43 SESTO FIORENTINO (FI) ITALY

Year	2005
Client	QUADRIFOGLIO SERVIZI AMBIENTALI AREA FIORENTINA SpA
Operator	QUADRIFOGLIO SERVIZI AMBIENTALI AREA FIORENTINA SpA
Partner	UNIECO Soc. Coop.
System description	Tunnel composting and odour control
Waste processed	Organic waste
Plant capacity	70,000 t/year

QUADRIFOGLIO SpA, which carries out environmental services in the Florence area, has awarded to the joint-venture including UNIECO Soc. Coop. and ECOMASTER ATZWANGER the contract for the design and construction of a biotunnel composting plant complete with air treatment and compost refining systems.

The organic waste treatment plant built by the temporary joint-venture Ecomaster-Unieco, uses the bio tunnel composting process. The plant has two purposes:

- Treatment of organic waste derived from the source separation of municipal waste mixed with garden waste;
- Stabilization of the organic fraction produced by the mechanical sorting (screening) of mixed municipal waste.

The quality of treated waste is fundamental for characterization of the product of the process; in fact only uncontaminated organic waste can be used for the production of compost to be used in agriculture.

The processing of the organic fraction derived from mixed municipal waste allows producing a stabilized material, that depending on the applicable rules can be used in particular applications, such as landfill cover material.

The plant includes the following sub-systems:

- Composting system including 14 bio-tunnels;
- Odour control system for the entire waste treatment complex.

Bio-tunnels are reinforced concrete built reactors having a parallelepiped shape, which are loaded by wheeled loader. Once the biological process has been completed, unloading is carried out by wheeled loader as well. Bio-tunnels are completely segregated by the other work areas with special sliding doors that contain the process.

The material sorted by screening mixed municipal waste is produced in another part of the plant (excluded from this project) and loaded into the bio-tunnels without any pre-treatment, while organic waste is mixed with shredded garden waste. Mixing with a wood-rich material ensures the presence of structural material and allows high air permeability of the mix.

The floor of the bio-tunnels consists of an aerated platform with an air distribution system cast into the concrete platform itself. The system is made of plastic ducts with air distribution nozzles.

In each reactor, a fan supplies the process air, which thanks to three air dampers, can be one of the following air flows:

- Fresh air sucked from the bio-tunnel material handling area;
- Air sucked from the inside of the bio-tunnels;
- A mix of the above two streams in a 0 to 100% ratio.

The three flows (fresh air, waste air and recirculated air) is controlled by electrically-driven air dampers.

The aerobic composting process is assisted by a PLC - Programmable Logic Controller based on a "fuzzy" logic (i.e. undefined), which maintains the process parameters within preset ranges.

Various process factors are controlled, such as temperature of the treated material, pressure and temperature of the process air, air pressure inside the bio-tunnel. Also, the oxygen level in the process air is monitored for each bio-tunnel.

The active composting process, that has a time length of 2 to 3 weeks, is divided in various phases: heating, pathogen control, stabilization and mass cooling.

A system for the acquisition and visualization of the process factors allows real-time monitoring of the process. All values measured are recorded and can be used for showing the trend in graphic form.

The 14 bio-tunnels are dedicated to the two different input materials (screened mixed waste and organic waste mixed with garden waste) depending on the quantities to be processed.

The two materials are always kept segregated to prevent contamination of the compost to be used for agricultural applications. The plant includes a collection system for the waste liquids, which are filtered and sprayed for recycling into the reactors that process mixed waste. Fresh water is used in the reactors that process organic waste.

The bio-tunnel intensive composting process is followed by a maturation treatment that includes turning of the material.
Two interconnected sub-systems are included in the odour control plant:

- The waste air of the bio-tunnels is first treated by three double-step scrubbers and then by a bio-filter;
- The air coming from the areas with less odour is treated by five double-phase scrubbers.

The plant has been built according to a phased schedule to avoid stopping the existing operations and causing organizational difficulties. The following functional lots have been completed one after the other:

- Odour control system with 3 scrubbers and bio filter;
- First group of 5 bio-tunnels;
- Odour control system with 5 additional scrubbers;
- Additional 9 bio-tunnels.

ATZWANGER SpA . Division Ecomaster Atzwanger
Via Palmanova, 31 . 33050 S. Maria La Longa (UD) Italy
Tel. +39 0432 920175 . Fax +39 0432 923393
www.ecomaster.it . www.atzwanger.net