

Improvements of Danger Experience Education Based on Actual Disasters

Member company	Nippon Steel Stainless Steel Corporation
Category	Safety training and/or skills development to reduce the number of safety incidents

The Challenge

For safety education, not only teaching knowledge in the classroom, but also sensory education that allows us to actually experience the danger is effective. At the Yamaguchi Works of NIPPON STEEL Stainless Steel Corporation, in addition to the general danger experience facilities where you can experience the dangers such as getting caught in rolls, we have developed our own facility where we can analyse the actual accidents and experience them. Furthermore we also hold monthly training to experience past accidents, which is effective in improving the sense of hazard.

As an example, we will detail the facility that allows you to experience the dangers of the work roll replacement of the Sendzimir mill.

Why?

Replacing the work roll of the Sendzimir mill is an operation of manually pulling out and pushing the roll on the table roll of the roll carriage, and is frequently performed. The roll speed is low due to human power, but the inertial force is high due to the large roll weight. As a result, an accident occurred in which a finger was caught between the roll that was pulled out by oneself and the next roll (Photo 1).

The existing danger experience facility was designed mainly for accidents

involving mechanical power, and it was very effective for experiencing 'the power of machine is bigger than we imagine'. However, we did not anticipate that such a serious accident could occur even when workers use their own power to move the rolls. From this accident, it seemed that there was a limit to the education of sensitivity to danger only with the conventional danger experience facilities. Therefore, education was examined that is to discover the lacking sensitivities to the dangers and to strengthen them by experience through not only general accidents but also the accidents that actually occurred at the Works.



Photo 1 Roll replacement operation for Sendzimir mill

Needed Action

From this point of view, we developed our own facility to enhance the sensitivity of inertial force during manual roll replacement and introduced it to the Danger Experience Training Center (Photo 2).

As with the actual roll replacement, heavy objects can be manually moved on the table roll, and the inertial force can be felt by breaking the steel can. The trainees were surprised that the cans were easily crushed even at a small manual speed,

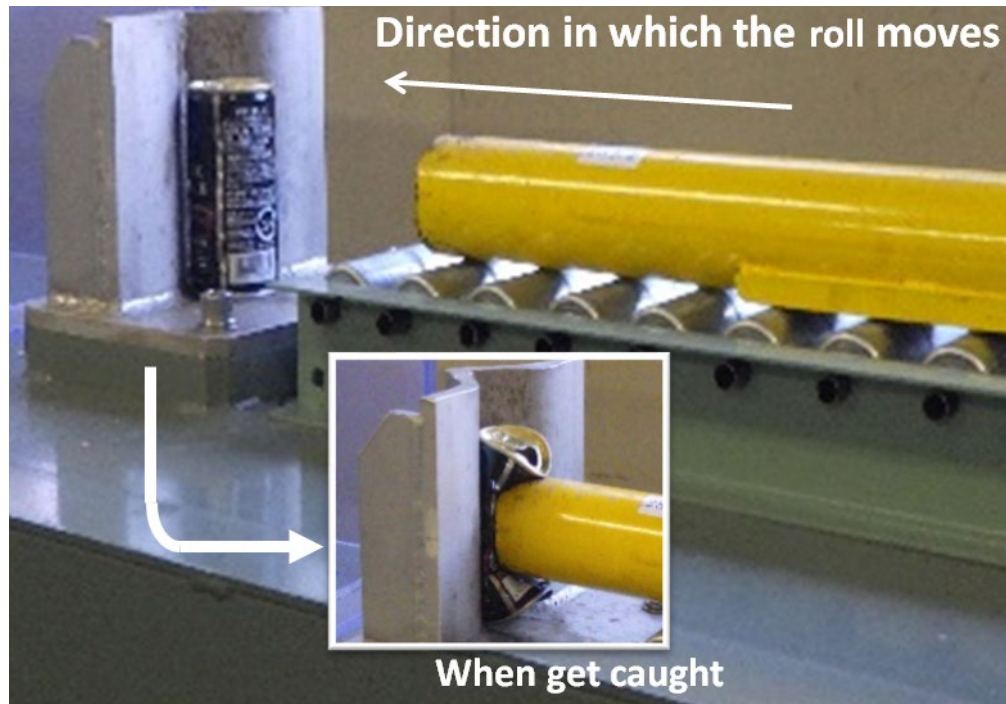


Photo 2 Inertial force experience facility when replacing rolls
(Experience of inertial force using a steel can)

and were able to improve their sensitivity to this work (Photo 2). In addition, information on the accidents analysed is posted near the device to introduce the seriousness of this inertial force.

Action Review

Specific; Trainees can easily understand the danger because the facility is designed by analyzing the accidents that actually occurred and can intuitively simulate the danger.

Measurable; We worked with the goal of zero accidents when replacing rolls.

Achievable; By performing in conjunction with a change of the roll replacement procedure, it considered achievable.

Realistic; Through this activity, the operator's sensibility was improved by being able to experience the large inertial force of heavy objects even at low speeds manually. As a result, not only was the risk prediction activity activated, but it also led to a change in the working procedure.

Time-bound; Danger experience education for all trainees has been completed as planned, and since then, zero accidents have been continued when changing rolls.

Target Beneficiaries from the Action

At the Yamaguchi Works, there are five Sendzimir mills that we change their rolls manually. Furthermore, since there are various operations of moving heavy objects at low speed such as sampling or handling paper rolls, this danger experience training is meaningful for almost all operations at the Works including subcontractors.

Horizontal Expansion Capability

Since the Sendzimir rolling mill is a standard facility in stainless rolling mills and manual roll replacement is common, there are many such operations inside and outside the company, and it is considered possible to deploy horizontally. Also, by expanding the scope to operation that moves heavy objects at low speed,

it can be deployed in almost all workplaces.

Outcome

After the completion of the facility, danger experience training has been conducted for all staffs and no accidents have occurred during roll replacement. In particular, by making this training annual mandatory program for new employees, accidents at a young age can be prevented. By analysing past accidents in the same way, a facility for experiencing cuts with edge of the strip was added.

Currently, the Yamaguchi Works' Danger Experience Center has five danger experience facilities and a danger experience room that utilizes VR, which is being used to educate new employees and mid-career employees. In addition to the facilities, we also hold monthly hands-on programs to experience accidents that have occurred in the past, which helps to improve the sensitivity of danger (Photo 3).



Panoramic view of experience training



Experience of suspended load height and necessary avoidance distance



Experience of the inertial force of a large bobbin



Experience of protective clothing when operating the disconnector for high-voltage work



Experience of the sparks at height place working



Experience of the instability of the crane suspended load

Photo 3 Monthly hands-on programs to experience accidents