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Kumagai Gumi Co., Ltd.
Sumitomo Forestry Co., Ltd.
KYC Machine Industry Co., Ltd.
KATO WORKS CO., LTD.

Signing of a Collaborative Research Contract with JAXA

Research on the labor saving introduced by the automation of forestry machinery systems (use of forestry machinery systems on the moon's surface)

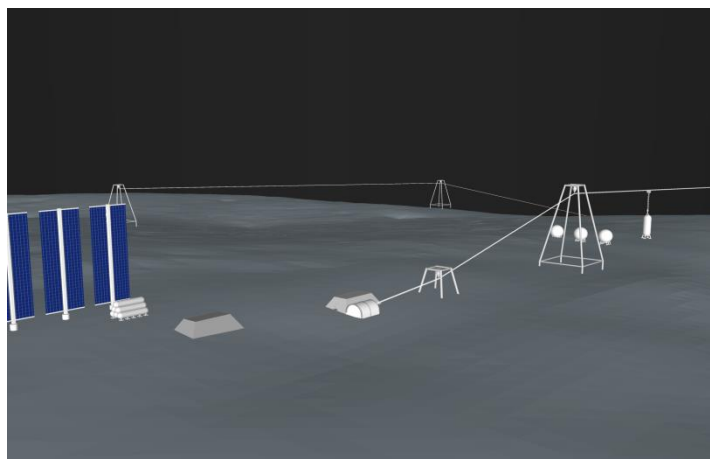
Sumitomo Forestry Co., Ltd. (President and Representative Director: Akira Ichikawa; Headquarters: Chiyoda-ku, Tokyo; hereinafter Sumitomo Forestry), Kumagai Gumi Co., Ltd. (President: Yasunori Sakurano; Headquarters: Shinjuku-ku, Tokyo), KYC Machine Industry Co., Ltd. (President: Masatoshi Naokawa; Headquarters: Chuo-ku, Osaka) and KATO WORKS CO., LTD. (President: Kimiyasu Kato; Headquarters: Shinagawa-ku, Tokyo), (hereinafter "this Group") announced that a collaborative research contract on the "Research on the labor saving introduced by the automation of forestry machinery systems (use of forestry machinery systems on the moon's surface)" has been signed with the Japan Aerospace Exploration Agency (hereafter "JAXA").

This collaborative research was chosen in the selection process of research proposals for the JAXA Space Exploration, Innovation Hub Center.

1. Collaborative research overview

The JAXA Space Exploration, Innovation Hub Center is not only for limited development or specialized space exploration—its objectives include the future application of study results in space exploration and the creation of technologies that have actual application in industrialization and so on, on earth.

In this collaborative research, by combining the "forestry technology" of Sumitomo Forestry, the "full automated construction technology" of Kumagai Gumi, the "plant provisional engineering" of KYC Machine Industry, together with the "domestic top share wheel winch technology" of KATO WORKS, it aims for the industrialization of the forestry field on earth, by devising an unmanned and fully automated aerial wiring collecting system. Furthermore, there will be research into and development of a useful transportation system to facilitate transportation and installation, etc., of structures and



Transportation image of the application of the aerial wiring collecting system on the moon's surface

materials on the moon's surface.

2. Contents of the collaborative research

(1) What is the "aerial wiring collecting system"?

The aerial wiring collecting system is a method of transporting the logged timber to the collection point by safely hanging it up a ropeway-like structure made by stretching a wire-rope in the air temporarily.

Compared to the vehicular collection (road net collection), considering that there is no need to build a work road, and that it is possible to build a system that is tailored to the steep mountain terrain, this system offers a higher versatility while being environmentally friendlier. Also, with the structure being simple, there is a lower likelihood of a breakdown, making for a stable use.

(2) What is the "full automated construction technology"?

The full automated construction technology allows for, in areas where it is dangerous to enter, such disaster-stricken areas, remote operation of construction machinery from a safe place in order to proceed with construction while assuring the safety of the construction workers. In recent years, thanks to the development of assistance systems the efficiency of automated operation is steadily increasing.

(3) Regarding the aerial wiring collecting system, unmanned and fully automated

1) Research background

The aerial wiring collecting system is fit for the complex terrains of forests in Japan, but on the other hand, it deals with the issues of the aging of the workers and the shortage of successors. Moreover, the existing aerial wiring collecting system has a limit to the improvement of the productivity, and the development of a more efficient system is desirable. Therefore, by introducing into the aerial wiring system the full automated construction technology, we plan to improve the work environment and increase the productivity by carrying out automated and labor saving collection.

2) Main contents of the research

Presently, the power of the winch used on the aerial collection is manually operated through the engine. With this research we aim at rendering remote control possible and moreover at the realization of automated operation, by introducing the full automated construction technology, and by devising electric powering.

3) The application of the aerial wiring collection system on the moon's surface

On the moon's surface, where in addition to the complex terrains there also is a harsh superficial environment, it is possible to make the most use of the advantages of an unmanned and fully automated aerial collection system. In particular, on the moon's surface where, contrary to the earth's, the heat exchange is difficult, by applying an

aerial collection system in which the source of power is anchored, and the suspended load is easily transferred it is possible to implement a stable and reiterative transportation operation.

In this collaborative research with JAXA, by making the most use of the advantages of the aerial wiring collecting system unmanned and fully automated, a useful transportation system to facilitate transportation and installation, etc., of structures and materials on the moon's surface, will be developed.

Main advantages of adopting an aerial wiring collection system on the moon's surface

- Ability to cope with complex terrains and wide areas
- Simple structure diminishes the risks of breakdown and makes for easy repair
- The power source is fixed in place, and does not use fossil fuels
- Ability to operate while ensuring safety, distanced from the harsh and dangerous workplace

3. The efforts in common problem solving in forestry and space exploration

In this collaborative research we will work on solving the common problems of forestry and space exploration through the aerial wiring collecting system, unmanned and fully automated.

As space exploration takes place in unique surroundings that differ for the earth's surface, ensuring the safety of the workers, as well as the improvement of work efficiency through labor saving is a great issue. Additionally a static point activity like a manned base on the moon's surface has advantages in a fixed broad area transportation system.

Of the Japanese forests, the majority of the forest plantations from after the war are approaching harvest, for the preservation of the forests a rotation utilization is in place, and there is a need to carry out proper maintenance such as thinning. However in forestry of our country there are issues such as low production condition, aging of forestry workers and a labor shortage, together with intensification of forestry (Note 1) and the maintenance of road net (Note 2), there has been a delay in the introduction and use of an efficient work system, that we hope to resolve with the assistance of this project.

(Note 1) Reforestation, nurturing, harvesting, etc., the series of artificial actions put in practice in order to cultivate the forests

(Note 2) The public roads, forest roads, auxiliary logging roads and those combined with them, used in order to put in place efficiently the forestry's reforestation, nurturing, timber production etc.

This is a collaborative research with JAXA Space Exploration, Innovation Hub Center which has received the project support for building the innovation hub by the Japan Science and Technology Agency (JST)