

Design & Development of a Novel Surface Water Solid Waste Management System

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Abstract

The surface water solid stuff disintegration system is a device that can be easily adapted to the boats very easily. It mainly consists of two conveyer system and a wide opening which is specially designed such that it will promote the easy entry of algae or waste into the conveyer when the boat is moving, which is fitted on the front side of the boat. The two conveyors are kept in such a way that the primary conveyor stays up the water surface and the other stays below the water and when the boat moves through the water, solid stuffs will be forced into the opening and is further forced in by the motion of the conveyer. Both the conveyors move in opposite direction such that it offers more easy movement of waste materials. The conveyor's movement allows the algae to fall into a collecting chamber. The conveyor will be powered by an engine or a powerful motor. The opening where the algae enters will be slightly narrowed in the inside region. Then the algae in the collection chamber is either disintegrated or crushed to smallest size possible. The crushed algae which is dumped offshore is further processed to get organic manure, bio diesel etc.

Keywords: Water Solid Waste Management System, Surface Water Solid Stuff Disintegration System

I. INTRODUCTION

Most of the water bodies are now covered with a certain type of algae called Eichhornia crassipes Algae or several accumulated floating wastes. This is a serious threat to the aquatic ecosystem and the water transportation. It makes water transport very hard and sometime it may cause accidents to the boats. The aquatic algae grow in very large quantity with very deep roots and they cause a condition in water called eutrophication which is the excess reduction of dissolved oxygen content in the water bodies making a serious threat to the organisms like fish and other plants in that water body. This excess algae growth will also causes the clogging and destroy the scenic beauty of the water bodies.

The proposed work mainly aims at the amassment of the accumulated wastes or algae directly from the water bodies. The collected algae or waste materials can be crushed so as to reduce its volume and a large quantity of this algae can be dumped offshore reducing the frequency of offshore dumping.

The projected design consists of mechanism to collect solid matter on top of water from a moving boat. This is very useful in urban areas where waste removal from the water bodies and channels is a tedious process, and also in rural areas where the accumulation of algae challenges the water transport and aquatic ecosystem.

II. LITERATURE REVIEW

Paul Munzenberger and Craig Wheeler in paper Laboratory measurement of the indentation rolling resistance of conveyor belts, a new test facility to measure the indentation rolling resistance of conveyor belts is presented. The indentation rolling resistance of conveyor belts is an important design consideration for long belt conveyors and can also be important for heavily loaded belt conveyors. Indentation rolling resistance is dependent on the properties of the conveyor belt, including the carcass and bottom cover as well as properties of the belt conveyor including induced loads, belt speed, ambient temperature and idler roll diameter.

The test facility accepts fabric and steel cord belts and tests over a range of operating conditions. Test data is presented for a range of loads, idler roll diameters, sag values and cover compounds.

Daijie He, Yusong Pang and Gabriel Lodewijks in paper Green operations of belt conveyors by means of speed control, Speed control of a long inclined belt conveyor is implemented. Belt conveyors can be partially loaded due to the variation of bulk material flow loaded onto the conveyor. Speed control attempts to reduce the belt conveyor energy consumption and to enable the green operations of belt conveyors. Current research of speed control rarely takes the conveyor dynamics into account so that speed control lacks applicability. Daily energy reduction of about 12.2% is enabled due to speed control. Yearly energy saving of about 160 MWh is shown.

Raveendran Sindhu, Parameswaran Binod, Ashok Pandey, Aravind Mahajan, Jose Anju Alphonsa, Narisetty Vivek, Edgard Gnansounou, Eulogio Castro and Vincenza Faraco, in paper Water hyacinth a potential source for value addition: an Overview on the production of value added products from water hyacinth is given. Water hyacinth a fresh water aquatic plant is considered as a noxious weed in many parts of the world since it grows very fast and depletes nutrients and oxygen from water bodies adversely affecting the growth of both plants and animals. Hence conversion of this problematic weed to value added chemicals and fuels helps in the self-sustainability especially for developing countries. The present review discusses the various value added products and fuels which can be produced from water hyacinth, the recent research and developmental activities on the bioconversion of water hyacinth for the production of fuels and value added products as well as its possibilities and challenges in commercialization.

Yang-zhi Chen, Huai Huang and Yueling Lv in paper A variable-ratio line gear mechanism, Based on the previous studies of line gear (LG), which is also named as space curve meshing wheel (SCMW) in the published papers, a variable-ratio LG mechanism is proposed in this article. The formulae of contact curves of a variable-ratio LG pair were derived. The fundamental design equations for variable-ratio line gear mechanism were derived and an experiment was carried out to verify its kinematic performance.

III. OPERATION

The power source for the machine is a battery. The conveyors are powered by dc series motor. The dc series motor is selected because of its high starting torque feature. The machine is detachable and can be attached even to a small boat and other water transportation aids. This enables the advantage of using this machine in narrow or shallow water bodies for collecting surface waste.

Since there are a number of water bodies which are shallow in nature. They are clogged by surface wastes such as water hyacinth, plastic wastes and other harmful polluting agents. This machine can be used for collecting those wastes efficiently and economically. This machine can be used for collecting those wastes efficiently and economically. This machine can be used in place where there is no effective way of removing surface waste from water bodies.

The operation of machine is mainly carried out by four main parts.

- Two conveyors
- Float
- Power transmission elements
- Motor

The float helps the whole machine to float on the water so as to support the other machine elements such as the conveyors and power transmission elements used are gear, pulley and belt arrangement. The power to the whole machine is given through a dc motor as mentioned above. The motor's torque is increased by using a reduction gear, since the speed of the motor is high we should reduce it and we have to increase the torque also. Hence for this purpose further pulley and belt arrangement is used. Then the output is given to conveyors. Then the conveyor rotates, one rotate in clockwise direction and the other one in anticlockwise direction. As the machine moves forward the surface wastes are moved into the conveyors by passing through an opening. Then the surface wastes passes through the conveyors towards the crusher unit.

IV. CONCLUSION

In this project, we were able to fabricate a machine to collect both algae and waste products from the water bodies. The solid wastes and algae that float along the surface of water bodies exhibit a great threat to the aquatic ecosystem as well as the water transportation. The existing method of removal method is not that much suitable for the lower water bodies. It is mainly focusing on higher water bodies and these are very costly too. In case of lower water bodies there is no efficient way to remove the algae from the water; the only possible way will be the manual method.

The advantage of this machine is that it can be used in the lower water bodies with an economic manner and at lower cost. The system can be easily attached or detached to any boats very easily during the process.

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