

“Exploding Toolbars”: The Rest Of The Story

By Jim Houtsma, Associate Editor

There's no doubt about it. Gases can build up inside sealed toolbars and explode if set off by a spark.

Since the last issue of FARM SHOW - when we wondered if the reports we'd seen on the internet about exploding toolbars were truth or hoax - we've talked with several farmers who've had it happen to them.

“Unfortunately, this isn't a hoax and it may be just the tip of the iceberg,” says Jane Boyd, an agricultural nursing specialist at the University of Rochester, N.Y. She got involved with two separate incidents in New York state. “We've had seven more unconfirmed reports from around the Midwest about similar mishaps which we believe involve at least three other manufacturers. Doctors in Minnesota and Wisconsin told us they've treated farmers with injuries from such accidents in the past.”

Here are details on two well-documented toolbar “explosions”:

Tom Martin, Piffard, N.Y.

Tom Martin works on the Joe Weiland farm near Piffard, N.Y. In April, 1995, he drilled a hole in the rear beam of a one-year-old Brillion chisel plow to attach a hydraulic hose bracket. He was working just outside the doors of the shop. His boss, Joe Weiland, was working inside. All Martin remembers is a large flash as his drill penetrated the toolbar. Weiland vividly recalls Martin, who's 6 ft., 7 in. tall and weighs 275 lbs., suddenly flying through the open door - in flames - and landing on the floor 20 ft. from the chisel plow.

His forearms and hands were badly burned and all his facial hair was singed off. He was rushed to the hospital where it took three hours in the emergency room to treat his third degree burns.

“When we inspected the toolbar we found one clean little hole with no discoloration, charring or blistering of paint where Tom had drilled,” Weiland says. “We called the local Brillion dealer where we bought the plow and a company rep came out the next morning. His main concern was how Tom was doing. Then he told us the company would have a new plow out to us the next morning. They delivered a bigger and better machine than

the one we had and hauled the other one away.”

Joe Shanks, Lima, N.Y.

In October, 1996, Joe Shanks had a nearly identical experience when he drilled a 1/4-in. hole into the rear frame of a 15-ft. Brillion chisel plow. He was mounting a slow moving vehicle sign on back of the 12-year-old implement.

“As I felt the drill penetrate the frame, I backed it off just a little. As soon as I did, intense heat and orange flame shot out of the hole, just like a jet engine. I'm 5 ft., 9 in. tall and weigh about 190 lbs. so I'm stocky, but the force blew me 30 ft., out of the machine shed and into the field. Luckily, it was a cold morning and I had plenty of clothing on, but no gloves. It burned a big hole right through all the layers of clothing down to my stomach and chest and burned my hands, which were directly in the flame. I had extensive second degree burns over an estimated 10 to 12 percent of my body. I called the company the next day and nobody said a word about the first accident, but they offered me a brand new machine and wanted to haul the old one away for testing.”

Shanks refused, insisting that the chisel plow remain at his farm.

Government Gets Involved

The farmers involved were soon contacted by Jane Boyd at the University of Rochester and researchers at the National Institute for Occupational Safety and Health (NIOSH) who began comparing the two accident reports. Samples of gas taken from the toolbar at Shanks' farm were analyzed. Brillion co-operated with NIOSH, delivering Weiland's chisel plow to a Pittsburgh research lab so it could be tested, too.

Tests showed a mixture of gas in the frames with a hydrogen content ranging from 60 to 90 percent. The hydrogen was apparently produced by an electrochemical reaction between galvanized metal punchings used for ballast and the water and oil emulsion coating on the metal wafers.

The discovery prompted NIOSH to issue a hazard warning in July, 1998, which included these recommendations to farmers:

- Do not drill or cut into any sealed frames of agricultural equipment.
- Use clamps or other non-penetrating devices to secure “SMV” signs or other objects to sealed equipment frames.
- If a sealed frame member must be penetrated, only qualified personnel who are aware of the hazard and have the proper equipment should attempt the operation.

Manufacturers Are Warned

NIOSH also issued recommendations to manufacturers. Among other things, they call for using only clean, dry, non-galvanized steel ballast and incorporating a pressure relief system into all sealed frame members.

FARM SHOW has learned that Brillion immediately incorporated pressure relief vents in their sealed frame members. The company is also reported to be considering redesigning its frames so they don't require any ballast at all.

However, David McClain, president of the Brillion, Wis., manufacturer, declined to comment on any aspect of the situation because of a lawsuit filed against the company by Joe Shanks.

Shanks is seeking \$1 million in compensatory damages for injuries sustained in the accident, according to documents filed in federal district court in Rochester, N.Y., in February.

“I don't want this hushed up because I don't want anyone else to get hurt or maybe killed,” Shanks says.

As for Martin, he eventually agreed to a small out-of-court settlement with Brillion just so he could get on with his life. “That was after months of stonewalling by the company and its insurance company,” notes Martin, 51, who now works for the local highway department.

Meantime, the scope of the hazard remains uncertain because of a number of unknowns, such as the source of punchings among those manufacturers that use them for ballast, says John Pollock, a retired Cornell University ag engineer and lead engineering investigator of the two New York incidents.

“We don't even know for sure how many manufacturers use ballast, let alone the portion of market share any given manufacturer has,” Pollock says. “For example, we know that Deere doesn't add ballast and they have a very large market share. On the other hand, a smaller, short-line manufacturer may ballast, but probably doesn't have anywhere near the market share of a manufacturer like Deere. So the majority of plows out there *may* be absolutely safe.”

Nevertheless, Pollock says farmers should follow NIOSH recommendations to the letter and treat all sealed frame members as potential “gas storage units”.

Readers Respond To Exploding Toolbar Story

Six years ago our neighbor had a fire in his machine shed. The shed was about one third full of round bales and the rest contained machinery. A Landoll chisel plow was backed up close to the bales.

One day the bales somehow caught fire. As soon as I heard about the fire I started driving toward the farm. I was about 1/4 mile away when I heard a tremendous explosion. When I arrived I found out that the main beam of the chisel plow had exploded and went flying right up through the shed's roof like a big steaming missile. It landed only about 10 ft. away from the fire department's new pumper truck. The beam was all twisted up and turned inside out. We heard two or three more smaller explosions as the fire continued to burn.

The next day after the fire was out I went back. There were three or four sections of 2-ft. long sealed box tubing on the chisel plow that hadn't exploded but were swelled up as round as pipes. I don't know if there were shavings inside the beam that exploded. I do know that all the other beams that were opened up later didn't have any shavings or punchouts inside them.

I don't know why chisel plow manufacturers don't drill a small hole in the bottom of the toolbar and put a plastic

plug in it to let out pressure. I also don't know how likely it is that the same conditions could be generated to cause this situation to happen again. (*Milton Weaver, Wooster, Ohio*)

If I ever had to weld on a sealed toolbar, I would back off 50 yards, get behind a barrier, and use a high-powered rifle to shoot a hole through it first to let out any gas. The thickest wall on most toolbars is 1/4 in. so it wouldn't be a problem to shoot through it. It would be safer than taking your chances drilling through it. (*Mike Pacha, Marysville, Kan.*)

Filling toolbars with metal filings and punch-outs obviously isn't such a good idea. Moisture will condense inside anything that's sealed tight. I know because water condenses regularly inside the water lines in my dairy barn. It'll also condense inside a metal gas can. It condenses because of the difference in temperatures inside and outside. When a toolbar is welded shut on both ends water will condense inside it and between the metal filings and punch-outs. It might not take much water to start a reaction. I think any sealed toolbar should have vent holes in it. I made my own toolbar and made sure that I didn't seal it up because I was concerned about this problem. (*Dan Hill, Dismont, Maine*)

I run a small shop here in Colorado. I've never had a problem with a toolbar explosion but I can see how it could happen. In my opinion, the best thing to do if you're worried about it is to use a hydraulic press to punch a hole in the bar to let the gasses escape. A punch ordinarily does not create a spark. Manufacturers should leave vent holes to allow gases and moisture to escape. (*Darman Fast, Cedar Edge, Colo.*)

Last issue's editorial, “Exploding Toolbars: Truth or Hoax”, stated that some bars are filled with metal punchings for ballast and that mix with water to somehow form hydrogen gas.

A leading manufacturer of tillage equipment stated that he could not understand how water got inside a sealed frame, unless a weld were cracked. I feel he is wrong. If an implement is parked outdoors in the sun, moisture could condense inside the frame much the same as an overturned glass on a table in sun does. Over time, I believe enough moisture could collect to create a problem.

Perhaps in the future, vents could be installed in these frames at the date of manufacture. (*Charles F. Weyrough, Hidden Acres, 12238 Genesee St., Alden, N.Y. 14004; ph 716 937-9613*)

FARM SHOW's article on “exploding toolbars” really got my attention.

I'm concerned about the statement that, for there to be a problem, water would have to first get into the toolbar through cracks, and that if the welds on your toolbar appear solid you probably don't have anything to worry about. The way I see it, if there are cracks big enough to let water in, these same cracks would have to let the gas out. Cracks or no cracks, it appears any ballasted toolbar should be approached with extreme caution.

The technology exists for tapping into pressurized gas, water and steam lines. Perhaps the same technology could be adapted for toolbars. Once a shut-off valve was safely installed, internal gas pressure could slowly be bled off in a safe and controlled manner. It would probably also be wise for all new ballasted toolbars to come with weep holes or breathers, which would keep moisture out while preventing the build-up of gas internally.

I first heard of this problem about 10 years ago, when a couple of farmers and farm equipment dealers reported having experienced the problem.

Meantime, keep up the good work investigating this potentially lethal hazard. (*Bruce Brittain, 135 Warren Road, Ithaca, N.Y. 14850; ph 315 668-3306*)