



like a bird's foot where I used a rotary end mill file on a milling machine to make the grooves in the engine head.

"Basically, the grooved head channels the explosion to the edge of the cylinder. This channeling scours the ring area by creating more effective turbulence. The burn is more complete and more energy gets transferred to the crankshaft. After modification, leaning of the fuel-to-air mix helps maximize efficiency.

"I had problems with sediment in the biofuel I use in my tractor. The sediment settled in the tractor's factory fuel filter, so I had to change the filter often and it got expensive. To solve the problem, I installed two extra spin-on fuel filters. One is located underneath the tractor's footboard and the other behind a homemade metal guard.

"The add-on filters I used are the same kind of filters used on many bulk storage tanks. They're a lot bigger than the factory filter and they catch a lot of sediment so I don't have to change the factory filter nearly as often.



"My homemade wire stretcher, designed to be used with a come-along, saves a lot of hassle. It's made from a length of twisted, 3/4-in. dia. metal rod with a hook at each end. A tapered metal 'gripper' with a donut-shaped hole at one end fits over each hook.

"I fit the wire under a loose ring on the gripper, then slide the ring up over the wire until the tapered rod grips it tight. The hooks are spaced about as far apart as the distance between two wires in a fence. That way the rod keeps the wire strands separated so they don't get tangled up.

"Each gripper can be used individually, or I can stretch two wires together at the same time."

John Bayes, Labelle, Fla.: "To discourage rodents from getting under your vehicle's hood and chewing up wires and insulation, sprinkle about a dozen mothballs around the perimeter of the vehicle. Don't put any under the hood, as you could get mighty sick when you get back in the vehicle. Also, remember to keep children and pets away."



Greg Smith, Pacific, Mo.: Greg came up with a simple solution for tool storage in his crew cab pickup. Although retired, he does a lot of handyman work and likes to have his tools with them. But he didn't want to have a big toolbox in the box. So he made some shelves that simply rest on top of the back seats in the cab. They can be quickly lifted out to make room for grandkids or guns and they protect the seats from damage that would be caused by placing toolboxes directly onto them.



Kenneth Gustafson, Carney, Mich.: "I couldn't find a replacement battery for my old Sears cordless drill. The drill was still in good shape, so I came up with a low-cost way to give it new life.

"I removed the battery from the drill and attached one end of a lamp cord to the battery terminals inside the drill. Then I attached a pair of alligator clips to the other end of the cord, allowing me to hook up the drill to any 12-volt battery.

"It works great and was simple to do. I use it often at our cabin, which doesn't have any electricity. I also take it with me on my 4-wheeler. I hook it up to a lawn mower battery that I carry around in a box on back of the 4-wheeler. It really comes in handy when I'm at my deer blind."

Forge Furnaces Made From Beer Keg

Brian Johnson turns steel cable into Damascus steel bars, bending and forging as many as 56 layers for strength and appearance. The steel bars, or "billets", are used for making knife blades. He has also made a steel vise, anvil and a multitude of other tools out of the metal. To reshape the hard steel, he uses heating and forging furnaces that he built himself using a beer keg and a propane tank.

"My single burner forge furnace puts out more than 2,600°F," says Johnson. "The body is a 16-gal., stainless steel beer keg with castable refractory interior."

Making the flux-proof forging furnace was a more complex job. The easy part was cutting a hole for the fire chamber. The refractory cement had to be poured all at once.

"I cut one end off the beer keg and centered a cylinder for the fire chamber inside the keg," recalls Johnson. "Insulation anchors had to be welded inside the shell to anchor the refractory material should it crack. I bought some anchors and made more, placing them every 6 in. on center. They give the refractory mud something to hold to while it cures."

Refractory material also had to be formed for the furnace mouth. An earlier furnace had a steel mouth, but it oxidized with heating and cooling. With this furnace, he made an outside form for the door and mouth with an inside square tube. Once the refractory cement was poured and cured, the form and the inside tube were cut away, and Johnson had a furnace with no interior steel to oxidize.

Johnson reattached the keg end, first fabricating 1/2-in. grooved rings in each edge. Using 3/8-in. thick, 1-in. bar stock, he made a steel ring to fit inside the two grooves for a tongue and grooved effect.

"I split the ring so it can expand and contract as the forge heats," he says.

The forge sits on a 10-ga. steel cone with a shelf and door. The cone serves as both a base and storage for fluxes and other materials. Heavy-duty caster wheels provide mobility. Each wheel is mounted on a steel tube within a tube for easy height leveling.

He also fabricated a Venturi tube to feed the burner. He describes the Venturi as a tube within a tube that he slides back and forth to



To reshape hard steel, Brian Johnson uses heating and forging furnaces that he built himself using a beer keg and a propane tank.

achieve the right mix of oxygen and fuel to the burner. Because he runs the propane at tank pressure, the flow of fuel pulls the air into the burner.

"I like a slightly fuel-rich flame," he explains. "If you have an oxygen-rich flame, you have more problems with oxidation."

Johnson mounted a small electric fan at the end of the mouth. It blows a curtain of air across the handle of pieces being forged, keeping them cooler and easier to work with. It also disperses heat coming out of the forge, making it more comfortable to work around.

"The furnaces make it easy to work with metal, which I enjoy," says Johnson. "I make tools and Damascus knife billets, but not the knives. I let others do that."

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Boom-Mounted Welder Frees Up Shop Space

"Hanging your welder from a telescopic boom frees up shop space and makes welding jobs easier. The welder hangs above your work, so you don't have to worry about trying to maneuver around everything," says Carl Peters of Polar Mfg.

The wall-mounted boom is free to swivel up to 180 degrees (optional brackets are available for up to 270 degrees). The welder hangs from a cable. To pull the boom out you just grab the welder and pull it to where you want it. By mounting the boom close to the shop door, it can be extended outside the shop for working on equipment parked just outside the door.

Peters builds 3 sizes – 14, 20 and 28 ft. – and can custom-build other sizes as well. The 14-ft. model has a 2-stage boom and can retract to 8 ft. The 20-ft. and 28-ft. models have 3-stage booms and can retract to 8 ft. 8 in. and 12 ft., respectively.

"Since the boom sections are hollow, all welder leads and gas hoses can be tucked inside for a neat appearance. With your

welder overhead, there's no running into power cords or other items on the floor every time you move your welder.

"In a steel frame shop the boom attaches to a vertical column, such as a steel rafter. In a wood frame building, a separate column from floor to ceiling may need to be installed first," says Peters.

"All the boom sections run on ball bearing rollers, which makes it easy to position the welder. You can also run power cords and air hoses through the boom sections.

"Another benefit is that your welder always stays cleaned up and out of the way, whether it's in use or not."

The boom is designed primarily for 2-piece welders where the power source is separate from the wire feeder, says Peters. "Most all-in-one welding units are too heavy for the boom. However, some all-in-one units can be used as the main power source and then all you need to do is add a remote wire feeder. That way you don't have to upgrade the entire all-in-one welding unit."



Welder hangs from cable on wall-mounted boom that can swivel up to 180 degrees.

The 14-ft. boom sells for \$1,790 plus S&H; the 20-ft. model for \$2,990 plus S&H; and the 28-ft. model for \$3,190 plus S&H.

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