# Adsorbers
# Concentrators
# Thermal afterburning units

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## OTTO Engineering Polska Sp. z o.o.

Otto Industries was founded in 1967. Since the beginning of our activity, we adopted the technical support of the industry in air pollution (resulting from the production processes) treatment as our mission.

In short period of time, the Otto Company has become a leader in its field, which allowed us to further develop and expand the offer. Therefore, we gladly share our long strong experience and provide the following services:

- Execution of all the necessary work to launch surface preparation and paint coating workshops,
- Installation of adsorbers and scrubbers,
- Thermal and catalytic oxidisers,
- Concentrators for increasing the concentration of pollutants,
- Clean Systems,
- Air conditioning and ventilation,
- Optimization of energy consumption,
- Accredited laboratory LBOTTO.

## SERVICES

We offer a wide portfolio of services related to all aspects of the optimal operation of your plant. Starting by defining the problem of technological optimization by adjusting to changing manufacturing conditions, through to the latest information on changes in the legal situation, our staff will advise you in a friendly, reliable and competent way.

## 24 h SERVICE HOTLINE:

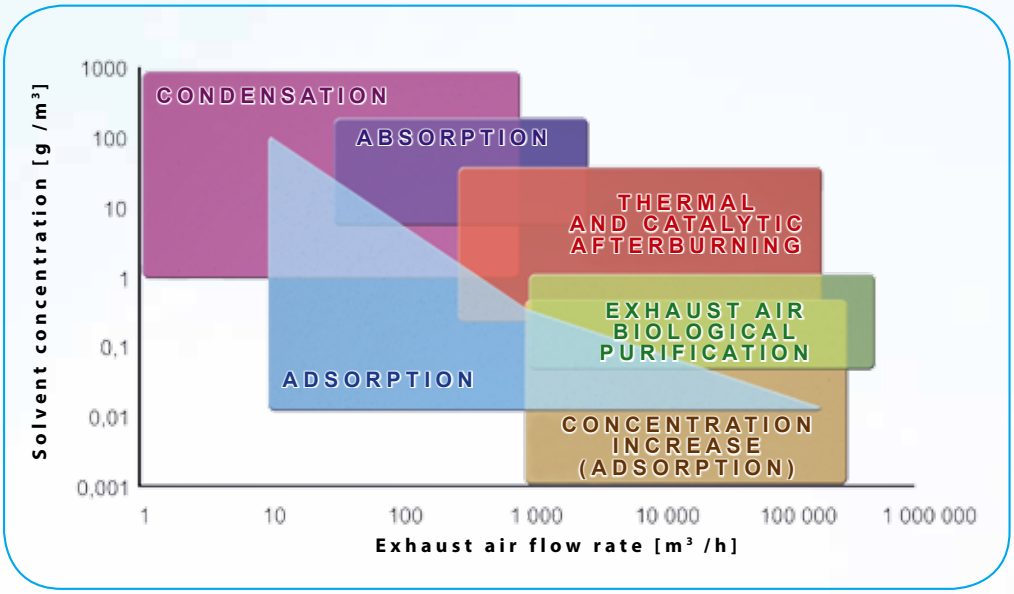
**+48 17 249 00 49**

## TELESERVISE

In order to optimize the services offered to our customers, we developed a system of remote data transmission TELESERVICE, which has been incorporated into our service offering.

With this solution, you can submit all relevant system data via modem connection with our office in Rzeszów. This allows us to solve most problems and to carry out operational inspections and checks of the control system without the cost of travelling and without the need of our personnel to be present on-site.

## METHODS OF AIR PURIFICATION



## PILOT PLANT

The OTTO pilot plant is a mobile plant that can be used wherever you need to check the applicability of air purification, or to confirm the effectiveness of OTTO technologies before deciding to build a large-scale plant at the customer. Pilot tests carried out in real conditions (occurring at the customer) allow to verify technology and its optimization in economic terms – they minimize the investment costs and indicate the operating costs associated with the construction of the target system.

The pilot plant consists of a technical container, adsorber modules and an optional scrubber module. It is designed for indoor and outdoor use.

This plant can be used for the following processes:

- separation of particulates/fat particles: dust/grease filter,
- adiabatic humidification of the gas and solids separation: scrubber,
- separation of inorganic impurities (e.g. hydrogen sulphide, ammonia): chemical scrubber,
- adsorption: separation of pollutants by adsorption,
- desorption.

In addition, the pilot plant is fitted with a device for continuous measurement of VOCs in 5 measuring points by the Flame Ionization Detection (FID) reference method of J.U.M./OMC ENVAG.

Depending on the given tasks, there are defined required processes and accordingly prepared pilot surveys. During pilot testing, confirming the effectiveness of the OTTO technologies, we use well-equipped measuring-analytical laboratory fully equipped with 3 FID analysers and an apparatus for olfactometry analyses (MANNEBECK TO7 System olfactometer) with all devices for sampling of the active and passive sources.

Pilot plant of a catalytic oxidiser type CAOX-P
Flow rate: max. of 25 $Nm^3/h$
Catalyst: in the form of pellets.

Pilot plant of a regenerative thermal oxidiser (RTO) type Regetar P
Flow rate: max. of 300 $Nm^3/h$
material for heat recovery: material with a honeycomb structure or in bulk

## SCRUBBERS

A scrubber is used for humidifying the gas, removing particulates and substances absorbed chemically (by applying an acidic or alkaline wash solution or other absorbent material). Proper preparation of the liquid is obtained by the addition of chemicals. In order to intensify the process, a column scrubber is filled with a packing material.

The construction of a scrubber is designed for its easy operation. It provides minimal interference in the inside (possible to remove the spray nozzles from outside). The scrubber is equipped with inspection openings and measurement systems through which (on the basis of reading the pressure drop on the element) you can determine the degree of soiling of the component and the need for its maintenance or replacement.

## EFFICIENCY OF THE OTTO ADSORBER

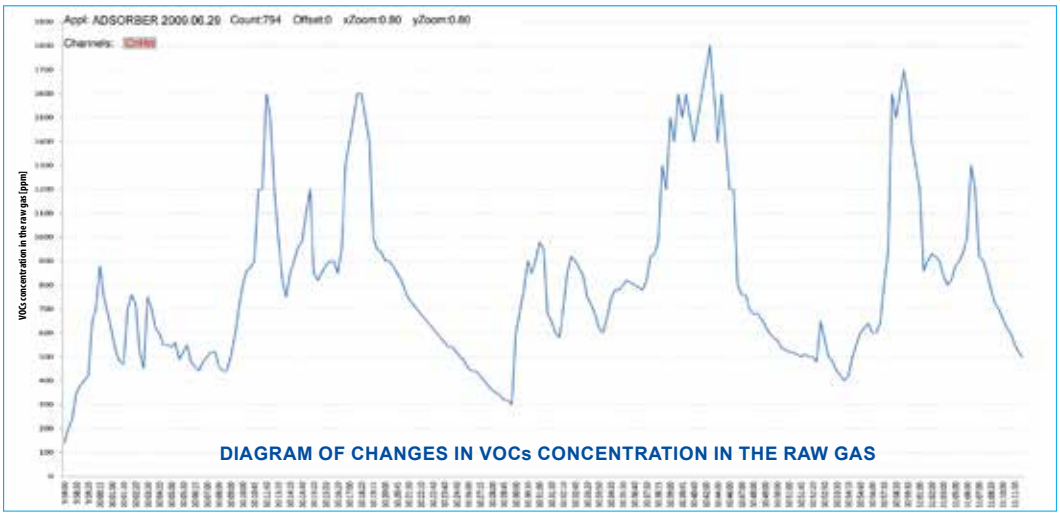



DIAGRAM OF CHANGES IN VOCs CONCENTRATION IN THE RAW GAS

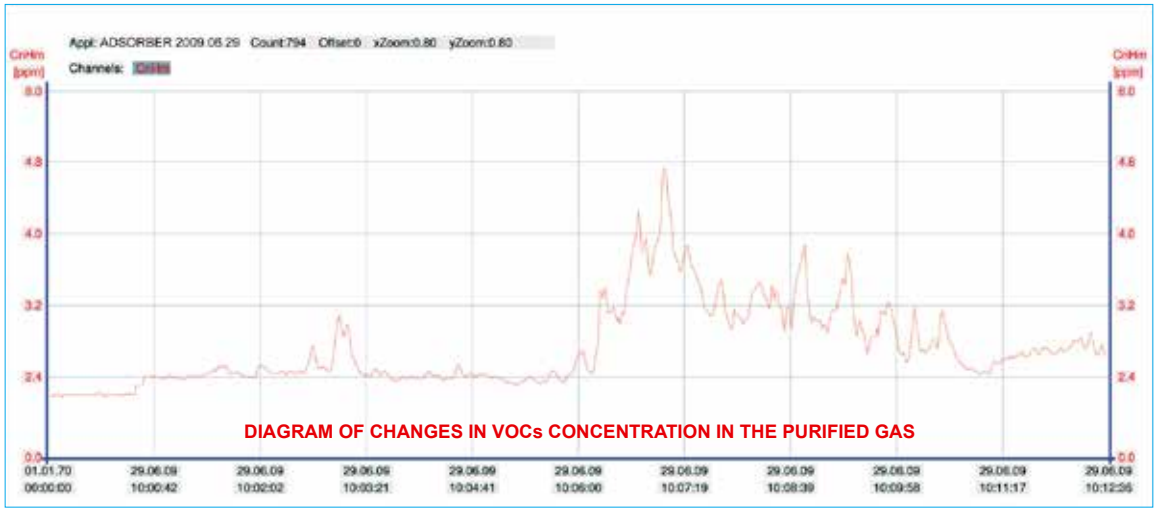



DIAGRAM OF CHANGES IN VOCs CONCENTRATION IN THE PURIFIED GAS

# Concentrators Thermal afterburning units

The OTTO Company designs and manufactures adsorbers from large-scale to small mobile units.

In order to prevent the self-ignition of the activated carbon inside an adsorber, the concentration of CO in the clean gas is continuously measured. Pre-set limit concentrations allow correspondingly earlier detection of the source, system auto-shutdown, cutting off the airflow through the adsorber and visual and audible alerting.

## COMPACT ADSORBERS

The OTTO Compact adsorber allows, as far as is permitted, the circulation of air inside the room. This allows savings on heating costs in the winter. Thanks to the high efficiency pumping system (max. 3 000 $m^3/h$), the entire room volume can quickly be treated. After purification, the air extracted from the room may also be released into the atmosphere.

The plant can be operated continuously and periodically. Local exhausts may be connected to the plant. It is also possible to install it into existing ventilation ducts. In the case where it is necessary to isolate particulates – a particulate filter is mounted before installing the adsorber.

This compact plant can be transported by means of manual or mechanical forklift. If the wheels are mounted, its movement is possible without the use of additional equipment.

Supplied plant is ready for operation.

A scrubber with recirculating (closed-loop) wash solution (water or water with chemicals for a chemical scrubber) minimizes operating costs.

## ADSORBERS

An adsorber is a closed vessel made of plastic or steel. The appropriate vessel design allows easy charging and removing the activated carbon. Depending on the composition of pollutants, a suitable sorbent type is selected, e.g.: activated carbon to extract odours or solvents, or specially impregnated carbon to remove inorganic compounds.

## THERMAL AFTERBURNING FOR CLEANING THE EXHAUST AIR

**Regenerative thermal oxidiser (RTO)** - It is used for cleaning the exhaust air from industrial facilities using ceramic heat accumulators. This proven series of REGETAR units ensures economic operation, regardless of the concentration of pollutants in the air, even at very high volumetric flow rates. Through the use of a regenerative ceramic heat accumulator (heat storage), it is possible to operate it without burning additional fuel even at very low solvent concentrations.

# Adsorbers

**Features and benefits:**
- Two-, three- or multi-layer unit.
- For volumetric air flow rates up to 200 000 $Nm^3/h$.
- Heat recovery rate up to 97%.

**For use in:**
- Industrial processing with all kinds of solvents

**Usage of the concentrators for increasing the concentration of pollutants combined with thermal oxidisers** is the most economical method for purifying the exhaust air of high volumetric air flow rates, but at low concentrations of air pollution due to solvents. In this process, a rotating rotor made of hydrophobic zeolite adsorbs organic pollutants from the exhaust air. Then, these adsorbed pollutants are desorbed with hot air and supplied to an oxidiser.

**Features and benefits:**
- For volumetric air flow rates from 20 000 $Nm^3/h$.
- Low concentrations of air pollution due to solvents < 1 g/ $Nm^3$.
- Low exhaust air temperature < 40°C.
- Pollutants concentration up to 1:18.

**For use in:**
- Paint industry and production of semiconductors.

**Recuperative thermal oxidiser** – is used for cleaning the exhaust air from industrial facilities at a high concentration of organic pollutants. The INTEGRA and FLEXA units, having a high heat recovery rate, combined with additional heat recovery system, provide their highly economical operation with little demand for additional fuel.

**Features and benefits:**
- Model INTEGRA, for volumetric air flow rates from 2 000 to 7 500 $Nm^3/h$.
- Model FLEXA, for volumetric air flow rates from 9 000 to 55 000 $Nm^3/h$.
- Heat recovery rate up to 76%.
- Heat recovery systems for air, water, oil, steam and for heating the adsorption refrigeration equipment.

**For use in processes of:**
- printing,
- coating,
- laminating,
- impregnation of materials.

**Regenerative catalytic oxidiser (RCO)** – is used for cleaning the exhaust air from industrial facilities at low temperatures of the combustion chamber. Catalysts are adapted (matched) to individual needs. Through the use of high-efficiency plate heat exchangers it is possible to operate the unit at a low concentration of solvents also without burning additional fuel.

**Features and benefits:**
- Individual design and appearance.
- For volumetric air flow rates from 1 000 to 50 000 $Nm^3/h$.
- Application of tried and tested (checked) catalysts for temperatures from 200°C.
- Heat recovery rate up to 85%.

**For use in:**
- Printing shops with intaglio and flexographic printing processes.
- Chemical and pharmaceutical industry.
- Equipment for applying paints and all kinds of coats.

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## REFERENCES – ADSORBERS

Aviation industry – surface preparation
Air flow rate: 8000 m³/h
Pollutants: acetone, isopropanol

Aviation industry – core leaching autoclave system
Air flow rate: 500 m³/h
Pollutants: NaOH fumes

Aviation industry – Plating shop
Air flow rate: 7000 m³/h
Pollutants: VOC and paraffin fumes

3-stage adsorber – municipal sewage treatment plant
- pre-treatment area
Air flow rate: 1 000 m³/h
Pollutants: Odours, hydrogen sulphide, ammonia

Aviation industry – blade etching
Air flow rate: 2 500 m³/h
Pollutants: VOC, Ranclene fumes, Trisol fumes

## REFERENCES – OXIDISERS

Production of abrasives
Air flow rate: 27000 Nm³/h
Pollutants: phenol, formaldehyde, ethanol

Automotive industry
Air flow rate: 34000 Nm³/h
Pollutants: ethyl acetate, xylene, MIBK

Automotive industry
Air flow rate: 27000 Nm³/h
Pollutants: xylene, MIBK, ethyl benzene, ethyl acetate, acetone, ethyl acetate, MEK

Production of abrasives
Air flow rate: 23000 Nm³/h
Pollutants: ethanol, methanol, methoxypropanol

# Leading technologies
# Individual solutions

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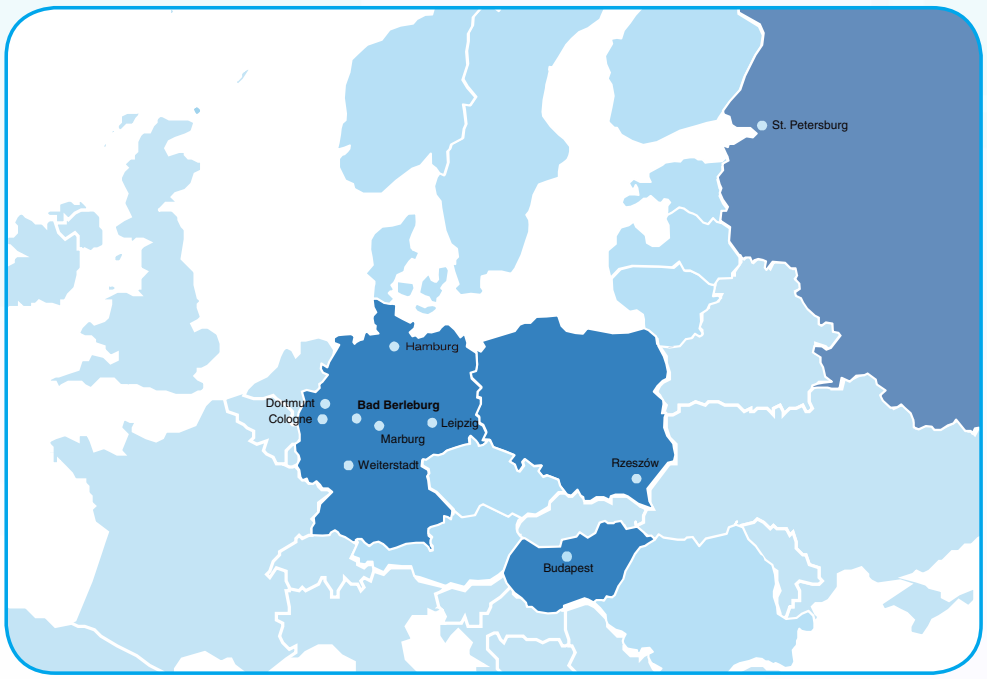
## OTTO ALL OVER THE WORLD

Otto has a lot of branches all over the world!
We provide services to more than 15 000 customers!
The headquarters is located in Germany Bad Berleburg. We also have a number of operational centres in Germany, Canada, Poland, Russia, Bulgaria and Hungary.

## Site locations of OTTO

### 300 specialists in the field of industry and construction




**Germany**
Headquarters: Bad Berleburg
Hamburg
Dortmund
Cologne
Weiterstadt
Marburg
Leipzig
Siegen

**Other countries:**
Rzeszów (Poland)
Budapest (Hungary)
St. Petersburg (Russia)
Krasnoyarsk (Russia)
Guelph, Ontario (Canada)
BIOREM Technologies