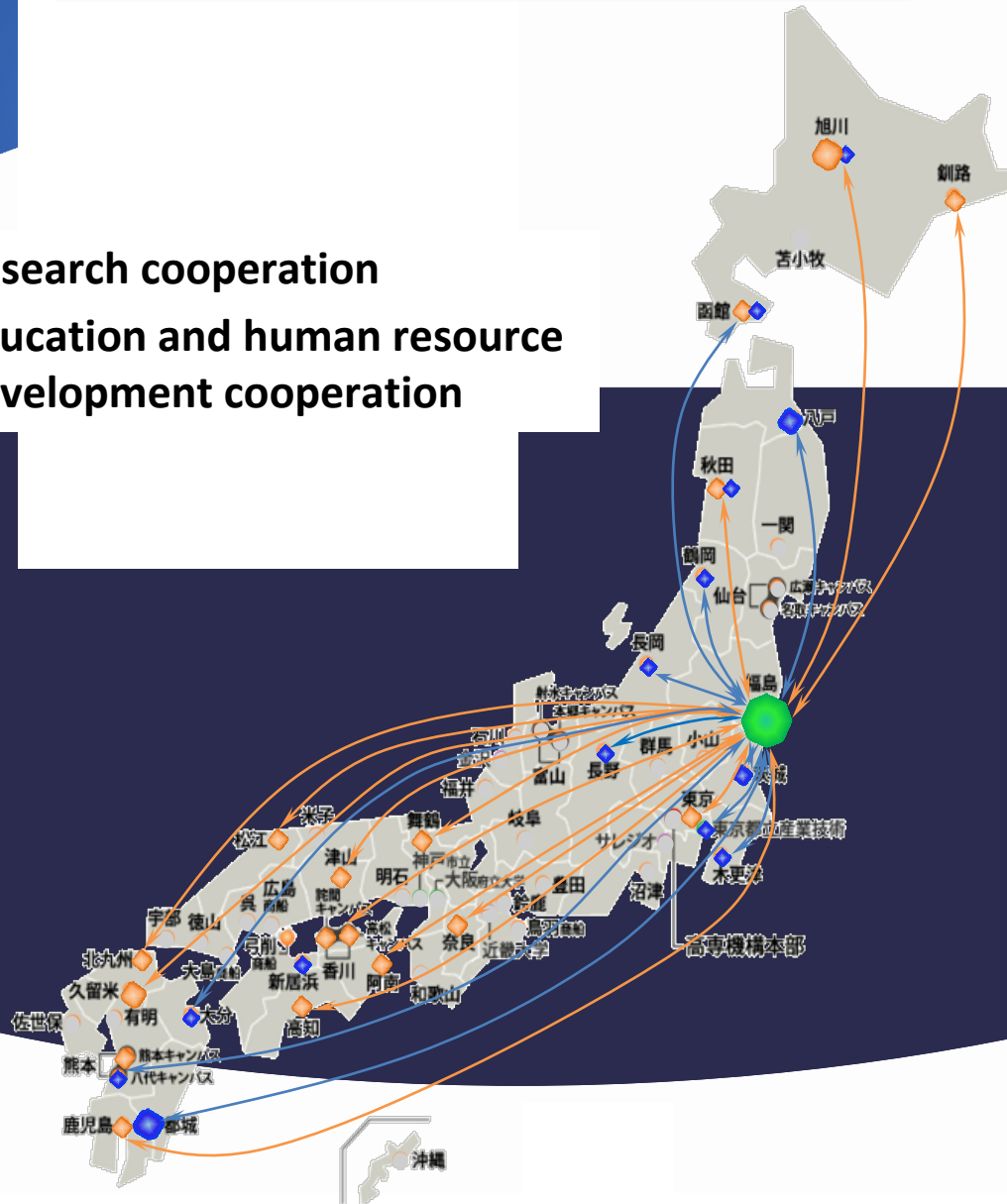
- **Project** : Basis research and human resource development, such as for the nuclear power plant decommissioning
- **Member** : President and professor of the KOSEN, professor of University and academic experts of an industry related to nuclear power, which was agreed for the purpose of the consortium
- **Chairman** : Nakamura president of Fukushima KOSEN
- **Secretariat** : Fukushima KOSEN


	Number of organizations	Number of enrollees	Number of president
KOSEN	31	67	20
University	9	6	
Company	5	11	
Municipality	2	2	
Total	47	86	20

As of
October 2016

Cooperation KOSEN List

- Research cooperation
- Education and human resource development cooperation



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Education program on decommissioning

Course on “Decommissioning Technology”

elective subject

5th grade: **Nuclear accidents**,
Graduation researches

4th grade : **Reactor decommissioning**,
Internship

3rd grade: **Decommissioning and the Society**,
• **Robotics for decommissioning**

• 2nd grade: **Radiation and radioactivity**

• 1st grade: **Nuclear power plants**

Mechanical Engineering
Electrical Engineering
Chemistry and Biochemistry
Civil/Environmental Engineering
Business Communication

Robotics at
Fukushima-Daiichi

Basics on radiation
and radioactivity

Basics for
Nuclear power
plants

2015

- 3rd grade: (Decommissioning and the Society) 60 students
- 4th grade: (Reactor decommissioning) 10 students

2016

- 2nd grade: (Radiation and radioactivity) 63 students
- 3rd grade: (Robotics for decommissioning) 96 students
- 3rd grade: (Decommissioning and the Society) 71 students
- 4th grade: (Reactor decommissioning) 36 students

total 266 students

Visit JAEA Naraha Remote Technology Development Center

Visit JAEA Fukushima Environmental Safety Center

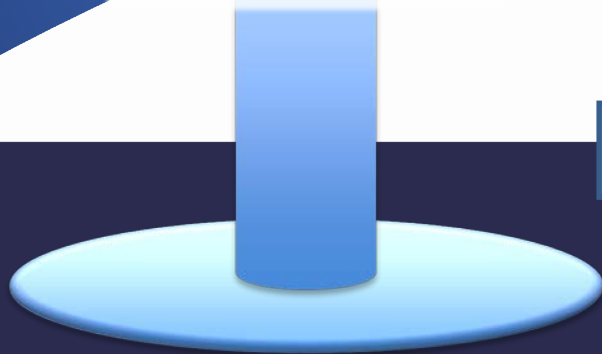
Temporary storage area tour, Radiation measurement practice, Lecture

Important to see the site directly

A complex type internship

- A complex type cooperation experience learning with KOSEN, companies and local governments -

Work experience
at a company



Usual internship

- Improvement of professional knowledge
- Understanding of company activities

Work experience
at a company

+

Work experience
at a local government



Complex type internship

- Improvement of professional knowledge
- Understanding of company activities
- +
- Understanding of local government activities
- Communication with local citizens

Engineer of training which has a **compound eye** and the **public communication skills**

Decommissioning-related internship

2015

- Tokyo Power Technology (Radiochemical analysis, 2 students)
- KURION (Contaminated water treatment, Robot, 4 students)
→9/14 Lecture, 9/20~27 Technical training (USA, Richland, Denver)
- JAEA (4 students)
- University of TOKYO Uppsala summer school (Sweden, 2 students)
- University of TOKYO Tokai summer school (2 students)

Decommissioning-related internship

2016

- University of TOKYO International summer school
(USA, Richland-PNNL/KURION, Huston-NASA, 2 students)
- University of TOKYO Naraha summer school (2 students)
- Decommissioning technology Study at KURION
(Tritium removal, 1 students)
- Fukushima Daiichi Nuclear Power Station (5 students)
Fukushima KOSEN (2 students)
Tsuruoka KOSEN (Yamagata, 2 students)
Niihama KOSEN (Ehime, 1 student)
- Iwaki city Nuclear Power Division (2 students,)
- KOSEN International Summer School
(USA, Richland/Hanford B reactor, Silicon Valley)
Fukushima KOSEN (1 student)
Ibaraki KOSEN (Ibaraki, 2 students)
Kagawa KOSEN (Kagawa, 2 students)
Kitakyushu KOSEN (Fukuoka, 1 student)
- JAEA (4 students)



Complex type
internship

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KOSEN International Summer School

KOSEN International Summer School

- Competition in cooperation KOSEN
- 8 students applicants
- **6 students selected** by evaluation of the report

Schedule

September 18 (Sunday)

- Visit to America
- Study on the history of Hanford (The Reach museum)

September 19 (Monday)

- Hanford site B Reactor tour
 - **Interviewed by the DOE PR division**
- Study on the PNNL

Research and development decontamination and environmental recovery, Public involvement

- Decommissioning technology Study at KURION
 - Glassification, Remote control, Tritium removal**

The Reach museum

Description from the volunteer



Hanford and the Cold War Arms Race

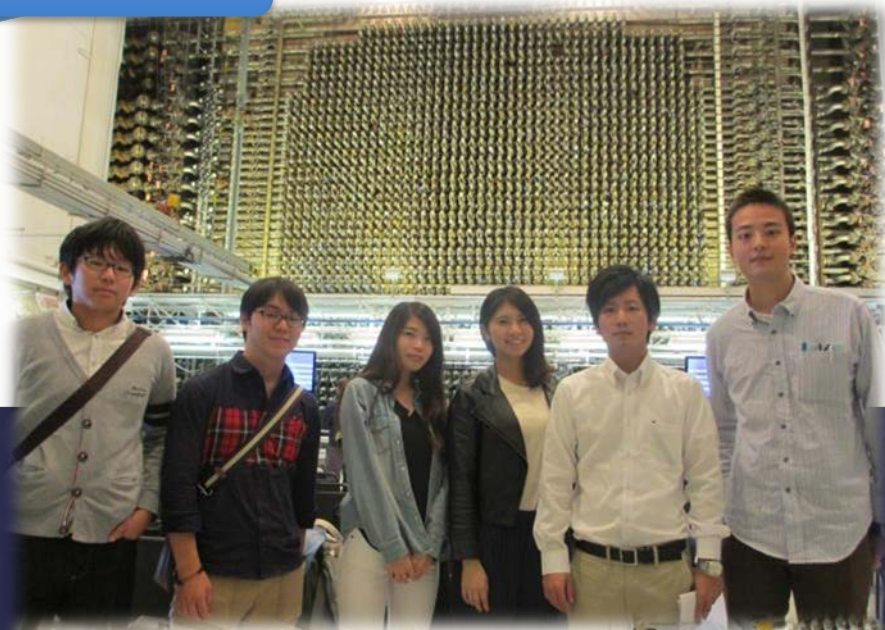


As the Cold War began the United States faced a new strategic threat in the rise of the Soviet nuclear weapons program. In August 1949 the Hanford Works announced funding for the construction of two new weapons reactors and research leading to the development of a new chemical separations process. With this announcement Hanford entered a new phase of expansions.

By 1963, the Hanford Site was home to nine nuclear reactors, along the Columbia River, five reprocessing plants on the central plateau, and more than 900 support buildings and radiological laboratories around the site. Extensive modifications and upgrades were made to the original three World War II reactors, and a total of 177 underground waste tanks were built. Hanford was at its peak production from 1956 to 1965. Over the entire 40 years of operations, the site produced about 63 short tons (571) of plutonium, supplying the majority of the 60,000 weapons in the U.S. arsenal.



B Reactor tour



Interviewed by the DOE PR division



National Park Service
U.S. Department of the Interior
U.S. Department of Energy



B Reactor

Manhattan Project
National Historical Park

Description of PNNL



Classification technology study



Contaminated water treatment technology study



KOSEN International Summer School

September 20 (Tuesday)

- Move from Richland to Silicon Valley
- Create a presentation
- Interaction with entrepreneurs

September 21 (Wednesday)

- Stanford University tour
- Create a presentation
- Presentation (Interviewed by Nikkei)

September 22 (Thursday)

- Move from Silicon Valley to Narita

Progress report




Nikkei newspaper reporter

KURION Vice president



Students Summary

- It was very interesting to be able to tour the facility for the war that the Hanford Site.
- **Decontamination and decommissioning, waste disposal could be re-confirmed that the world is the scale of the problem.**
- The first time the United States Travels was able to feel the difference of culture with Japan.
- I hope that a problem about the atomic energy is resolved quickly

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Creative Robot Contest for Decommissioning

The outline of the contest implementation

Name: The 1st Creative Robot Contest for Decommissioning

Time: Saturday December 3rd, 2016

Place: JAEA Naraha Remote Technology Development Center

Organizers:

Ministry of Education, Culture, Sports, Science and Technology

Decommissioning human resource development consortium

Auspices: METI, NDF, IRID, Japan Science and Technology Agency

Fukushima pref., Iwaki city, Hirono town, Naraha town

JAEA

Supporters: IHI, ATOX, Joban Engineering

Secretariat: National Institute of Technology, Fukushima College

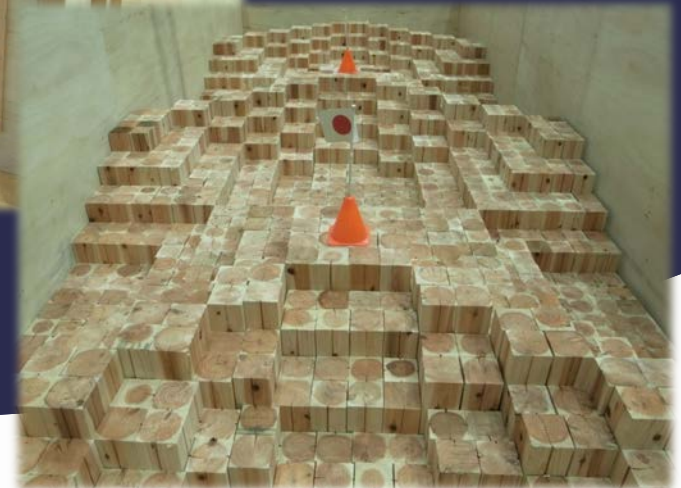
Administrator:

The executive committee of Creative Robot Contest for
Decommissioning

Environment of the Field

Each team selects a field from the two options below with the assumption that it is the Fukushima Daiichi site.

1. Mock up stairs
2. Step Field



Environment of the Field

- Complete darkness
- Impossibility to see the robot body directly while operating it remotely
- Radio wave does not reach because there is a thick wall of concrete
- There is a limit for the control of cameras and semi-conduct instruments due to the influence of strong radiation

Tasks for the Robots

(Mock-up Stairs)

- Carry 5kg object from 1st floor to 2nd floor and return to the original position on 1st floor
- Detect an unknown object on 2nd floor
- Others related to the tasks for decommissioning

(Step Field)

- Detect the shape, the area and the up-and-down of step field
- Detect an unknown object which is set in the field
- Others related to the tasks for decommissioning

Number of the Participants

- 15 teams
- 11 colleges of National Institute of Technology
 - Hakodate (Hokkaido, 2 teams), Asahikawa (Hokkaido)
 - Sendai (Miyagi, 2 teams), Fukushima (Fukushima)
 - Tokyo (Tokyo), Toyama (Toyama)
 - Maizuru (Kyoto), Nara (Nara)
 - Kouchi (Kouchi), Kitakyushu (Fukuoka)
 - Kumamoto (Kumamoto)
- 1 Tokyo Metropolitan College of Industrial Technology (Metropolitan KOSEN)
- 1 Osaka Prefecture University College of Technology (Osaka Prefecture KOSEN)

Naraha Summer School

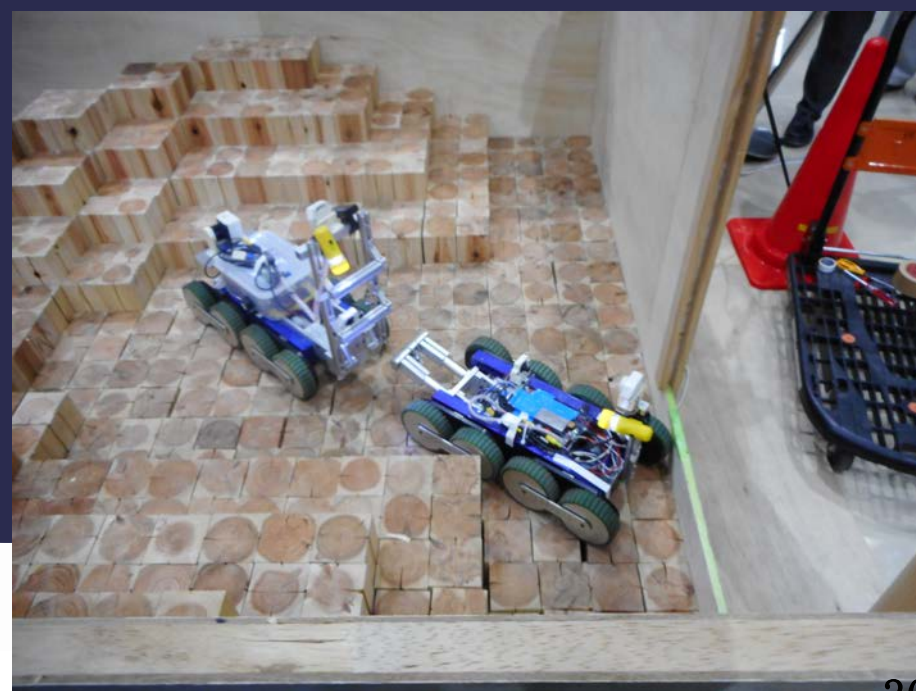
- September 1st : Visit Fukushima Daiichi
- September 2nd : Study of decommissioning at Naraha Remote Technique Development Center



J village



company cafeteria of TEPCO 1F



Summary

- With a mission to Fukushima revival, technology grows up with a person through a technical challenge, and the safe abolished furnace work of the Fukushima Daiichi advances by continuing developing
- Specialty and ability of overlook the whole
- Flexibility to think about plural scenarios
- Ability to cooperate across the field
- Challenge mind and the executive ability

I want to educate the student who learned the ability mentioned above continuously

Thank you for your attention

