CUSTOM-MADE CANADIAN MACHINES TAME CENTRAL ARTERY TUNNELS

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When it finally wraps up in 2004, Boston's $14-billion Central Artery/Tunnel project will feature almost four miles of state-of-the-art tunnels. Helping with the lion's share of tunnel finish work is Arva Industries Inc., St Thomas, Ontario, Canada, which teamed with a local joint venture to custom design and build two new self-propelled work platforms that are now seeing heavy-duty action on a $170-million job.

LIFT-0FF *Ceiling erector(above) and "giraffe" platform boost productivity. (Photo by Bigdig.com)*

(Photo by ARVA Industries Inc.)

"We had an aggressive schedule to finish over three miles of Interstate tunnel and we needed the ability to build the ceiling modules in the tunnel, then self-load, haul and erect in place," says Paul E. Buco, project manager for McCourt Obayashi JV, Boston. "There was nothing in the market to meet our needs but within two weeks of talking to Arva officials we had a functional design and a finished product in nine months."

Arva was formed in 1980 to design and manufacture specialized equipment and lifting devices. To meet the project's needs, Arva developed a huge ceiling module erector and support system costing $500,000. Using the erector, McCourt Obayashi workers typically can mount eight to 10 modules in a standard shift. Each 12x40-ft module weighs 30,000 lb and is comprised of five precast concrete panels joined by

structural steel supports. The modules serve as the tunnel ceiling finish and the air exhaust plenum. "This [machine] was our brainchild and we worked with Arva to develop it," says Buco.

"Alternatives, such as a low-bed trailer with hydraulic jacks, yielded production rates of three modules per shift."

To maintain aggressive production, Arva also designed six dolly carts on which to build the modules. "We almost have a nonstop factory set up in the tunnel," says Buco. "Trailers supply materials to construct two complete modules per cart. The dolly loads on the erector like a dumpster [and the erector] then travels to the work site and lifts it to the ceiling where the modules are fastened to hangers." Precise movement is needed to place suspension pins, so workers on another platform use joystick-equipped radio controls. "It provides complete freedom of movement for workers in the air without dragging around a communications cable," says Arva President Fred Smith. "But it also has hydraulic and electric backups to keep it fully operational."

Before the panels can be placed, workers must complete other ceiling work using two "giraffes." The $220,000 Arva work platforms can lift 20,000 LB up to 23 ft on a four-section telescopic column. Each giraffe replaces four conventional scissor and boom lifts on the Interstate 93 tunnel.

Because the giraffes are only 10 ft wide in transport mode and up to 17 ft wide when operational, they can rotate 360 degrees at the top in the tunnel to accommodate a transverse placement from their 40-ft-long platform and allow traffic to flow underneath. Up to 10 workers using electric and hydraulic tools set hatches and cellular decking in the tunnel ceiling. After the ceiling work is in place, a joint venture subcontractor, Adams Management Group Inc., Worcester, Mass., uses another giraffe to apply fireproofing.

"The big advantage [of the machine] is the fact that the materials to support the work are on the platform, whereas in a conventional lift, you have to repeatedly come down and restock," says Buco. "It saves time and having a larger platform provides a safer environment."

Each giraffe has a hydraulically controlled trap door and telescoping stairs that allow workers to move around easily. "We don't need to lower it or bring in another machine to off-load workers," says Buco. "That's important because it doesn't tie up another lift."

"We do a lot of special design work but we've never built a self-propelled work platform before. So the big challenge was to meet all codes and operating conditions in a short period of time," says Smith. "The staircase design was particularly challenging because it required telescopic sections that had to be

operated anywhere from 10 ft to 23 ft and cannot be lowered while the platform is turning. Another challenge was being able to rotate the deck from the top."

Joint venture officials are pleased with the equipment. "The most complicated part of the job, ceiling installation, now has become routine," says Buco. "And the equipment has worked so well there isn't one thing we would change today."