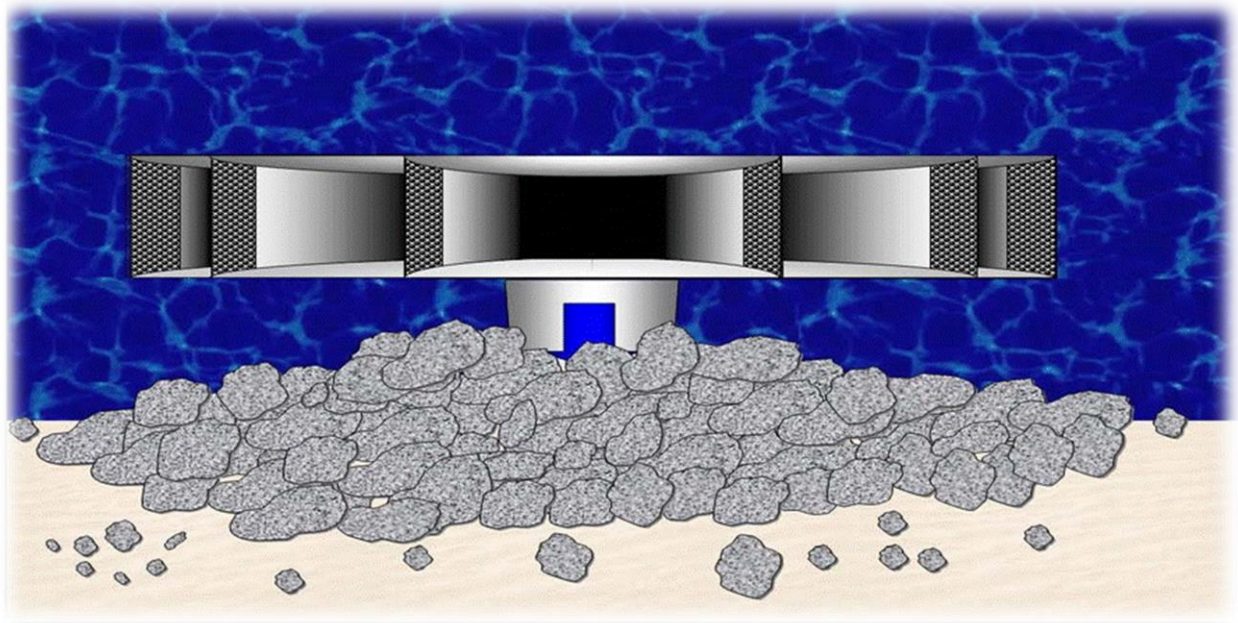




InvisiHead SEA WATER INTAKE SYSTEM



CES has developed an innovative system that contributes positively to the economic and environmental status of vital operations that require drawing large amounts of surface water.

A hydraulically balanced simple system, free of any operating or maintenance needs, made CES seawater intake system attractive. This innovative InvisiHead system functions positively by utilizing the natural forces. In doing so, sediment flow is drastically reduced and pressure losses are minimized.

Water Intake Problems and Conventional Systems

Water from surface sources is required to be used in industrial projects such as power plants, desalination and petrochemical plants.

The major sources of water intake problems are related to the inflow of fish and fish larvae, sea weeds, sand, zebra mussels trash and oil spills that did result in clogging the intake leading to interruption of operations, and affecting the economic operation of these plants.

In the open channel intake systems these contaminants find their way into the intake channels where massive screening measures have to take place to filter these contaminants out.

In conventional design methods a dimension -the height or the width -is arbitrarily chosen and the other is calculated by dividing the estimated cross-sectional flow area by the chosen dimension to find the other. Should the dimensions become out of phase with the approaching flow streamlines – which is the case in nearly all designs-eddies will form at the entrance vicinity and multiply causing turbulence and flow disturbances at the head entrance. This will cause a higher pressure drop, higher suction and, therefore, higher head losses and level drop at the intake basin.

The InvisiHead system solved the problem and prevented intake system clogging that had been experienced previously with the use of other system. This product was manufactured of stainless steel in Canada and was successfully installed in Jamaica, Pakistan, China and Quebec. There is at present increasing demand to order this Canadian system, for many applications at various world industrial locations.

An Innovative Design

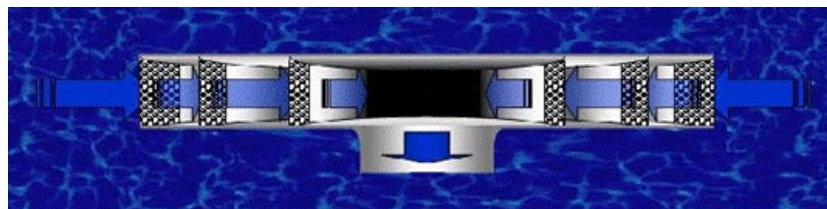
The InvisiHead (IH) an omni-directional intake head system is fitted to the upstream end of the intake system pipeline located some distance into the sea from the shoreline. At super slow approach and entrance velocities, the IH intake head becomes hydraulically invisible to suspended matter. In other words, the Intake head does not act as a sink point and therefore does not draw in debris.

Super slow entrance velocities also lead to lower head losses and lower level drawdowns at the pump intake basin. The IH entrance section is hydraulically balanced and fine-tuned in lab tests to flow streams. The entrance dimensions are not arbitrarily selected but hydraulically calculated and selected in multi-dimensional approach and through model setup and testing. Each dimension is a function of the steady flow velocity. Eddies, by this approach, are totally eliminated thus head losses at the IH are reduced to a few millimeters.

At Canadian Eco Systems, we tune the flow with the height and the circumference of the InvisiHead. Once the three are in phase, the IH is kept to minimum in size, the head loss is kept to minimum. When that is done, less sediment and debris flow through and smaller pipelines will satisfy the flow capacity required. These optimization factors translate into lower initial investment and lower operation and maintenance costs for the intake system and for the plant as a whole.

The key to preserving the intake integrity is to maintain the original ambient conditions at the spot where water is to be drawn into the intake pipeline and transported onshore. Inferior designs of the upstream inlet of intake pipelines can lead to creating high negative pressures at and around the inlet (Intake Mouth), which will result in the suction of sand, fish, seaweed and other debris. The inlet has to be properly designed. The InvisiHead is created to address that very notion: be hydraulically invisible and act like if it was not there.

The InvisiHead system is fitted to the upstream end of intake system pipelines located between 50 to 10, 000 meters from the shoreline at depths range between 1 and 50 meters. The point of entry positioning depends on the site conditions and the requirements of the user.



Flow into the InvisiHead: Approach, Stabilization, Acceleration & Steady Flow

System Design and Operational Criteria

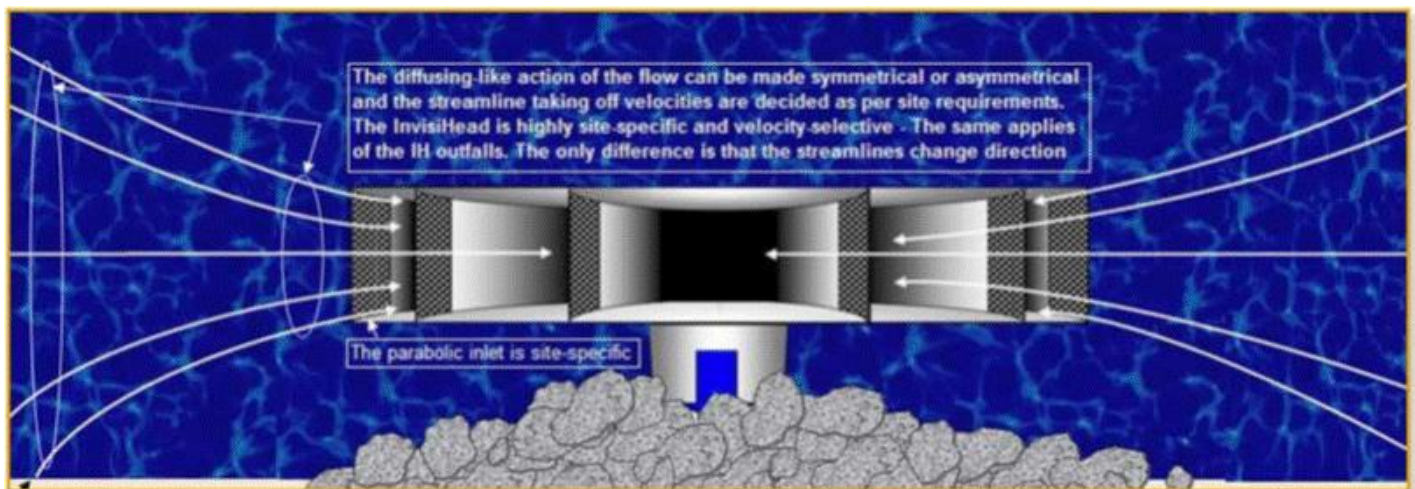
- Low approach velocity
- Low entrance velocity
- Head loss reduction
- Debris inflow reduction/prevention
- Minimal or no maintenance; no backwash; no cleaning; no scrapping; no parts replacement or recharging
- No moving parts

InvisiHead Flow Phases

The flow into the InvisiHead Intake Head System could be divided into four phases:

- Approach
- Stabilization
- Acceleration
- Steady Flow

It was a meticulous task to tune the InvisiHead and to divide the through flow regime into four sequentially mating phases. Super smooth flow transition from one phase to the next leads the flow through into the pipeline upstream end. The sequence of flow regimes made the head virtually invisible in hydraulic terms to suspended matter; there where the InvisiHead borrowed its name.



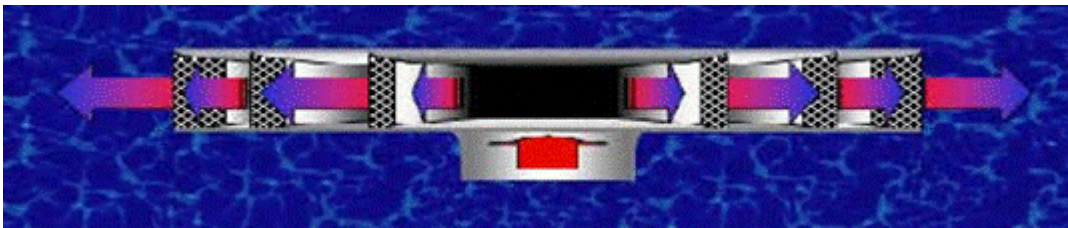
Smooth approach and entrance of the flow streamlines into the InvisiHead

The InvisiHead Outfall System

The Invisihead works also as an offshore submarine outfall system providing many benefits.

It diffuses the effluent in such a manner that does not allow it to rise up to the surface and be waved back to shore. The dispersed effluent mixes with the ambient deep water and in a short time it assumes physical and chemical properties similar to those of the surrounding seawater thus the effluent remains below the surface.

The Invishead works as an efficient heat transfer system when used as a power plant cooling water outfall.



*The InvisiHead works as an Outfall
Heat and effluent dispersion and dilution takes place at the immediate vicinity of the
InvisiHead*

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