

## **Taikisha Developed the High-Concentration Model VOC Concentrator, “Admat Z” - Improvement of the concentration ratio, and reduction of running cost have been realized -**

Taikisha Ltd. (headquarters: Nishi-shinjuku, Shinjuku-ku, Tokyo, President: Eitaro Uenishi, hereinafter referred to as Taikisha) improved its “Admat Z”, which collects and concentrates VOC (volatile organic compound). VOC is found in gas emitted from the manufacturing processes of semiconductors or automobile paint lines. The improved high-concentration model “Admat Z” raises the concentration ratio to over 30 times. It also reduces the running cost by about 20%.

### **1. Background of the development**

The treatment process of emission containing pollutants emitted from plants is classified roughly into a) pre-treatment process in which dust and high-boiling substances are eliminated as a preceding process, 2) VOC concentration process in which low-concentrated gas with large volume is processed into highly-concentrated gas with small volume and 3) post-treatment process in which the concentrated emission is combusted, and converted into a non-hazardous gas, by using regenerative burner system. The VOC concentration is a key step in the process, having an influence on the initial cost, running cost and space. The higher the VOC gas concentration becomes, the more the combustion heat of VOC can be used, resulting in energy-saving in the post-treatment process. It also allows for the post-treatment process to be downscaled, by decreasing the concentrated emissions sent to the final treatment process, leading to space-saving in the post-treatment process.

In the conventional VOC concentrator Admat Z, when the concentrated emission was decreased in view of the post-treatment process, treatment performance was degraded due to a lack of regenerated hot air volume and purge (cooling) air. Because of this, it was difficult to raise the concentration ratio. Concentrated gas, regenerated hot air, and purge (cooling) air have the same volumes. (See the reference, Figure 2)

For this reason, Taikisha decided to improve the structure of the duct around the adsorption-desorption rotor in the Admat Z, to realize “regenerative circulation” and “purge (cooling) air extraction”. This enabled a decreased volume of concentrated emissions, while securing sufficient amounts of regenerated hot air and purged air to be supplied to the adsorption-desorption rotor. It successfully raised the concentration rate to over 30 times.

### **2. Components of the high-concentration model, ”Admat Z”**

#### ■ Treatment (adsorption) sector

This sector adsorbs VOC contained in raw gas with zeolite (adsorbent), and releases raw gas as clean air into

the atmosphere.

The adsorption-desorption rotor adsorbs VOC, and moves to the regeneration (desorption) sector while rotating.

- Regeneration (desorption) sector

VOC that was adsorbed by the adsorption-desorption rotor in the treatment sector is desorbed with a small amount of hot air (regenerated hot air) in the regeneration sector. Therefore, the rotor can adsorb VOC again. This operation is called “regeneration”.

- Purge (cooling) sector

As the temperature of the adsorption-desorption rotor becomes high after regeneration, if the rotor is directly moved to the treatment sector, it does not exercise its adsorption ability even if desorption is completed. For this reason, the sector that cools the adsorption-desorption rotor is installed between the regeneration and treatment sectors. In the purge sector, the adsorption-desorption rotor is cooled by letting part of low-temperature air through the rotor, to recover its adsorption ability. In some cases, air taken directly from outside is used for cooling.

### **3. Features of the high-concentration model, “Admat Z”**

- Regenerative circulation

Regenerative circulation is a method adopted to resolve the lack of regenerated air volume.

This system returns part of the air from the regeneration outlet to the regeneration inlet. Regenerative circulation enables the securing of sufficient regenerated air volume, even if the concentration ratio is raised by decreasing the concentrated emission volume.

- Purge (cooling) air extraction

Purge air extraction is adopted method to resolve insufficient cooling. This method extract a part of the purge air from the purge outlet, and returns it to the inlet of the treatment sector. This system enables securing sufficient air volume for cooling, regardless of concentrated exhaust gas volume.

<Reference>

Figure 1: Outline of Taikisha's VOC treatment system

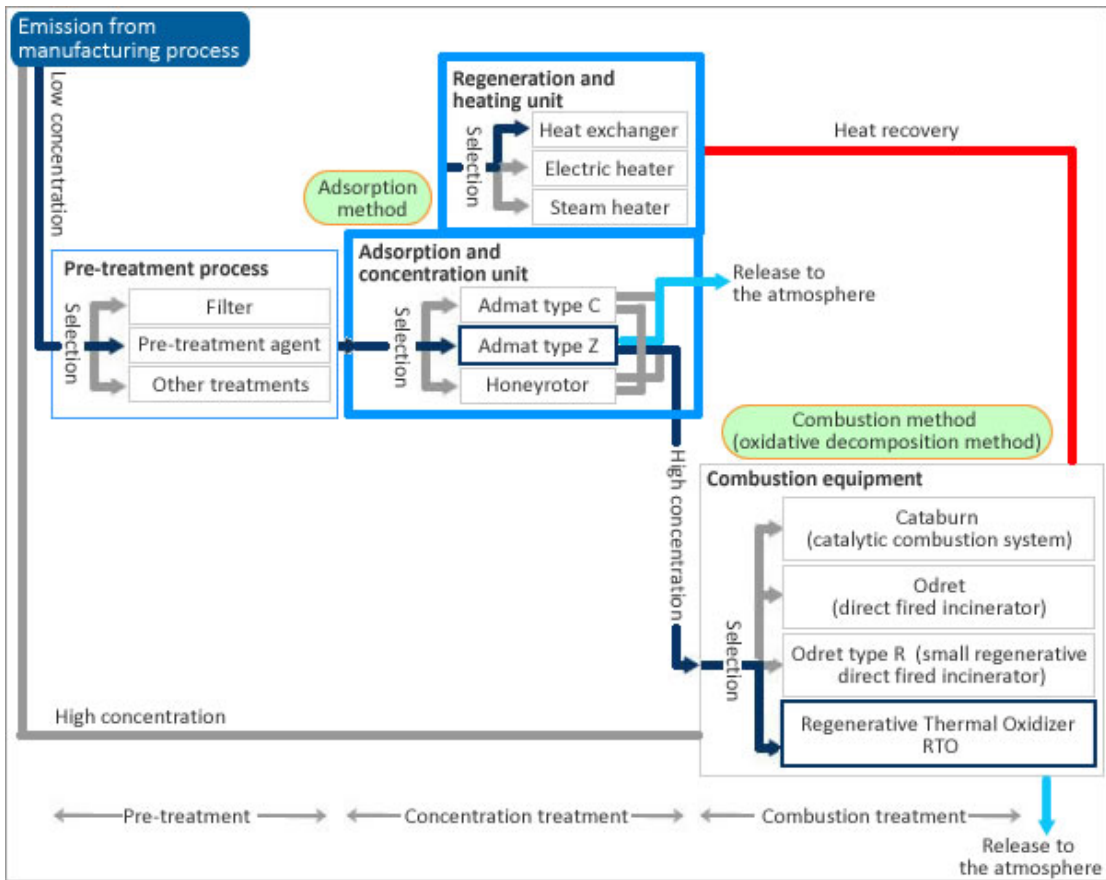


Figure 2: Flow chart of the conventional Admat Z

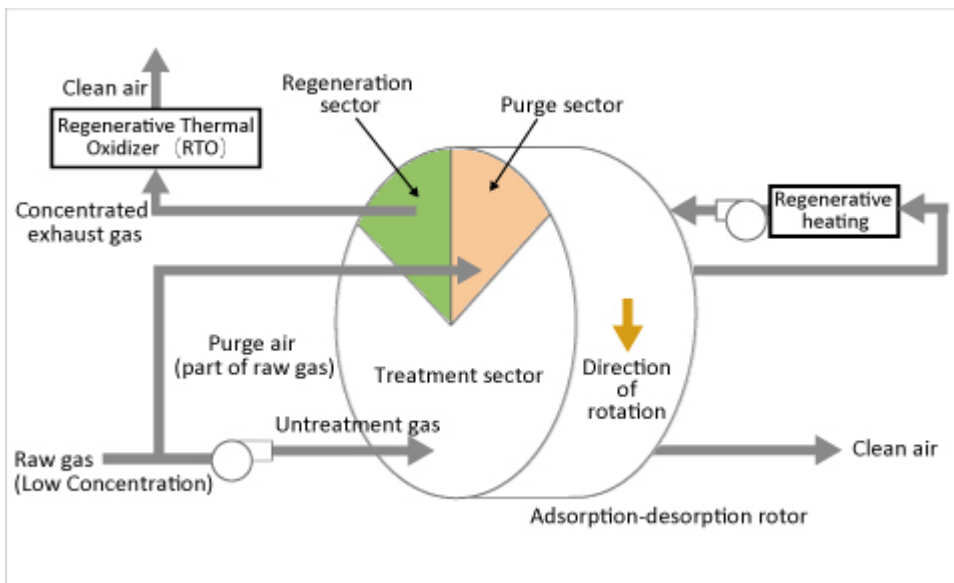


Figure 3: Flow chart of the high-concentration model Admat Z

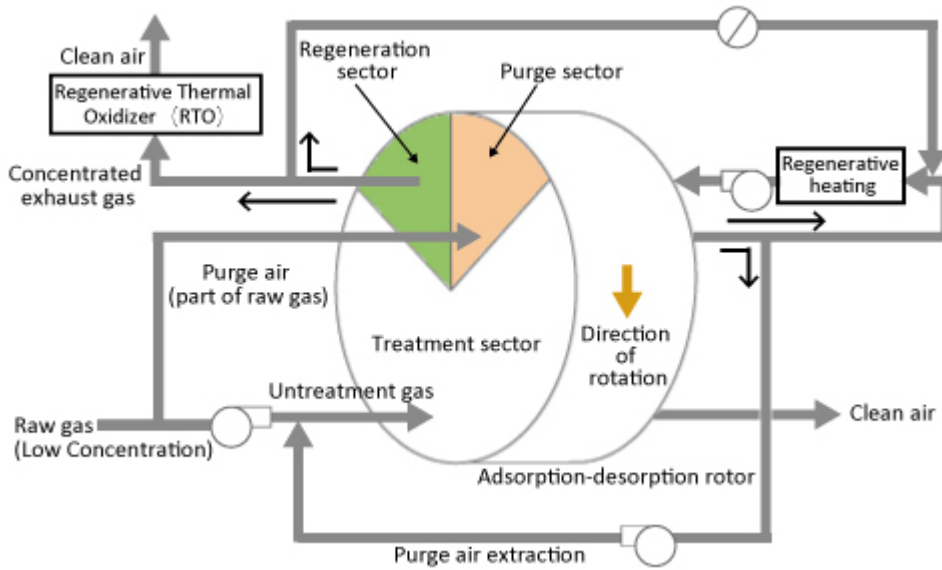


Figure 4: Comparison of running costs

Trial calculation under conditions of 785m<sup>3</sup>/min of treatment air volume,  
15 yen /kWh of electricity charge, 60 yen/m<sup>3</sup> of combustion improvers

Concentration rate		Conventional model (10 times of concentration)	High-concentration model (30 times of concentration)
Running costs		100	78
Breakdown	Power cost for fans	87	80
	Cost reduction through steam recovery	0	-2
	Cost for combustion improvers	13	0

A numerical value is the index which set the running cost of the conventional type to 100.

A minus numerical value expresses recovery of cost.