Makin' Hot-Rodding Honest

It wasn't long ago that dynamometer use was the sole preserve of car manufacturers and big-time speed shops. As a result, engine tuning was largely a black art. Mark Dobeck's Dynojet changed all that.

by JEFF HARTMAN

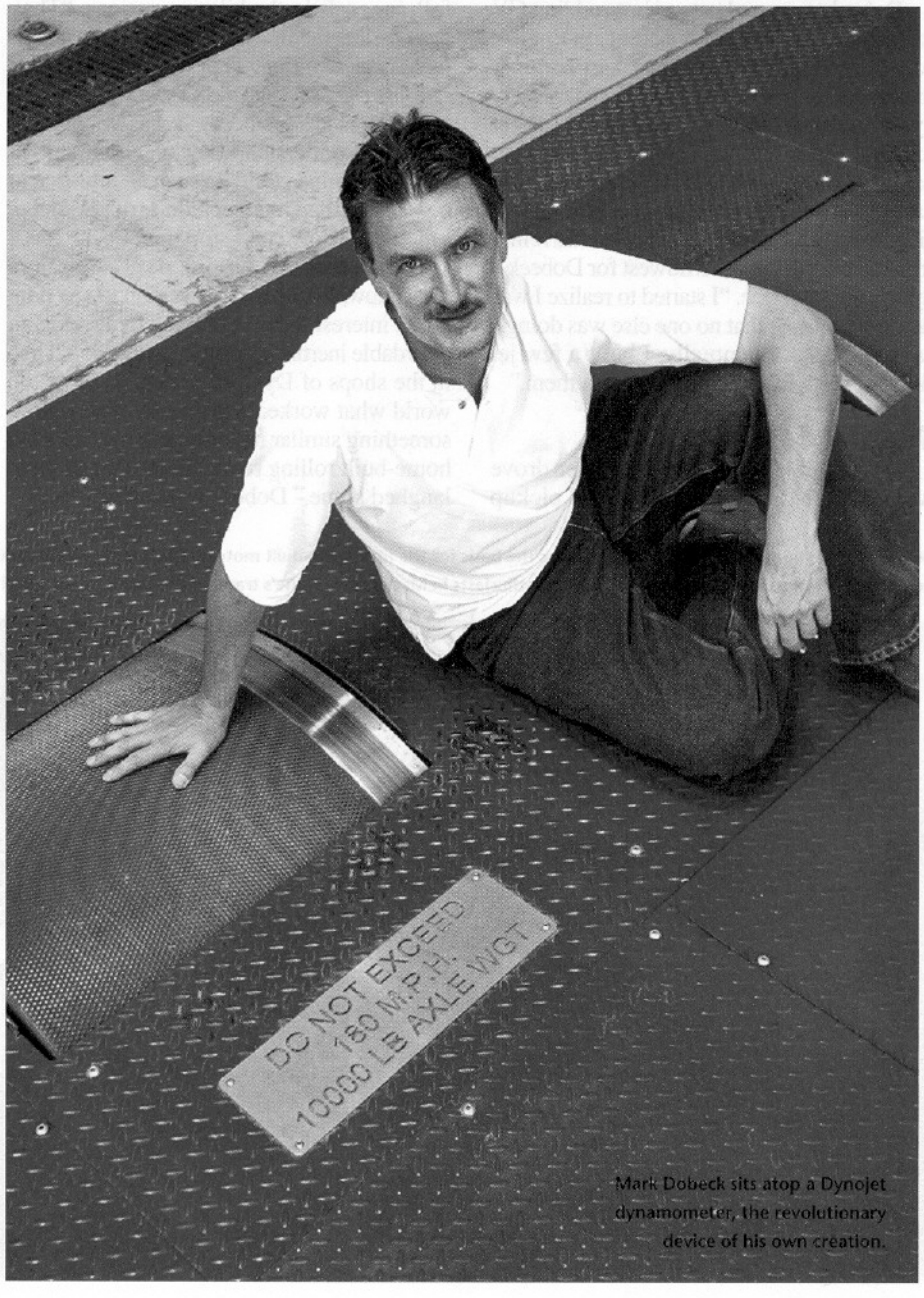
Mark Dobeck was working in a Portland, Oregon garage in the late '70s, tuning English sports cars, when, one day, an irritated customer returned with an inscrutable engine stumble that happened only while driving. The 19-year-old Dobeck decided to stick the probe of the shop's Sun infrared exhaust analyzer in the tailpipe of the car and dump the machine in the passenger seat so he could tune the air/fuel ratio on the go—something that just wasn't done. He not only fixed the problem, he made the engine run better.

Dobeck, who has been called both a genius and a wack job, soon became a whiz at using exhaust-gas carbon monoxide readings to optimize power under real-world conditions.

The trouble came later, when he opened a motorcycle shop in Wisconsin in 1980. Cars were one thing, but there was no way to haul around a gas analyzer as big as a decent-sized TV set on a motorcycle. Dobeck talked his inventor/fabricator father into building a stationary rolling road that could support the rear wheel of a motorcycle on a moving drum so he could continue tuning while "driving" with the big infrared analyzer.

Dad's rolling road was designed with a hydraulic system that could be adjusted to work a bike engine harder at a given speed, something like the resistance controls on a Stairmaster machine at a gym. But because Dobeck and his dad were mechanics rather than mathematicians, they made the rolling drum heavy, and the home-built device had a surprising amount of inertia. It was accidentally pretty good at simulating a motorcycle's ability to accelerate.

Dobeck was thus able to measure performance improvements that would be invisible on torque-cell-type dynos limited to displaying a snapshot of the instantaneous power an engine could exert against the dyno at one particular speed. Torque-cell dynos, which load an engine by forcing it to



Mark Dobeck sits atop a Dynojet dynamometer, the revolutionary device of his own creation.

pump water or generate electricity, are also expensive, and using them usually requires removing the engine from a vehicle. What's more, they do not measure the time it will take a real-world engine to accelerate a particular car or motorcycle from zero to 60 mph, or even how fast the engine can rev itself from idle to redline—the sorts of things hot-rodders and racers care about.

As it happened, Dobeck's new bike shop opened just in time for the arrival of factory Japanese superbikes equipped with constant velocity (CV) carbs, which were new to motorcycling. These carbs sensed load to provide excellent performance combined with improved economy and emissions, but they could not be tuned and jetted using traditional methods. Many people recommended replacing them, a $600 solution.

Dobeck, who understood hot-rodding CV carbs from his days of wrenching on English cars—MG and Triumphs had 'em—immediately set to work modifying the new motorcycle carbs to run right with aftermarket exhaust pipes and air filters. He was also using his home-built inertial dyno to tune the carbs for improved acceleration and responsiveness. Before long, bikers were traveling from all over the upper Midwest for Dobeck's dyno-jetting service. "I started to realize I was doing something that no one else was doing," says Dobeck. "Eventually, I built a few jet 'kits' to see what we could do with them."

The Big Time

In 1983, Dobeck and his brother drove west to K&N in California in a red pickup full of tools and CV carb parts. K&N was the Big Time, with performance air-filter kits and supporting products for pretty much everything in automotive and motorcycle performance.

Dobeck spent a month proving his skills on bike after bike at K&N. And suddenly, one day, K&N ordered 3,000 jet kits. "I didn't even know if we could mass-produce something; I'd really only been modifying parts of individual bikes," says Dobeck. "Of course, we didn't tell them that. I just went home and did it because I had to." Dobeck named his company Dynojet, and it wasn't long before it was supplying jet kits to everyone and growing 400 percent a year.

By and by, a new product arrived to compete with Dynojet's jet kits, easy to install and designed to fix fuel problems. There were full-page ads in the bike magazines. "They were selling them," says Dobeck. "The advertising was working. They were taking away sales. But the product didn't work. Not at all." Dobeck shakes his head. "I was young, and I couldn't understand how any company in their right mind could do such an injustice to people. It killed me. I couldn't frickin' sleep. I thought, 'How can I stop this?'"

Dobeck called engine dyno suppliers Superflow, Darcy and Servequip to see if he could interest them in helping to develop an affordable inertial chassis dyno that could live in the shops of Dynojet dealers to show the world what worked and exactly how well—something similar in concept to his dad's old home-built rolling road. "Every one of them laughed at me," Dobeck remembers.

Dynojet would eventually eviscerate all three companies.

The Zen of Inertia

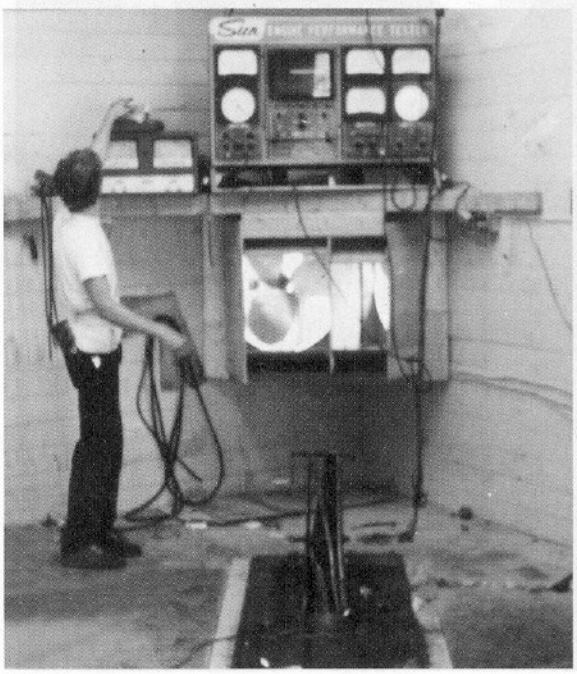
One of the biggest headaches of Dynojet's go-it-alone chassis dyno project was figuring out how to assign meaningful power numbers in the face of unknown inertia from the moving parts of hundreds or thousands of engine, drivetrain and tire combinations.

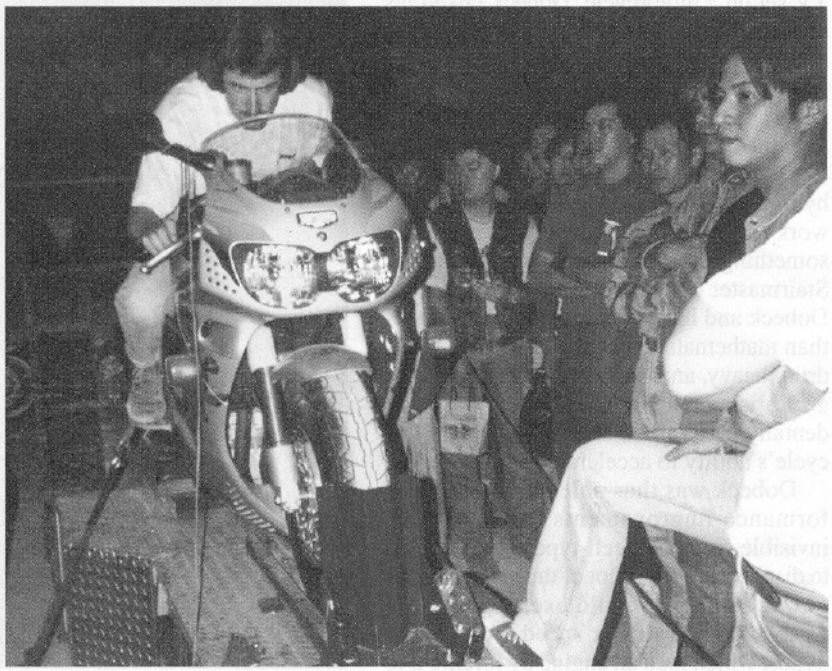
Wrestling to fully understand inertia and powertrain losses, Dobeck and his team quickly realized that the standard physics formula of weight, time and distance for converting acceleration into horsepower simply didn't work right. Even after eliminating all drivetrain losses and attempting to account for all heat loss in the vehicle and dyno systems, the derived number was always lower than accepted numbers.

The Dynojet team poured on resources and burned up time and money investigating the Mystery of the Missing Power. But no matter what it did, the mathematics never added up.

Dynojet's final number fudge—which would eventually be applied to every vehicle strapped to a Dynojet chassis dyno—was arbitrarily based on a number from the most powerful road-going motorcycle of the time, a 1985 1,200-cc Yamaha VMax. The VMax had 145 advertised factory horsepower, which was far above the raw 90 horsepower number spit out by the formula. Meanwhile, existing aftermarket torque-cell engine dynamometers delivered numbers that clustered around 120.

Below left: Sun infrared exhaust analyzer forms the basis for the first home-built motorcycle dyno inside Dobeck's Wisconsin shop, circa 1980. Below right: Dobeck demonstrating the Dynojet 100 to motorcycle enthusiasts in Macao, China—he's traveled the world promoting his products and the notion of honest tuning.





Always a pragmatist, Dobeck finally ordered his chief engineer to doctor the math so that the Dynojet 100 measured 120 horsepower for a stock VMax. And that was that: For once and forever, the power of everything else in the world would be relative to a 1985 Yamaha VMax and a fudged imaginary number that was close to the "agreement reality" of the average of some other imaginary numbers.

Dobeck's engineering staff was dismayed by the decision. But the Dynojet 100 measured surplus power available to accelerate the vehicle's mass—no more, no less—and that was true even if the power modification was a low-inertia flywheel or lightweight wheels. As long as the inertial dyno's numbers were repeatable, the critical question of whether a particular mod makes the engine accelerate faster or slower would be answered correctly.

Selling Fear

Dobeck turned his attention to providing the new bullshit meter to motorcycle shops across the country. His first 20 dealers were early adopters of Dynojet technology, experienced front-line troops who had defeated the replace-your-CV-carbs drumbeat seven years earlier. "These guys believed in what we were doing," says Dobeck. "I called, said I've got this dyno and it costs $6,500. And they said, 'Send it.'"

When a small network of the most important dealers had dynos, Dobeck took to the road to change the world with a mobile bike dyno mounted in a trailer. He would ask performance shops, "Aren't you sick and tired of being the scapegoat for stuff that doesn't work as advertised?"

Dobeck remembers a lineman for the Chicago Bears who had bought a turnkey 4-valve conversion package for his Harley. The guy had paid a lot for the kit and installation, and then been beaten racing a friend with a stock Harley. He was complaining that the shop that installed the kit had ruined his bike. He was an NFL lineman and he was pissed: Who was going to tell him differently?

Dobeck arrived to work on the bike, which the portable dyno found made two horsepower more than stock, and at least 50 less than advertised. He tried stuffing a rag in one of the carbs to lean out the engine. The rag picked up six horsepower, so he re-jetted the other carb leaner until he'd found 15 or so horsepower. Nothing to write home about, but enough to preserve the reputation of the shop for competent engine building. For the owner, the experience was enough; he wrote a check and ordered a new Dynojet 100 dyno.

In subsequent years, Dobeck would demonstrate the Dynojet 100 bike dyno everywhere from Montana to New York and Paris to China. He racked up uncounted road and air miles, tested uncounted vehicles and found massive amounts of "free power." A new term was entering the lexicon of American hot-rodding: wheel horsepower.

Wonder if that aftermarket exhaust pipe really gets you an extra 12 horsepower? Now you can find out.

The Big Big Time

Meanwhile, Dobeck had new worlds to conquer. The pre-Dynojet world of hot-rod cars circa 1993 was a vast swamp of information, misinformation and disinformation. No one can feel a five or ten horsepower boost on a car, so most engine modifications were faith-based efforts made with a screwdriver and a prayer. Hot-rodding had left more than a few hapless victims with unfulfilled dreams and empty pockets.

The wholesale movement of automakers to computerized engine controls in the 1980s made increasing engine output even more complicated, escalating the opportunities for the unscrupulous or incompetent to fleece those with the need for speed: *Install this PROM, double your power.* Car guys needed a cost-effective, repeatable bullshit meter every bit as much as bikers

"I remember the afternoon in '93," says Dobeck. "I drove a Mazda Miata onto this humongous World War II chassis dyno we'd modified and rigged up as a test mule with the bike dyno electronics. I made a few runs, but numbers were inconsistent. As soon as I remembered to turn off the frickin' A/C, it started repeating perfectly. For me personally, there was a definite excitement again: I can do this. So I started gearing up."

Dobeck hired his dad and put four or five engineers on the project to handle various critical design issues related to thermal expansion, duty cycles above 200 mph and how to make a big inertial dyno unbreakable. The car dyno team constructed the original Dynojet 248 using two 48-inch 1,200-pound rollers, later increased to 1,600 pounds.

Below the Radar

When it came time to market the new inertial car dyno, Dobeck faced the fact that although his company was big-time in the motorcycle universe, no one in the door-slammer crowd had ever heard of Dynojet. He had no dealer buddies in the automotive realm who'd order a dyno just on his say-so. "I spent time with the dyno at events in 'low areas,'" says Dobeck, "where I could operate below the radar to get exposure testing a lot of cars without a whole bunch of people really knowing what was going on."

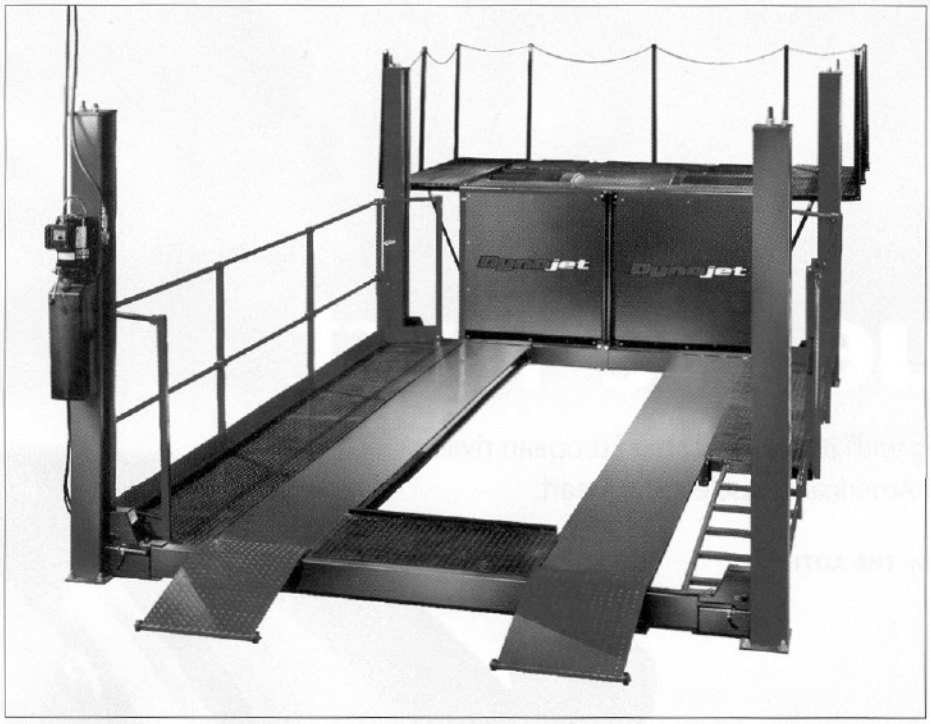
One such "low area" was Palmdale, California, where the first young import tuners were starting to pool money and rent lonely tracks where they could strap on nitrous kits or turbos and drag race the piss out of a FWD Honda. "The importers latched onto the dyno immediately," says Dobeck. The Dynojet would be a critical factor in the import tidal wave that swamped American hot-rodding in the '90s.

When he had dyno-tested tons of cars below the radar, Dobeck took the mobile car dyno to Lingenfelter, Edelbrock, Borla, Steeda and the like. "I went down to one place to show them how the dyno works," he laughs. "They're pretty impressed. We're talking, and this guy says, 'Now why should I buy it?' I go, because for 25 grand, you can sit there and make better product and develop it and everything else. He laughs, and says, 'Do you know that I can spend five grand on a full-page ad, sell absolute horseshit and make 15 grand. Why would I spend 25 grand to know that?'"

The Dynojet often brought bad news to aftermarket manufacturers, who were sometimes forced to quit advertising power gains from performance parts. But the good news was, in the right hands, the dyno could find

Mobile Dynojet dynos were a natural for racing, allowing teams to check horsepower right at the track.

John Carmack's Ferrari F50 twin-turbo conversion made as much as 1,000 rear-wheel horsepower on Team Dynotech's Dynojet in Dallas, Texas.



The Dynojet 248x can measure up to 1,800 horsepower and simulate speeds up to 200 mph.

"free power" eight out of ten times: Throttle cables that didn't open all the way, air filters that were too small or clogged, ignition timing that was too retarded, pathological air-fuel ratios. On one occasion, removing an open three-inch air intake on a magazine's project car boosted power from 498 to 537 at the rear wheels. Dobeck says he could virtually always find some power.

The NASCAR Challenge

By 1996, Dobeck was running on fumes, working like a fiend and on the road way too much. "I had no normal life," he says. There was an investor group interested in buying the company, but they were waiting to see if he could pull off one more big coup. What Dobeck had in mind was to make the Dynojet "The Official Dynamometer of NASCAR."

"So I was on a mission," says Dobeck. "If I could just get NASCAR, a lot of things would follow. I knew that they had a big problem with trying to make the cars competitive, because it's supposed to be about the drivers, not the technology. I thought I could sell them on the concept of using horsepower as a policing factor, which would be very good for the credibility of the series. But how do you get into NASCAR?"

Given the love-hate relationship between NASCAR and the NASCAR teams, Dobeck needed to make sure that he had the backing of the race teams if and when he ever got in to see NASCAR to talk about official status. Dobeck assigned a top engineer to work full time in North Carolina where he could take a mobile Dynojet around to any race shop that wanted it, at a moment's notice. The race teams began using Dobeck's mobile chassis dyno service, and then depending on it.

Dynojet learned a lot in the NASCAR garages, some of which fed back into engineering and software changes. The company demonstrated it could be trusted, which was important, given that some of what it was seeing was pretty secretive stuff. Drivers like Ricky Rudd and Richard Petty were early adopters of the Dynojet; Dale Earnhardt, Robert Yates and Richard Childress followed later. Meanwhile, Dobeck was getting tremendous mileage in the rest of the world bragging about how all the NASCAR teams were using the Dynojet 248.

Before too long, there was a portable 248 on the infield at a NASCAR event. "They liked the concept," says Dobeck. "It would help them to look for cheaters or people combining incremental new technologies in unintended ways to make excessive power, and prevent any bad publicity. The teams and drivers would know it's there and they might get pulled in for a power test. It was a great 'be careful' type thing."

One day, remembers Dobeck, the head exec of NASCAR licensing jumped in the driver's seat of his pickup and said, "'Okay, what do you want?' And I said, 'I would like to be the official dyno of NASCAR. For that, we will be at the events and we will make it available for you, and that's it.'" Well, that and a couple of passes to get in.

Dynojet was pronounced "The Official Dyno of NASCAR" for three years—credibility and connections worth millions. Every NASCAR team bought at least two Dynojet dynos, and Dynojet designed fabulous NASCAR chassis dyno rooms that generated six times the revenues of selling the dyno alone. And not long after that, in 1997, Dynojet sold to an investor group for $6 million in cash.

As the use of Dynojet dynos became more widespread, the effect on the car-tuning industry was profound: The Dynojet made hot-rodding honest. Performance consumers expected to know dyno results for speed parts. Dyno tuning and development became endemic for serious racers and hot-rodders. The world expected dyno results and companies like Mustang, Superflow and others stepped in with new dyno products that provided an alternative to Dynojet.

The Future as History

Several years down the line, Dynojet resold for something like $22 million and Dobeck's non-compete clause instantly terminated. The day came when Dobeck turned to ask his wife if she was ready for one more big tilt at windmills. Estelle was.

Dobeck reassembled technical talent from the long ago and far away Dynojet days, and continued work to create a fast handheld infrared analyzer using a laptop-based wideband air-fuel ratio meter.

He simultaneously developed electronics and software to convert any on-board ECU into a virtual dynamometer, and bundled in a Dynojet-like user interface for a PDA or laptop. He also developed an electronic interceptor device for bike and car ECUs that made it easy to "jet your ECU" by adjusting little pots analogous to the main and pilot jet adjustment screws on a CV carb. The company is rumored to be producing a revolutionary new chassis dyno based on proprietary patented inertial and torque measurement technology.

Meanwhile, Dobeck hit the road, as always. "I started going to some races in California and in Phoenix, which can be really grueling. If I can solve some of the problems they're having, I know I'm going in the right direction.

"I wanted a name that was easy to remember. So, for anyone who thinks I'm a wack job, I thought I'd take the opportunity to prove it," Dobeck laughs. "So I went ahead and named the gas analyzer 'The Sniffer' and I called the interceptor 'The Fuel Nanny.' So, again, I did the routine that works: I put myself right out there in the pits, at the track level, playing around."

Could that be the genius of it? ●