

PROFORM PRESS BRAKES PROVE BULLETPROOF RELIABLE IN 24/7 PRODUCTION OF HUMVEE “UP-ARMOR”

Around-the-clock production is a life and death matter for BAE Systems' armored vehicle complex in Cincinnati, Ohio, says Dan Sizemore, plant manager of a facility dedicated to “up-armor” kits for military Humvee vehicles.

The plant operates 24/7 churning out underbody armor components to increase Humvee protection against land mines and improvised explosive devices. Emphasizing the critical importance of the work being done, BAE employee can see the charred, twisted remains of an up-armored Humvee that was blown up in Afghanistan by a landmine, but saved the lives of the crew.

The CINCINNATI complex has been creating armor for Humvees since 1993 as part of Armor Holdings, which was purchased by BAE in July, 2007. However, the conflicts in Iraq and Afghanistan demanded tremendous boosts in production volumes, says Sizemore. Applying lean methods, cellular manufacturing, and standardized equipment and processes, the plant has doubled output over the past two years from 40 to 80 truck armor sets a day.

In one respect, the press brakes are the most critical element in the cell processing, says Sizemore. As the only non-automated element, bend precision and consistency are essential. “We have to present accurate parts to the robot,” he stresses. “The robot goes to the same spot every time. If a bend is off, the set is ruined.



Up-armored Humvee features under-body armor cladding, thicker armored doors, and ballistic glass. Eighty Up-Armor kits produced by BAE in Cincinnati ship daily to AM General's Humvee plant in Mishawaka, Indiana, for truck assembly.

For this kind of automated product, variation is the devil.”

To minimize variation, the Up-Armor plant standardized on one model of press brake, PROFORM machines from CINCINNATI Incorporated, along with interchangeable dies and programs. “We’re able to standardize our training, our tooling, bends, programs, and methods, and our maintenance,” says Sizemore. “Along with reducing variation, this gives us maximum flexibility in scheduling and assigning personnel.”

CINCINNATI provided initial training on the press brakes to cell personnel, but now BAE Systems handles training in-house with experienced operators giving instruction to new employees, he says.



Dan Sizemore is plant manager for Humvee up-armor production at BAE Systems in Cincinnati. The plant is organized for 2417 cellular production. Flow through processing starts with cutting part shapes out of plate. Components are next bent on CINCINNATI press brakes and then sent to robot welding.

Known for heavy-duty construction, the CINCINNATI press brakes have proven to be highly reliable, essential in round-the-clock production, stresses Sizemore. Precision servo hydraulics on a highly rigid, heavyweight platform allow the PROFORM to hold ram repeatability to ± 0.001 .

"The CINCINNATI brakes are also very operator friendly and easy to program," he adds. A powerful PC-based control combines 3D graphics interface with simple touch-screen operation to speed setup and programming for optimized bending productivity."

The up-armor plant is organized into four fabricating cells, each with a part of CINCINNATI press brakes. Between the cells, BAE



Standardizing on CINCINNATI press brakes allows interchangeable dies, programs, and operators, simplifies training and maintenance, and enables maximum flexibility in scheduling. The company has 11 CINCINNATI press brakes bending armor parts - eight for Humvee up-armor kits, three for the Caiman MRAP program.

ordered six 90-ton PROFORMs and two 350-ton units to handle its mix of part sizes. Seven underbody armor parts are bent in each cell, four on one press brake, three on the other. "Standardized press sets and dedicated setups for each cell allow us to drive down time and maximize throughput," he says.

After bending, the seven pieces go to automated robot welding at the final station in the cell. Complete up-armor sets ship daily to AM General's Humvee plant in Mishawaka, Indiana, for truck assembly. Previously, such as during the Balkans break-up, the Fairfield plant installed armor on finished Humvees, notes Sizemore, but integrating armor into Humvee vehicle assembly speeds delivery to combat troops.

An up-armored Humvee weighs about 2000 lbs. more than a standard Humvee. Besides under body armor, modifications include 200-lb. plate steel doors and bonded multi-layer, ballistic-resistant to glass

In addition to Humvee up-armor kits, the CINCINNATI complex produces armoring for the new MRAP combat vehicles, which feature V-shaped hulls to divert explosive charges away from the passenger compartment. BAE Systems in CINCINNATI also creates armored "stealth" versions of production vehicles for governments and private companies to protect their employees from terrorists, insurgents and kidnappers. Three more PROFORM press brakes are used to produce parts for those applications. Altogether, BAE Systems CINCINNATI fabrication operations process some 55 tons of steel a day.

The company started in 1876 as a coach builder, built its first motorcar body in 1906, and in 1942 began production of commercial armored vehicles. It has supplied armored vehicles for several U.S. presidents since and more than 60 international heads-of-state.

PROFORM press brakes are available in 14 model sizes from 60 to 2000 tons. They feature adjustable stroke length and full-tonnage throughout the stroke. Programmable ram speed allows users to maximize forming speeds for fast throughput of small parts and to select optimum speed for large parts to reduce back-bending and ease part handling.