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## **Mitsubishi Electric Develops High-speed Algorithms for Optimization**

*Formulations and high-speed calculation methods for improving system performance*

**TOKYO, February 13, 2014** – [Mitsubishi Electric Corporation](#) (TOKYO: 6503) announced today its development of advanced optimization algorithms and high-speed calculation methods aimed at optimizing the performance of three practical systems: laser-processing machines for high-speed cutting of sheet metal using the shortest possible trajectories, moon probes achieved with minimized fuel consumption, and particle beam therapies for prompt medical treatments.

The algorithms and high-speed calculation methods make it possible to solve optimization problems that otherwise necessitate the use of calculations that are exceedingly complicated and require unacceptably long periods of time to complete, along with other constraints.

In the case of laser-processing machines, the new series machines with automatic trajectory generation enable cutting time to be reduced 45% compared to conventional machines. The first system was shipped to a customer in November 2012.

For moon probes, Mitsubishi Electric's new algorithm optimizes earth, moon and probe gravity computations to cut fuel consumption by 10% or more. As a result, the weight of a probe's scientific payload could be at least doubled, a huge benefit that the company is now considering putting into a proposal for a Japanese lunar probe planned for later in this decade.

The third algorithm is designed to provide doctors with a faster and better planning tool for particle beam therapies. At present, determining a therapy requires extensive calculation time, requiring doctors to taking at least one night to check a plan. The practical application of the algorithm for medical therapy is still being considered and has not been approved by the US Food and Drug Administration yet.

Optimization is the process of finding the best solution under various constraints. In industry, optimization problems occur both during product development and practical usage. Needs for optimization are rising in response to the increasing diversity and complexity of products, but the time required to arrive at optimal answers can make application of the technology impractical. Methods for high-speed calculation are urgently required to expand the practical use of optimization technology.

Mitsubishi Electric has been developing a high-speed calculation algorithm, called Parallel Quadratic Programming (PQP), for quadratic optimization, a typical problem for which such technology is useful. PQP can arrive at a solution 1,000 times faster than conventional methods. Additionally, it is suited to multi-core processors, reducing calculation time in inverse proportion to the number of cores. In practical terms, this means, for example, that PQP can be used to optimize the process of determining an ideal particle beam therapy for a patient in a relatively short period of time.

Going forward, Mitsubishi Electric will continue to research optimization problems from basic theory to commercial use, aiming at developing algorithms for formulations and high-speed calculations with possibilities for practical application.

### **Patents**

Pending patents for the technology announced in this news release number six in Japan and eight abroad.

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### **About Mitsubishi Electric Corporation**

With over 90 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of 3,567.1 billion yen (US\$ 37.9 billion\*) in the fiscal year ended March 31, 2013. For more information visit <http://www.MitsubishiElectric.com>

\*At an exchange rate of 94 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2013