Rotating Disc Systems

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Rotating Disc Waste Water Treatment Plants

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PO Box 550
Highfields Qld 4352
Ph: +61 7 4696 7177
Fax: +61 7 4696 7166
Email: admin@rotatingdiscsystems.com
Web: www.rotatingdiscsystems.com

Rotating Disc Systems Pty Ltd: ACN 124 536 161
It has often been stated that the effectiveness of a wastewater treatment plant is only as good as the skills of its operating staff. Modern sewage treatment plants are based on complex chemical and biological processes and depend on highly skilled operators to ensure satisfactory operation.

Owing to the costs involved, this type of treatment is usually limited to larger towns, creating a need for a process that can effectively treat wastes from small communities.

Treatment works for smaller communities should be highly affordable in terms of capital cost, reliable and simple to operate and maintain, while producing high quality effluent at all times.

The ROTATING DISC Treatment plant, being a "Rotating Biological Contactor (RBC), addresses these requirements and is the modern-day solution to waste water treatment problems and pollution control.

**ADVANTAGES OF THE ROTATING DISC RBC PLANT**

- ROTATING DISC plants do not require bar screens or detritus removal. This is a great advantage as no full-time attendant is needed to rake the bar screens and offensive odours, flies and other nuisances are also eliminated.

- The ROTATING DISC system operates exceptionally well on septic tank effluent. Large cost savings are gained by incorporating the system directly with existing septic tanks.

- The efficiency of the system is not negatively affected by shock loads or flash floods, as the functional bacteria are growing on the disc surfaces and cannot be washed out of the system. This is in opposition to activated sludge and to extended aeration plants where the bacteria cultures are suspended in the liquid.

- The effect that sudden shock loadings have on rotating disc plants, has been researched extensively. Shock loads of up to 4 times the design capacity have been applied over short periods (2 hours). This resulted in a three-fold increase in the Biological Oxygen Demand (BOD) reduction performance of the system. This proves that the biomass of a rotating disc plant is capable of additional waste absorption imposed by shock loads and still has the ability to achieve the required design performance under these circumstances.

- The efficiency of rotating disc plants is not affected when reduced design capacity situations prevail. When returned to normal design conditions, design efficiency is obtained almost immediately. This adaptability of ROTATING DISC plants make them particularly suited for application at developments where the number of people is expected to fluctuate greatly.

- Desludging is generally needed only once a year and not weekly as for activated sludge plants. The desludging operation is normally undertaken by local authorities by means of vacuum tankers. This eliminates offensive odours completely.

- ROTATING DISC plants consist of a number of rotating disc units which are individually powered. In the unlikely event of one rotor unit becoming defective, the balance of the rotors will continue to operate, thereby still reducing BOD to acceptable levels.

- The rotor units rotate at approximately 5 r.p.m. and very low electrical consumption is experienced, adding to the low maintenance cost already encountered.

- Due to the simplicity of the ROTATING DISC plant and to the fact that the plant is self compensating to flow variations, no full-time attendant is needed and running costs are, therefore, even further reduced.

- As a result of the slow rotation and the absence of aerators and compressors, noise pollution is minimal. Plants can therefore be built much closer to residential areas, resulting in shorter sewer lines and electrical supply cables.

- The availability of different types of tankage provides the customer with options regarding environmental issues. ROTATING DISC plants can be designed to blend in with the environment and take up very little space.

- ROTATING DISC Waste Water Treatment Plants are robust and unobtrusive, and deliver a high quality effluent, making their application ideal anywhere.
OPERATION OF THE ROTATING DISC RBC PLANTS

• The rotating disc process is considered a high performance biological stage of the conventional sewage treatment plant (replacing the trickling filter). The disc unit is normally preceded and followed by sedimentation and clarifying tanks of a design appropriate to the size of the plant.

• In the ROTATING DISC system, the biological stage takes the form of a series of parallel, flat self-cleaning discs, manufactured from high density polyurethane and mounted on a steel shaft at closely spaced intervals to form a solid unitary structure.

• This rotor assembly is then installed in a sewer grade polyethylene basin and is submerged to almost shaft level. The water flows through the basin while the rotor is slowly rotating.

• Biological growth, similar to that found in percolating filters, grows on the discs’ surfaces. An aerobic, freely circulating bio-mass is, in addition, found in the basins, contributing to the biological treatment of the waste water. The rotating motion of the rotors creates turbulence in the water keeping the free bio-mass aerated and in constant suspension until it eventually leaves with the treated liquid for subsequent settling in the humus tank.

• Bio-degradable organic wastes are, therefore, being treated by both the intermittently submerged bio-mass growing on the discs and the suspended bio-mass present in the basins. Depending on the loading of the plant, these wastes are either transformed into harmless substances, or oxidised or absorbed by the bacteria.

• The oxygen required for the oxidation process is absorbed through the wet upper surfaces of the bio-mass growing on the disc while it is passing through the atmosphere. Full oxygen absorption is immediately achieved due to the very large contact area created by the disc surfaces and the oxygen freely available in the atmosphere above the plant.

• This continuous absorption of oxygen by the bio-mass allows the oxygen to penetrate effectively to the deepest parts of the bio-mass, mainly by diffusion. The immediate submersion of the rotating, oxygen saturated bio-mass that follows, causes part of the absorbed oxygen to be transferred to the free bio-mass in the basin. Therefore, the absorption of oxygen into the process is not through direct absorption of air by the waste water, but almost exclusively through the absorption of oxygen via the wet surfaces of the bio-mass growing on the discs.

• The oxygen absorption is so effective that, despite the fact that oxygen is absorbed by both the disc bio-mass growth and that suspended in the basins over 2mg/L of oxygen is still present in the liquid leaving the disc stage.

• Since the waste substances present in the liquid are constantly converted into harmless substances, both the bio-mass growing on the discs and that found in the basins are continuously increasing. The excess bio-mass is automatically removed from the disc treatment stage by the flow of treated waste water through the plant.

• Sludge thus produced is removed from the treated water by sedimentation in the clarifier, which follows the disc treatment stage.

• Disinfection by conventional methods is finally undertaken resulting in effluent complying with regulators’ standards.
THE ROTATING DISC SYSTEM TREATMENT PLANT PRINCIPAL

The basic BIO-DISC plant layout is detailed in the flow diagram and comprises the following elements:

- **ANAEROBIC TREATMENT** – Settlement in primary or septic tank.
- **AEROBIC TREATMENT** – Biological treatment: ROTATING DISC SYSTEMS.
- **HUMUS REMOVAL** – Secondary settlement tank.
- **DISINFECTION** – Chlorine contact tank or UV disinfection equipment.
- **PHOSPHATE REMOVAL** – Chemical dosing.

WASTE WATER, FLOW DIAGRAM

![Flow Diagram](image)

SERVICES OFFERED BY ROTATING DISC SYSTEMS Pty Ltd

- Comprehensive design and advisory services.
- Turnkey projects undertaken from initial investigation to final commissioning.
- Mechanical and electrical components supplied individually.
- All design and construction drawings supplied free of charge for awarded projects.
- Complete installation and maintenance.
- Plants are fully developed and manufactured in Australia.
- Projects are accepted and executed in all countries.