

# Mandrel bending:

Car enthusiasts flock to Southern California exhaust engineer for both show and go

**D**on't even suggest that LaBree Motorsports is a muffler shop. Company owner Brent LaBree is emphatic that his Canoga Park, Calif., firm engineers custom exhaust systems. It produces everything but the manifold for domestic and imported high-performance cars ranging from slammed Honda Civics to Lamborghinis.

The Ercolina Megabender 030 from CML International is central to LaBree Motorsports' custom exhaust business. The machine makes mandrel bending cost-effective for small-volume operations producing 1,000 or fewer bends per day.

*Photographs courtesy of CML-U.S.A., Inc.*



# If you offer it, they will come

It's also an exhaust fabricator with a long leg up on its competitors. LaBree claims that he is the only installer in the car-obsessed Southern California market with a mandrel tube bender.

"The mandrel bender is a response to customer demand," he says. "People would call and ask if we had a mandrel bender. I got so many calls that I decided to buy one."

The unrippled appearance of a mandrel bend wasn't the only reason LaBree's customers pressed him to add the capability. Because an open bender doesn't support the tube ID, the walls tend to wrinkle when forming tight radii, and that affects performance as well as cosmetics.

"Crush benders don't maintain the wall shape and reduce the ID of the tube," LaBree reports. "The distortion restricts exhaust flow. A 2¼-in. OD pipe can be reduced to as little as 2 in. on a sharp bend. That cuts horsepower by about 7 percent."

## Limited production

If you're a company the size of LaBree Motorsports, doing custom fabricating in a single 2,000 sq.-ft. location, buying a mandrel bender can be a daunting investment. Brent LaBree and his technicians fit an exhaust system to a car the way a tailor measures a bespoke suit, and while their bending needs are long on quality, they are significantly short on quantity.

The typical CNC mandrel bender is a high-production machine, making 10,000-plus bends per day in

an automotive plant, furniture factory or other OEM operation. LaBree Motorsports does build some systems for area speed shops and tuners, and also for sale to Internet customers. These standardized products are bench-assembled using welding jigs and fixtures and are the closest the company comes to volume production.

But the bulk of its work is done on individual customers' cars, using an angle finder and a degree wheel to design tube sections when a vehicle comes into the shop for the first time. A heavy day of manufacturing, from 100 to 1,000 bends, wouldn't touch a hundredth to a tenth of a CNC bender's capability. The company needed a mandrel bender built for its low-volume requirements.

Brent LaBree found what he needed in the Ercolina Megabender 030. Built in Italy by CML International S.p.A., the machine is imported by CML-U.S.A., Inc., the North American subsidiary headquartered in Davenport, Iowa. It's engineered for up to 1,000 bends per day and marketed to job shops doing short-run custom work and low-volume production. It is also promoted as a prototyping bender for high-volume operations.

The Megabender is a semiautomatic machine that combines micro-processor and manual controls. It eliminates some of the automation of full-featured CNC benders but sells at roughly one-third the price.

Fully programmable are the bend angle—the C-axis—as well as material

springback compensation, clamping, mandrel movement and bending speed. Positioning the bend along the length of the tube and rotating the tube out of the original plane are manual adjustments.

## Controlling bend distance

"A bender that is fully automated would control the distance between bends and the part rotation with servomotors," explains Scott Tunis, general manager at CML-U.S.A. "The linear distance between bends on the Megabender is set with hard stops. Part rotation is measured with a calibrated chuck."

A physical measurement of the distance between bends is unnecessary. Spacing is shown by a digital readout that indicates where to set the stops. A readout for the chuck displays degree of rotation from the original plane, and the chuck is graduated in 1-degree increments.

Most high-production mandrel benders are fully hydraulic. For the Megabender it's hydraulic operation for tube clamping and mandrel movement, and electromechanical drive for the bending head. The hydraulic system has a built-in pump, and bending power is provided by a brushless induction motor with a gear reducer. A rotary encoder on the motor maintains bend angle accuracy within ±1 degree.

The footprint of the Megabender is smaller than heavier-duty machines. Because it is a relatively low production bender, it isn't as massive, and the tube clamping technology makes the





# Tube Bending



forming mechanism more compact.

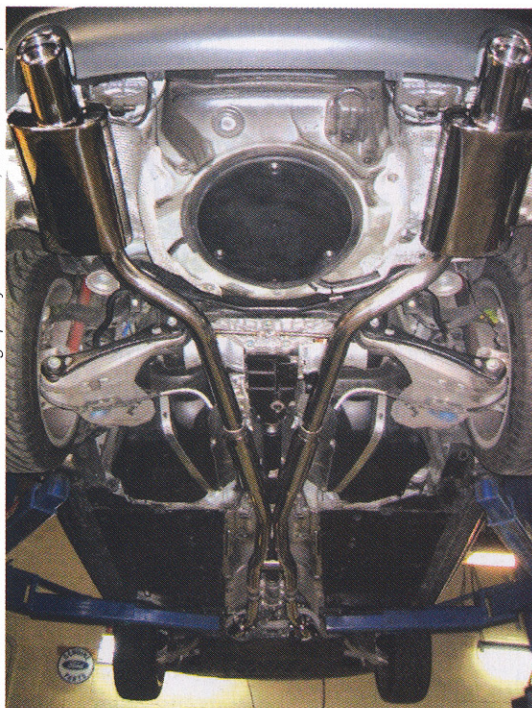
The capacity of the Megabender targets

LaBree Motorsports' forming range dead-center. The machine bends diameters from  $\frac{3}{8}$  in. to 3 in. with a minimum bend radius of 1.5 times the OD on tube below  $2\frac{1}{4}$ -in. in diameter. Over  $2\frac{1}{4}$ -in., it's 1.75 times the diameter.

## Aluminized and stainless

LaBree uses five mandrels to form 14-ga. (0.0747-in.) aluminized mild steel tube in diameters of  $2\frac{1}{4}$  in.,  $2\frac{1}{2}$  in. and 3 in.,

Photograph by Brent LaBree, LaBree Motorsports.



LaBree's manifold-back exhaust system wrings as much as 65 additional horsepower from the Audi S4's already-potent 340-hp 4.2-liter naturally aspirated V8. Mufflers and resonators are custom-made for LaBree by Sebring Tuning/Jim Cook Racing.

and 16-ga. (0.0598-in.) 304 stainless steel in  $2\frac{1}{2}$  in. and 3 in. Its minimum bend radius: a generous two times the tube OD.

LaBree's Megabender has a 5-ft. bend table, the smallest produced. Interchangeable tables of 10 ft., 13 ft. and 20 ft. are also available, and Brent LaBree is considering a 10-footer. "We bought the 5-ft. bed because no exhaust system component is longer than 5 ft.," he says. "And space is at a premium in our shop."

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The company also fabricates racecar roll cages, which require 10-ft. tube lengths. That work is currently done with a nonmotorized bender. "We are considering a move to a larger shop," LaBree notes. "When we do, I may add a 10-ft. bed. With that, I can mandrel-bend the roll cage components."

LaBree doesn't store bend recipes in the Megabender's numerical controller. Job data are compiled in meticulously maintained notebooks detailing every custom system LaBree has produced. While each drive-in customer receives a custom-fabricated installation, the complete hand measuring procedure is done only on the first vehicle of its type to be fitted. Subsequent jobs use the recipes.

LaBree tests each system with a sound

pressure meter to certify that it meets California's rigorous noise pollution standard of 90 dBA at 2,700 rpm. The company also documents the performance of its production exhausts with dynamometer tests. Horsepower gains are generally 15 percent to 20 percent and 2 mpg to 4 mpg in fuel efficiency. "On most V8 pickup trucks that I do, our cat-back system will give an increase of approximately 20-22 rear-wheel horsepower and a 4-mpg fuel economy improvement," LaBree reports.

#### Couldn't do without

LaBree won't consider doing business without the mandrel bender. "If I didn't have it, I'd be like every other muffler shop in the [San Fernando] Valley," he acknowledges. "But with it, I have

customers drive here from Northern California, Oregon, Arizona, Texas—even Ohio."

Word of mouth and enthusiast Web sites are LaBree's most effective marketing tools. "There's a car show or meet virtually every night in Southern California," he says. "Enthusiasts get together and compare notes. Our systems get a lot of exposure.

"I'm doing thousands of dollars worth of business that I would lose without this capability," he concludes. "I really can't live without it."

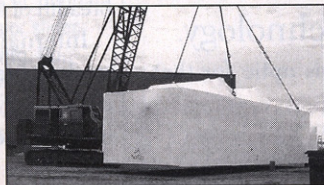
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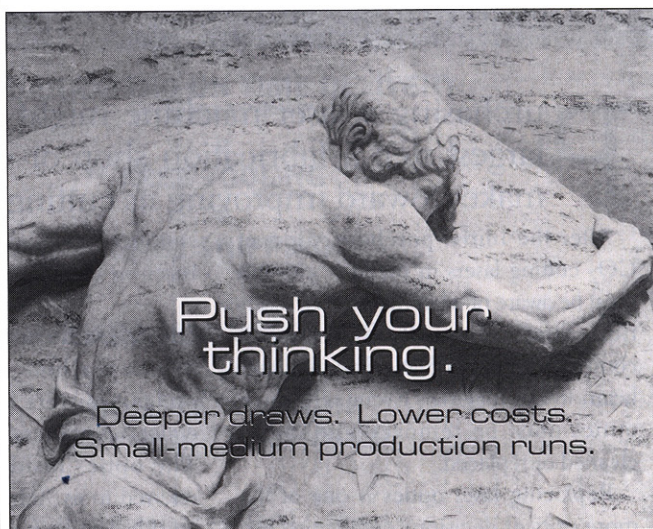


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