

# Large Size Jointless Monoblock Refractory Lining for Throat Area of RH Degassers

Noritaka HASHIMOTO<sup>\*1</sup>Toshiaki NISHIKADO<sup>\*2</sup>

## Abstract

A newly developed large size jointless monoblock refractory lining for the throat of RH degassers was investigated. This new technology eliminates red hot temperature on the outer shell surface, which is caused by steel penetration into the joint. Thus, the large size jointless monoblock throat allows to operate stably.

## 1. Introduction

The RH degasser is a steel refining vessel equipped with two snorkels, which are immersed in the molten steel in the steel ladle. While the refractory linings of the throat are worn by steel abrasion as well as chemical corrosion, considerably large wear is observed at the joint section since the throat are complex and composed of a large number of parts which have been assembled together utilizing refractory mortar. Hence, we developed the large size jointless monoblock throat. The large size

jointless monoblock throat has shown excellent performance in commercial applications.

## 2. Features

In general, the throat is manufactured by combining bricks of various shapes. Thus, it has many joints in both the horizontal and circumferential directions as shown in Fig. 1. On the contrary, as can be seen in Figs. 2 and 3, no joint is required with the large size jointless monoblock. Moreover, the high accuracy of its geometrical dimensions is ensured by a numerically controlled

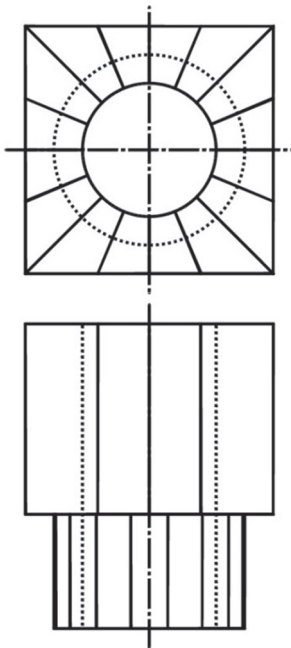


Fig. 1 Conventional type throat.

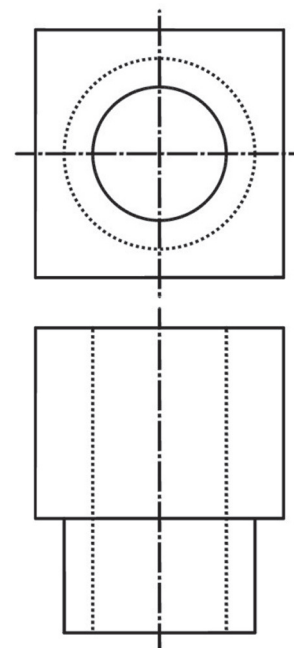


Fig. 2 Monoblock type throat.

\* 1 Managing Engineer, Technical Group, Okayama Works

\* 2 General Manager, No. 4 Sales Dept., Himeji Sales Office

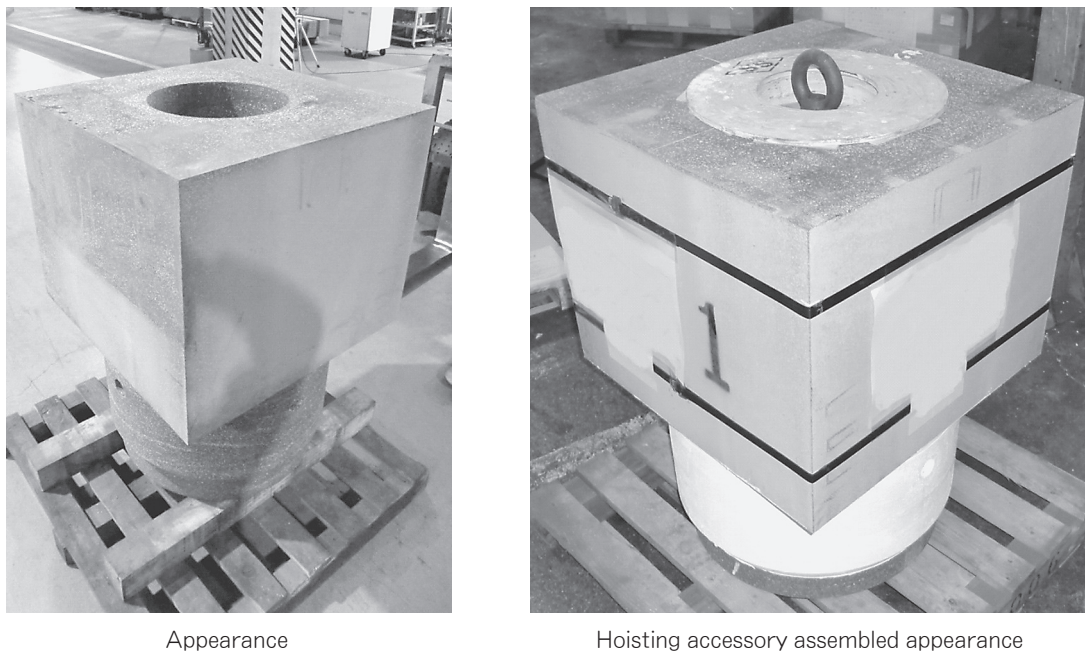


Fig. 3 Monoblock type throat.

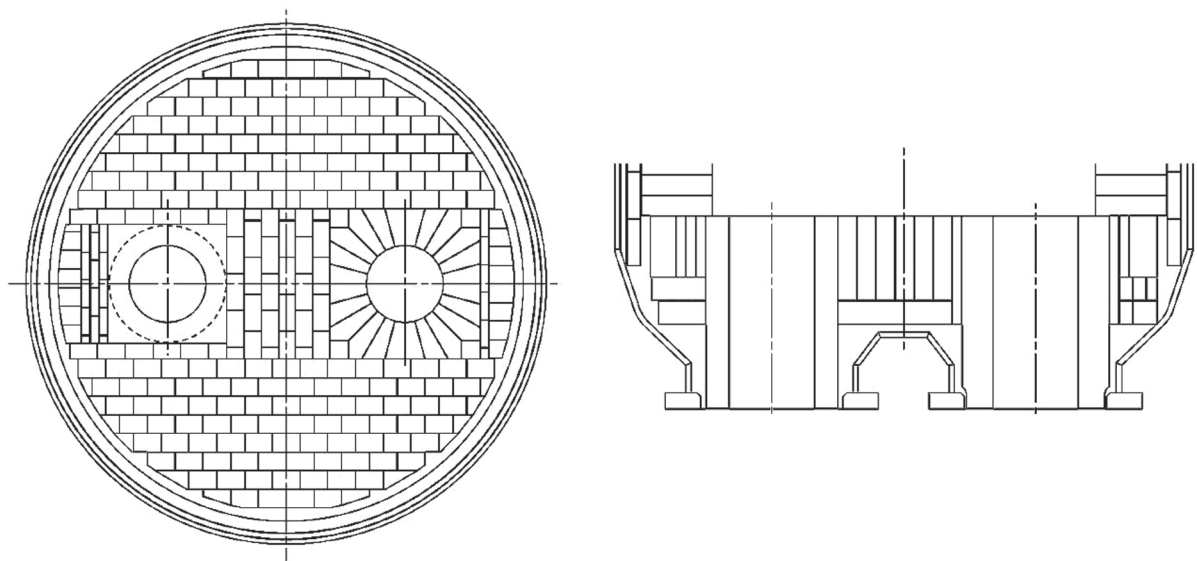


Fig. 4 Structure used for actual test.

machining process. Needless to say, it is tough against the mechanical stress induced by shell deformation because of its structural unity. The maximum capable size is 650mm×650mm×900mm in height.

### 3. Field Test

The advantage of the developed large size jointless

monoblock throat was validated by comparing the developed type with a conventional one, installed under the same vessel at the same time (See Fig. 4). In order to evaluate accurately, they were used as equal number of times as up-leg throats and down-leg throats. Fig. 5 shows the wear profile of the throats after the field test. Obviously, larger corrosion was recognized in the conventional

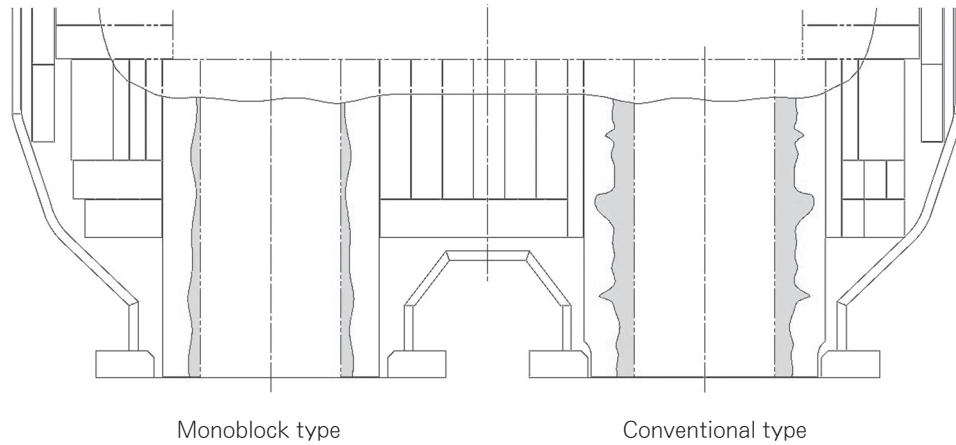


Fig. 5 Wear profile of throat after use.

one particularly around the joint part. On the other hand, the developed throat showed a smooth worn surface with a 30% reduction in wear volume.

#### 4. Actual Achievement

We have already supplied more than 100 monoblock throats. An application of this new throat eliminated

the need for irregular repairs that had been required because of red hot temperature on the shell surface. No penetration of molten steel through the joints and/or the construction element breakage, which had been induced by shell deformation, occurred. Our customers have been satisfied with the performance because it attributes to stable vessel operation.