By the mid-1990s, Sunnybrook Welding had mastered the art of fabricating a rigid combine cylinder that did not flex or bend in a heavy crop. Now it was faced with a challenge. Was its high inertia cylinder an academic engineering exercise, or was there a way to extract superior harvest performance so a farmer had good reason to pay $4,000 or $5,000?

“We took a real good look at those first Cat Lexion combines that came to North America,” says Gerald Foster, owner of Sunnybrook Welding in Sunnybrook AB. “Now here was a combine with 35,000 pounds of steel rumbling across the field, compared to 25,000 pounds for the big North American combines of the day. In a good barley field, the Cat processed 1,600 bushels per hour while the competition processed only 900 bushels per hour. “Many people say the difference is that everything on the Cat is bigger, and that’s true. But, purely in terms of harvest function, we think the most significant factor is their unique accelerated pre-separation cylinder. Everything else is engineered bigger to support the higher capacity created by that extra cylinder up front.”

At that point, Foster said his goal at Sunnybrook was to take a traditional cylinder design and get it as close as possible to the Cat performance, but without an additional pre-cylinder drum.

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High inertia cylinder

Foster says there’s no mystery about the basic high inertia cylinder. The company started building these when it first produced enclosed rotors for Gleaners beginning in 1991. Since then, it has built rotors and cylinders from scratch for just about every type of combine sold in North America.

“The term ‘high inertia’ simply means the weight is displaced outward from the centre of the cylinder. The more weight you have out at the circumference of a drum, the more inertia you have and the more it wants to keep spinning, like a heavy flywheel. On a high inertia cylinder, the more weight you have out at the circumference, it may weigh about the same as an original equipment high inertia cylinder, but ours has more rolling force once you get it rolling. Once it starts spinning, it wants to keep on spinning.”

Foster says all this spinning mass, by itself, offers only a small advantage in a harvest operation. The rigidity of the cylinder helps a lot, but Sunnybrook had to find a way to take full advantage.
Aggressive bars

“The primary factor affecting combine performance is the crop contact area, or the surface of the cylinder bar. So if we wanted to make use of this high inertia to gain a functional advantage, we had to put in more aggressive cylinder bars. When we tested our first prototypes, the crops were in as much wear between the teeth as we saw at the trials. That confirmed that something different was happening in there.”

Rigid tube

While conventional combine cylinder bars are built with a spine and a shaft down the centre, with cylinder bars as braces, the Sunnybrook design uses the cylinder tube itself as the structural shaft. Large Browning hubs mounted on the two end plates support the cylinder. This creates a rigid tube that resists bending or warping in the middle.

“In a conventional design, the cylinder/concave bows anywhere from an eighth to a quarter of an inch. Our design creates a mat that is more uniform from side to side. We don’t feel the plugs. Before, a plug would just sit there. You could tell the difference right away just by feeling the plugs.”

Reversible cylinder

Rub bars on the Sunnybrook high inertia cylinder are made in 12-inch to 16-inch sections instead of continuous bars across the whole 55-inch to 70-inch width of the cylinder. This makes for quick repair when a stone damages one or two bars. Each bar is reversible, so for longer service life, service sides don’t typically allow quick access, with enough rooming work for impact wrench. Another unique feature is a reversible cylinder. It can be turned for end with all bars in place. This means a producer can flip-flop and get all new rub bars without individually rewiring the rub bars.

“Sunnybrook provides a solution to get them all the same. They are not rebuild cylinder bars. A complete kit, with bonzoned bars, for a class six/raven combine costs $4,000.”

“If this is such a good idea...”

“If this is such a good idea, why doesn’t John Deere, Cat, New Holland and AGCO all have it on their combine? That’s a question I got all the time at farm shows and field demos,” says Foster. “There is no polite answer to that question. For one thing, manufacturing costs are not comparable. Ours cost a lot more to build. That extra cost is probably a factor for combine manufacturers.

“The other thing that always annoys me is when people infer the best products come from the United States or Europe. The simple fact is that Canadian farmers don’t realize some of the top engineers down in Iowa and Kansas and Nebraska are Canadians who can design and construct as well, if not better than, their American cousins or the Europeans.”

PAM test

To determine if there really is a functional difference between the aggressive high inertia cylinder bars and conventional cylinders, Sunnybrook contracted with Prairie Agricultural Machinery Institute at Humboldt SK to do lab tests comparing power to run the cylinder and weight on the combine.

PAMI used a stock John Deere 9630 combine that could be fitted with either cylinder. With the combine running but stationary, a 60-foot long, seven-row strip of wheat straw was used to draw the straw to the combine pickup point at various feedrates. Most tests were conducted in the range of 700 pounds of product per minute because this is the upper threshold of class six machinery.

To ensure accurate measurements, a tractor pull was used to drive the cylinder. A torque sensor recorded 800 readings per second. The lab tests showed the Sunnybrook cylinder required about 17 percent less power.

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“If we decided to put it in, that would make it a lot stronger and I find it’s vibration free, it has staggered bars, which makes it a little bit more aggressive in getting the straw spread evenly throughout the concave area.”

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“It was just a couple of bolts. Strap in the new bar and away we went.”

Contact: Gerald Foster 780-789-3855

Farmers say it’s the real deal

Jay Holt

Jay Holt runs a 9610 and a three-year-old 9620, which has 25 more horsepower. He wondered if it was possible to bring the older combine up to the performance level of the newer machine so he installed a Sunnybrook cylinder and backer from Sunnybrook. “I looked pretty closely at their design. It’s a lot heavier, because it’s totally enclosed. I think that makes it a lot stronger and I find it’s vibration free, it has staggered bars, which makes it a little bit more aggressive in getting the straw spread evenly throughout the concave area.”

“With our setup, we have the distinction of having bought the only unit Sunnybrook ever built with chrome-instead of boronized bars.

“I was very surprised with how quickly it worked. I took the new cylinder for a test run and the machine runs so much smoother. The original cylinder had no weight, it was not solid, so it went out of balance. That’s when you get the flexing.”

“This set-up feeds much better. I don’t feel the plugs. Before, a plug would just sit there. Then it would all go through at once and you’d feel the sudden change in rpm. The combine would jump around 300 or 400 rpm all the time. Now it’s very gradually up or down, only 50 rpm.”

Schmidt says the new setup somehow spreads out the material and feeds it through gradually so the combine doesn’t seem to feel it. It’s easier on the whole machine.

“It’s hard to understand why the manufacturers have been building combine for many years and they can’t build something like this at the factory.”

Bill Ramsey

When Bill Ramsey bought his new Gleaner CS4 four years ago, he removed the original cylinder and backer and put in Sunnybrook’s. “That way they’re in good condition so I can put them back in when it comes time to storage, ” he says.

“In their place, he installed a high inertia cylinder and backer from Sunnybrook. I looked pretty closely at their design. It’s a lot heavier, because it’s totally enclosed. I think that makes it a lot stronger and I find it’s vibration free, it has staggered bars, which makes it a little bit more aggressive in getting the straw spread evenly throughout the concave area.”

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Contact: 780-336-2269

Murray Palim

Murray Palim runs four Lebcon 480s on his farm near Calgary. He converted one of the Sunnybrook before this harvest, but says conditions this year didn’t put any of his combined to the test.

“We had a pretty good crop this year, but the straw was dry. This wasn’t the kind of year we could really tell any difference.”

Contact: Jay Holt 780-332-3441

Lawrence Schmidt

Lawrence Schmidt runs three 8820 combines. He has the sunnybrook in his 9820. “It runs much smoother. The original cylinder had no weight, it was not solid, so it went out of balance. That’s when you get the flexing.”

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Contact: 780-486-8475

Claus Toerper

Claus Toerper bought a 1997 Massey 9860 in 1998. A year later, he decided to try the Sunnybrook high inertia cylinder. He feels he has gained fuel efficiency, but the main advantage has been having a simpler design.

“It runs much smoother in tough conditions. The crop seems to flow a lot better, especially when you get into something like wet gale vines. You put a wind through it and it just sort of gradually slows the engine down a little bit and then it splits off. Of course, we can’t see what’s happening in there, but I’d be pretty sure that what we’re getting is an even spread of crop right across the cylinder.”

He put a rock through and broke a bar in the first 400 acres with the new cylinder, but the repair was quick. “It was just a couple of bolts. Strap in the new bar and away we went.”

Contact: 780-786-2242

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Contact: Jay Holt 780-336-2269

Lawrence Schmidt 780-332-3441

Bill Ramsey 780-232-8133

Michael Raine 780-486-8475

Claus Toerper 780-786-2242

Murray Palim 403-650-7435

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