<Attachment>

Overview of Development of the Superheated Steam High Speed Dryer

1. Development framework

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2. Specifications of the newly developed product

Fig. 1: Appearance of newly developed product

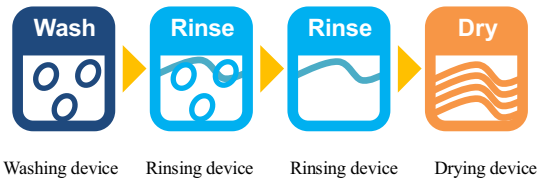


Fig. 2. Devices included in washing equipment

Table 1. Specifications of newly developed product

Item	Units	Newly Developed Product
Model	-	SSD-303
Exterior dimensions	Width x Depth x Height mm	606 × 1,360 × 1,010
Capacity	L	20
Power requirements	kW	20
Basket dimensions	Width x Depth x Height mm	220 × 320 × 250
Steam volume	kg/h	7
Superheated steam temperature	°C	200 - 250
Installation area (incl. boiler)	Width x Depth mm	800 × 1,900
Power specs	—	AC200V three-phase

3. Development considerations

(1) Development challenges

♦ Drying time constraints

The actual cycle time of washing equipment in a plant is about 3 minutes, so it was necessary to make the time required for drying with the newly developed product within 3 minutes.

♦ Drying of parts with complex shapes

Drying moisture from parts with complex shapes sometimes took from 10 minutes to 1 hour. Specifically, water in holes like those shown in Fig. 3 and in crevices like those shown in Fig. 4 took longer to dry.

♦ Even distribution of steam

When drying moisture, the steam sometimes did not reach every corner of the drying compartment and some parts were left undried. It was therefore necessary to distribute the steam evenly through the drying compartment.

♦ Temperature loss inside the dryer from opening and closing the lid

During the actual drying process, the lid is repeatedly opened and closed, and parts are put in and taken out. When the lid is opened, the temperature inside the drying compartment momentarily drops, and the drying capability decreases. There was therefore a need to quickly increase the temperature of the drying compartment after the lid was closed.

Fig. 3. Parts with holes

Fig. 4. Part with inset sections

(2) Techniques of the newly developed product

<1> Use of superheated steam

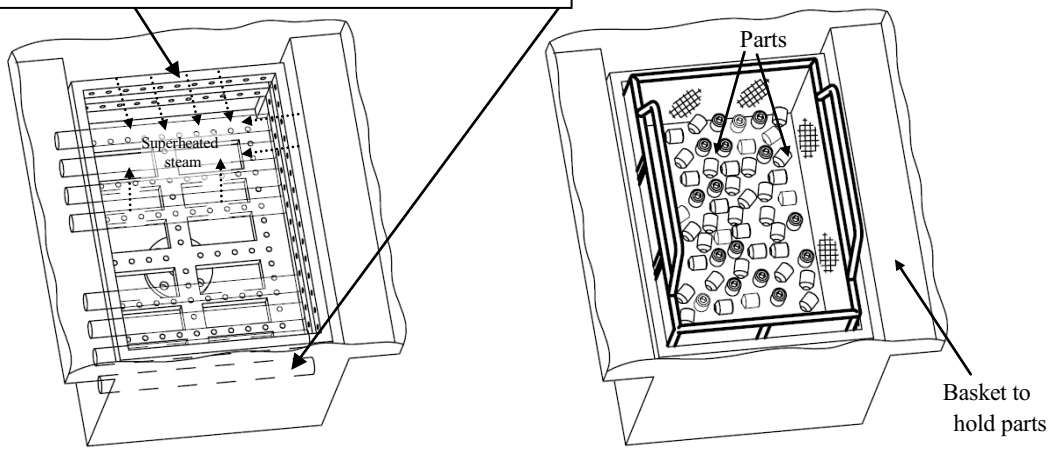
♦ Has 5-10 times the heating capacity of regular hot air, enabling high-speed drying within 3 minutes.

<2> Optimization of the construction

♦ Superheated steam is released from a box-shaped pipe and is blown evenly across the machine parts, eliminating uneven drying.

<3> Electric heater

♦ Even if there is a momentary drop in temperature when the lid is open to take out dried parts and put in wet ones, an electric heater quickly applies heat to maintain the drying capacity.



<1> When not holding parts **<2> When holding parts**

Fig. 5. Structure of the newly developed product