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- 14 Mobile CAD has its appeal but still faces challenges
- 24 Spec' the correct motor for your application's requirements
- 34 Linear servo system creates unique transport application

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# Motion Control 2012

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Motion Controls  
Buyers' Guide p. 29

## IN THE NEWS

- 8** Engineers Canada appoints Catherine Karakatsanis president
- 8** Discovery Air, Hybrid Air Vehicles deal expires
- 8** COM DEV completes instrument for space telescope
- 8** Robotics industry posts record quarter
- 10** SNC appoints new president and CEO
- 10** Siemens Canada celebrates 100 year anniversary
- 10** MCAD market growth projected
- 12** Eurocom debuts "Over the Top" mobile workstation
- 30** Dal researchers Secure funding for pneumatic motor design
- 30** PTMC Sector Growth Slows in Q2

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## Columns

### 14 CAD Report

Mobile CAD has its appeal but still faces challenges

### 22 Idea Generator

The latest in industrial products including sensors, fluid power & electrical

### 27 Canadian Innovator

Prototype Equipment Design specializes in finding unique solutions for very specific problems

### 44 Shop Talk

Diagnosing tricky motor trouble requires a close inspection of power loads

### 46 Motion Product Showcase

Coverage of the latest in positioning, power transmission and automation products

## Features

### 18 Snake Handler

Hydro-Quebec heightens safety of plant operations with modular "snake-arm" manipulator

### 34 Choosing the Right Motor

How to match your application requirements with the correct motor

### 38 Motion Control Roundtable

Canada's motion control leaders discuss the slowing MC market, product trends and network security

### 42 Slot Car Racer

Beckhoff's smart servo motor system, XTS, creates a unique linear transport application



14



18



27



44



34



# Snake Handler

Hydro-Quebec heightens safety of plant operations with modular “snake-arm” manipulator.

By Steve Scanlan

Handling in small confined spaces where machinery cannot enter is usually done manually by several workers, complicating the task and posing a safety risk to handling personnel and equipment. Tighter worker safety norms in the 2009 Occupational Health and Safety Act have encouraged employers to seek handling equipment for these tasks, as well as safer methods for manual handling in an effort to reduce back and joint injury resulting from heavy lifting.

Cranes, cables, forklifts and other commonly used handling equipment can be complex and time-consuming to deploy and employ, especially in limited work spaces. In order to reduce job length, as well as ensuring the safety of personnel for handling in confined spaces, innovative solutions are required.

To address this challenge, Montreal-based robotics manufacturer, Robotics Design Inc., has created the ANATERGOARM TMA-500, an assisted manipulator that reforms the way handling heavy loads is performed. The arm was first tested in the confined and hazardous spaces under the rotor of Hydro-Quebec’s Robert Bourassa Generating Station. The TMA-500 designed to maximize job output and reduce personnel in the handling, repair, maintenance and manufacturing industries.

This assisted manipulator provides a high safety method for handling up to 500kg loads through tight spaces, and around obstacles. It can be assembled and disassembled onsite with a minimum workforce, due to the company’s ANAT technology. The patented mechanical architecture allows any mechanical and robotic system to be formed from identical U- and H-shaped modules. When connected in a chain, the modules distribute pressure evenly amongst other attached modules like cells of the body, improving payload carrying capacity without losing flexibility.

This ANATERGOARM model is operated by a single worker by moving the arm around its base by hand, and by pushing the arm over a distance when it is attached to a rail. It can be designed in a dual or quad-arm configuration, with arms working in unison to increase carrying capacity. Larger models can be created for heavier loads. In addition, the tool-holder is customizable for different shaped loads, or for clamping onto the object.

Hydro-Quebec deployed this arm at the Robert Bourassa generating station to remove, repair and replace 300kg break units



Hydro-Quebec used Robotics Design’s ANATERGOARM to repair and replace 300 kg break units at its Robert Bourassa Generating Station.

from a four-foot tall confined space under the turbine rotor in 2011. It helped make repairs easier and safer than attempting to repair the components on-site and reduced the down-time of the plant, in comparison to having them repaired in place.

The equipment’s modular design was critical for this task, as it allowed a single worker to carry the arm’s components and install and remove them easily, although the equipment can also be fixed in place. It can be quickly deployed and re-deployed for different handling tasks throughout the turbine, or stored along with the rail in portable cases. This ANATERGOARM was awarded the “Work Health and Safety” award in 2011 at the 21st exhibition of the innovation awards by IRSST (Institut de recherche Robert-Sauvé).

The TMA-500 is designed for automobile line assembly, materials handling, mould manipulation, positioning parts and any other handling, repair and maintenance task where heavy objects must be manipulated or require fine-tuning, and is particularly effective for tasks in limited spaces.

Throughout the automobile line assembly market, workers sit on assisted manipulators to attach doors, panels, windows and other parts. However, these arms don’t allow the arm to bend around more than one obstacle at a time, and take quite a bit of space.

By contrast, Robotic Design’s machinery allows workers to position parts using the most direct movement paths possible, while the arm itself requires minimal working space. In addition, its zero-gravity load design allows workers to carry 500kg loads horizontally without power con-



Like other ANATERGOARM models, the TMA-500 is composed of a series of H- and U-shaped modules that can support up to 500 kg.

sumption, and it maintains its vertical positioning even when power is removed.

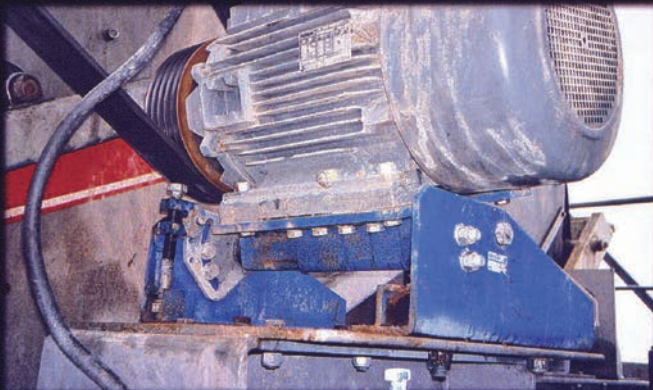
To date, two ANATERGOARM models have been released, starting with the AEA-15 tool-support, which won the gold medal and the Industrial Design award at the 31st International Exhibition of Inventions in Geneva. This ergonomic assisted manipulator allows users to position and manipulate pneumatic, electric and hydraulic tools without the effect of gravity, and allows users to manipulate tools.

It is made from anodized aircraft-grade aluminum, and eliminates the weight and absorbs torque of tools up to 15kg. The arm also reduces repetitive motion injury in workers, as well as workplace injury and worker fatigue. The arm can be used for welding, tapping, de-burring, nut running, burnishing and sizing, inserting helicoids, drilling, screwing, grinding, torch cutting, handling and repairing objects in restricted places and maintenance. It can also be customized to hold tooling of any shape and size and is scalable for heavier loads or can be tele-operated for tasks in confined or hazardous environments.

This equipment can be customized for heavier payload weights in tasks such as aircraft assembly and naval maintenance. The arm can also be motorized, and the equipment made tele-operated for tasks that must be performed at a distance, and can be made mobile along a removable rail, or fixed in place. Thanks to its modularity, this arm is fully customizable, as new systems and enhancements can be formed from identical ANAT modules making ANAT equipment the perfect solution for any handling task. This innovative industrial technology allows users to create the machine that suits their needs, without the standard high custom-made tooling costs.

<http://roboticsdesign.qc.ca>

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