

# Practical Use of SST Equipment

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## Abstract

Shinagawa has developed a new generation of slide gate valve equipment called ‘SST’ for flow control at steel plants. It is a very simple mechanism because of an unique automatic surface load system. SV equipment of the ‘SST’ type is in practical use.

This paper presents details of this new generation of SV equipment.

## 1. Introduction

Slide gate valve equipment (aka SV equipment) controls the flow of molten steel and is used at steel plants. It is an important system, because it influences steel quality and productivity. SV equipment controls the flow of molten steel with a moving slide plate that is face pressure loaded. The slide plate is moved by hydraulic or electric cylinders.

Recently, an automatic surface load system using the thrust of an actuator is becoming popular in order to decrease the workload. Shinagawa has already developed automatic surface load SV equipment of the ‘SAT’ type.

Furthermore, Shinagawa has developed a new type of SV equipment, the ‘SST’ type.<sup>1)</sup>

The number of parts in the ‘SST’ SV equipment is significantly less than that of the ‘SAT’ type, and operation of ‘SST’ SV equipment is simple. The ‘SST’ has been improved and used in actual plants according to the results of tests.

This paper presents the details of this new generation of SV equipment.

## 2. Features

### 2. 1 Improvement of refractory exchange work

Both the ‘SAT’ and ‘SST’ types are automatic surface load system SV equipment. Fig. 1 shows a comparison of the face pressure release process of the ‘SAT’ and ‘SST’

types. In the case of the earlier model ‘SAT’ type, when the face pressure is released to replace the plates, the operator has to move the slide plate to a fully closed position after cleaning up the inside of the nozzle hole with

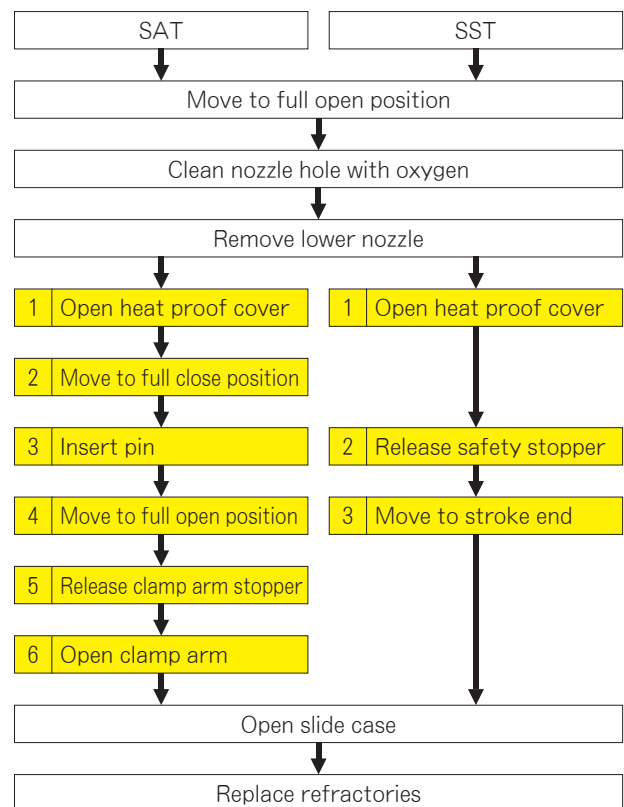


Fig. 1 Flowchart of face pressure release in SAT and SST.

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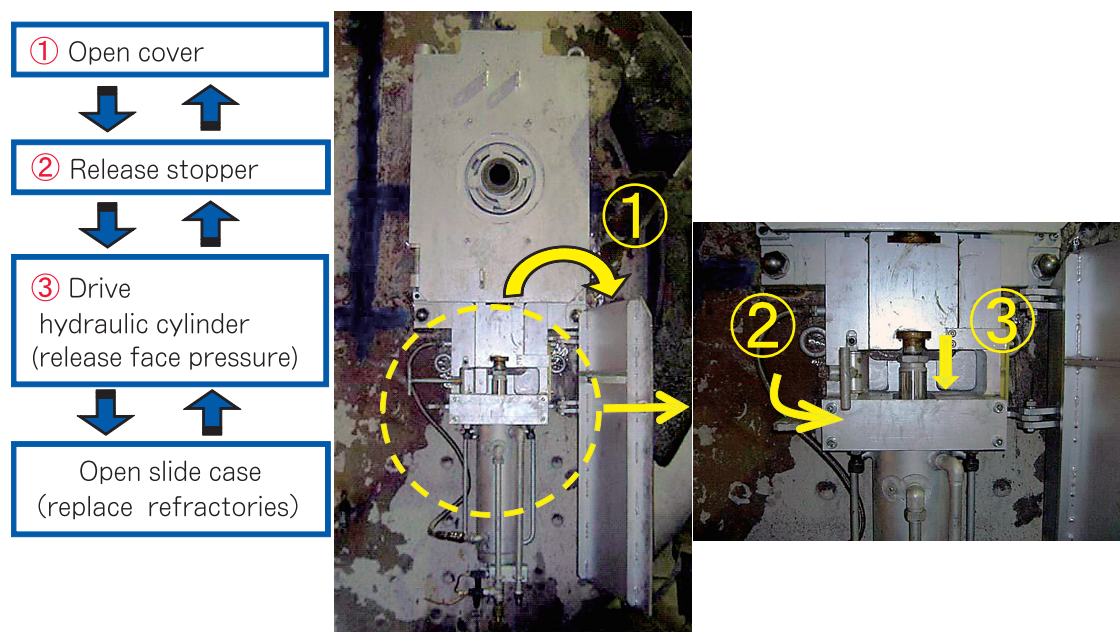


Fig. 2 Procedure of release face pressure.

oxygen at the fully opened position, then insert a pin, and move the slide plate to a fully opened position again. Afterwards, the slide case is opened by disengaging the clamp arm to release the stopper.

On the other hand, in the case of the latest model 'SST', it is possible to release the face pressure by moving the slide plate only several tens mm after turning the safety stop device through an angle of 90 degrees. Fig. 2 shows the procedure for releasing the face pressure during production.

## 2. 2 Reduction of component parts

Fig. 3 and 4 show the structures of the 'SAT' and 'SST' types. The 'SST' type consists of approximately 50% less component parts than the 'SAT' type. This was realized by eliminating the need for a clamp, clamp arm and rod to release the face pressure of the main parts of the 'SAT' type. The reduction of the number of component parts contributes not only to lower cost of the SV equipment itself but also to reducing maintenance costs.

## 2. 3 Optimum shape of plate bricks

Plate bricks are shaped to an optimum compact size based on thermal stress analysis. And plate bricks are fixed by a unique fixation method. Fig. 5 shows the fixation method. As a result, the plates can be used without trouble, contributing to a reduction in costs.

## 3. Past Results and Machine Type

SV equipment of the 'SST' type has been used by some customers for over two years. Shinagawa has received favorable reviews from many customers. At present, SV equipment of the 'SST' type has been used at five companies. And, conventional SV equipment will be further changed to the 'SST' type.

Machine types include ① two-plates type, ② three-plates type (Fig. 6) and ③ cylinder position at top or bottom. Shinagawa has designed several machine types to adapt to customer's operational requirements, and received favorable reviews from many customers.

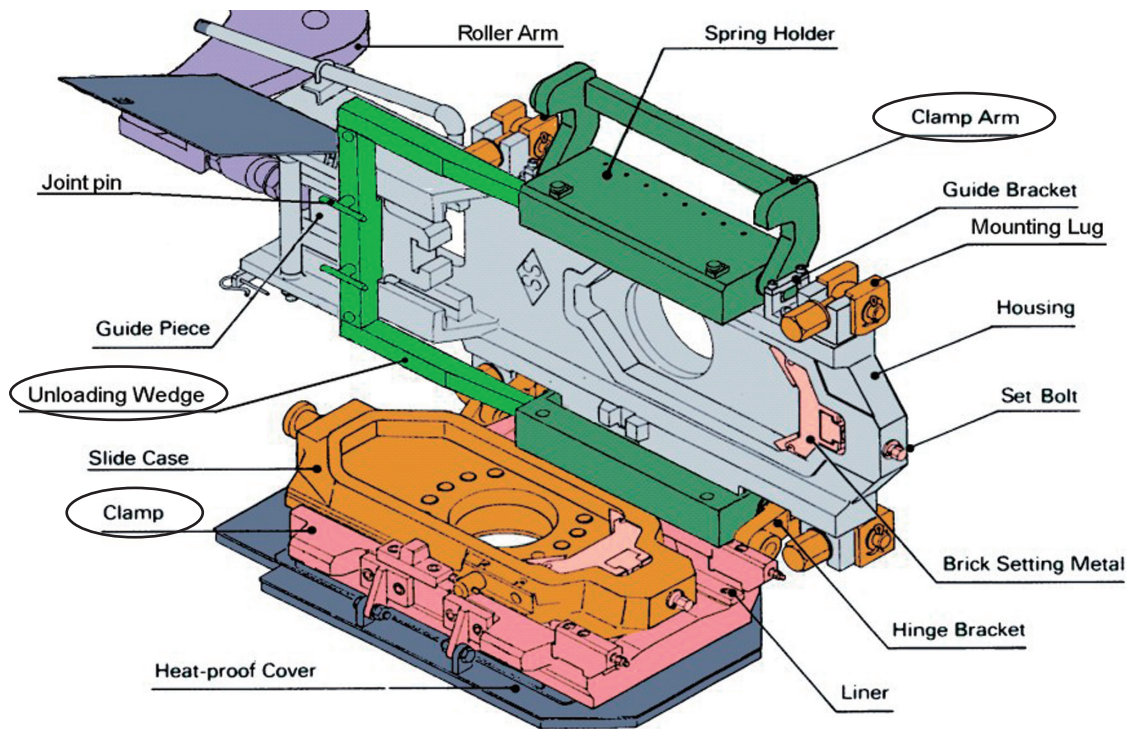


Fig. 3 Structure of SAT.

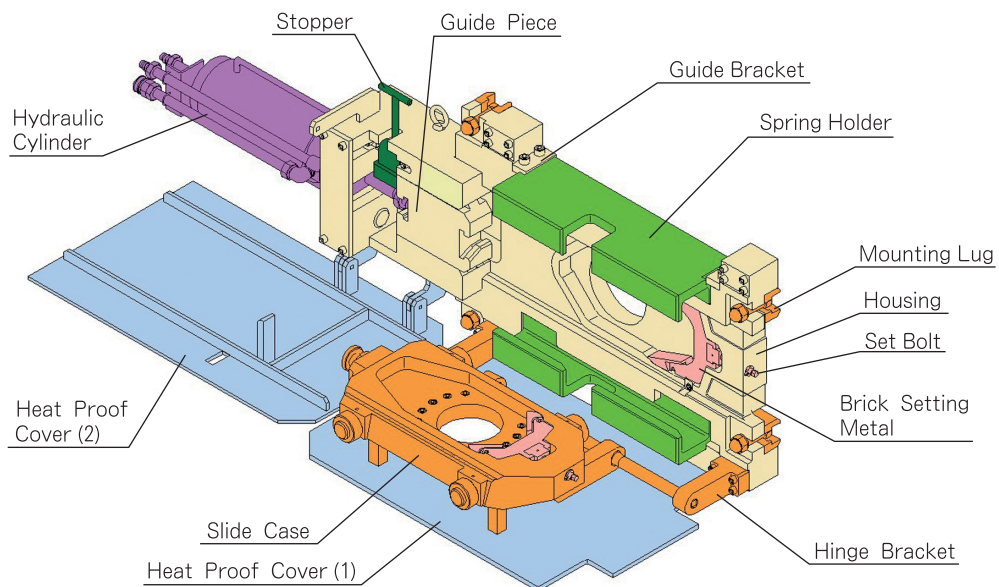


Fig. 4 Structure of SST.

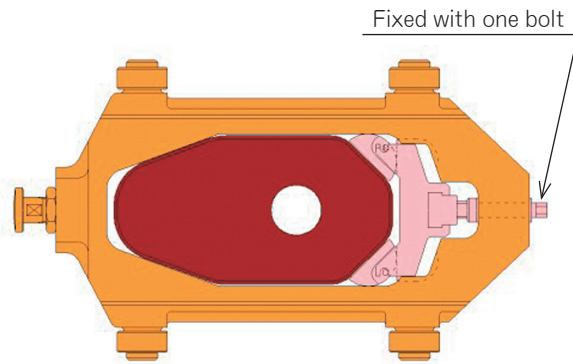


Fig. 5 Fixation method.

#### 4. Conclusion

The new 'SST' SV equipment has improved exchange operation of refractory bricks, decreased refractory brick exchange workload, and has achieved a reduction in SV equipment cost, by adopting a simple method for face pressure loading and reducing component parts. The 'SST' has been improved, and safety and reliability have been enhanced through the results of the tests.

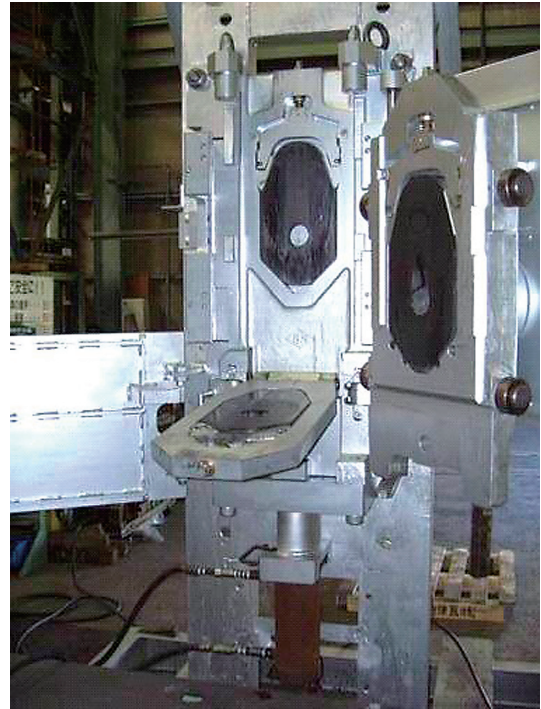


Fig. 6 Three-plates model of SST.

#### Reference

- 1) K. Mitsui, M. Osada, H. Morii ; Shinagawa Technical Report, 49, 51-54 (2006)