Steel Arched Support Erection Robot

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Fall of loosened rock at the tunnel face is an industrial incident specific to mountain tunnels, and cases of such disaster are most heard of when erecting steel arched supports. To prevent such incidents, there is a need to combine and conduct measures such as suppressing the loosening of ground, predicting rock fall, and safety measures to protect workers. These measures are taken to reduce disaster rates, but they are not fundamental resolutions. If workers did not have to work at the tunnel face, such incidents would not happen in the first place.

With such understanding, we developed the "steel arched support erection robot", which allows workers to install steel arched supports in mountain tunnels without stepping into the tunnel face area.

The robot consists of the "support location navigation system" including an automatic tracking total station, a "high-grade erector" that can make fine adjustments to the support position, and "steel arched supports for automatic erection" that does not need bolt and nut fastening. This system allows machines to do the work humans were doing at the tunnel face, namely measurement and adjusting support positions. As machines grip onto the steel supports while applying shotcrete, the worker can stay in the operator's seat to conduct highly accurate support erection. This system requires only one operator to erect supports, and with no humans working right beneath the tunnel face, safety and productivity is boosted greatly.

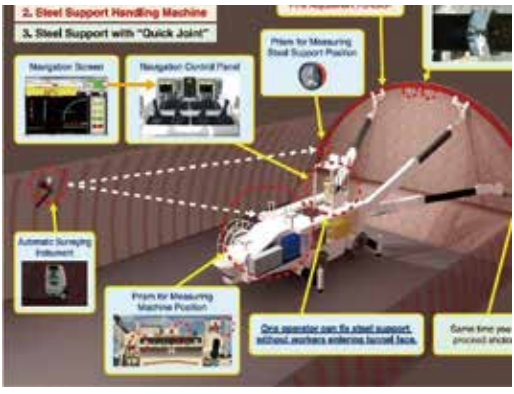

Fig. 1 Summary of Technology

Fig. 2 Photo from the Front of a Support Erecting Robot