



Easy riders

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Easy **RI**

Penetrating the big-capacity cruiser motorcycle market is something that bike manufacturers from outside the United States have traditionally found very difficult to achieve. But now the team at Ricardo Motorcycle has the know-how to help develop cruisers which American leisure motorcyclists will find irresistible. **Jesse Crosse** reports.



Several nations specialize in fine-handling sports bikes, other countries have acknowledged expertise in rugged adventure bikes to tackle deserts and trails; still more are masters in the art of making commuter mounts for traffic-clogged cities. But when it comes to heavyweight continent-crossing cruisers, laden with ornate equipment and creature comforts, there is only one country with true credibility – the USA.

The cruiser is uniquely American in its origin – relaxed and comfortable, with languorous power delivery and oozing style. Its roots are set deep in the heart of middle America and it represents a style of motorcycling that has endured from the 1930s to this day. As such, it also represents a

considerable commercial opportunity for global motorcycle manufacturers – yet this is a market that has historically proven formidably difficult for outsiders to crack.

For proof of how popular the cruiser market is in the US, look no further than Sturgis, a small town located in Meade County, South Dakota. Sturgis is fairly typical of its type, a mountain town and ranch community sitting in the border lands between the Black Hills and the prairie. During most weeks of the year, visitors driving through might find it unremarkable. It has a population of just under 7000 and its fair share of stores, churches, restaurants and bars. But in the first full week of August each year, this small Midwestern community

DEERS

Ricardo Motorcycle

Ricardo Motorcycle was formed in 2014 to build on the success of Ricardo's existing motorcycle division with the acquisition of UK consultancy Vepro Ltd. The new business unit also includes a Memorandum of Understanding with the Italian firm Exnovo Srl, taking the headcount of the group to nearly 130 people. With its unique skill set, Ricardo Motorcycle can offer the specialised expertise needed to handle full motorcycle design and development programmes.

Vepro and Ricardo previously gained extensive experience in the US cruiser motorcycle market working together on iconic brands like Excelsior Henderson, Victory Motorcycles, Harley-Davidson Motorcycles and Indian Motorcycles, since acquired by Polaris. These are some of the greatest names in cruiser motorcycles, names which actually defined the genre.

→ undergoes a startling metamorphosis.

The Sturgis Motorcycle Rally is the biggest of its kind in the world and is remarkable not least because in 2015 it swelled the population of the town to 790,000 in just a couple of days. First held in 1938, the economic benefit the Rally brings to the State annually is around \$800 million. The sheer magnitude of the event serves to define something else too: the scale of America's love for the motorcycle and the many different forms that takes.

Distinctive in every sense

Cruisers are a distinctive breed, with a feet-forward, back-upright riding position; they are focused on delivering an easy, relaxed riding experience with smooth shifting and lots of low-end torque taking precedence over high power. Providing such an easy style of riding is not without its drawbacks, however, and in comparison with other more conventional motorcycles – whether touring, sports or off-road

focused – cruisers generally offer less performance, reduced cornering ability, and inferior low-speed manoeuvrability.

Above all others, the air-cooled V-twin became the favourite engine configuration for both pre-war and post-war American-built motorcycles; even from the very early days, large capacity engines, some as large as 1300 cc [79 cu in], were not uncommon. It is this engine configuration which presents one of the biggest challenges, a challenge which Ricardo Motorcycle is especially well equipped to meet.

Understanding the cruiser's heritage helps explain why it is so tough for a foreign nameplate to take on the US domestic manufacturers at their own game. From the 1920s onwards, motorcycle enthusiasts customised, raced and performed stunts on motorcycles while other riders just enjoyed them for transport and leisure. From around 1910 until the Great Depression in the 1930s, 'board trackers' raced their bikes

on steeply banked wooden-boarded circuits and for a time became the highest-paid professional athletes, drawing the largest crowds in America. Wall of Death riders defied gravity and the unthinkable, blasting around vertical cylindrical walls to the delight of spectators.

Outside sport and shows, motorcycles became extensions of the rider's personality, both a character statement and a fashion statement at the same time. Post-war, cruisers served as raw material for returning GIs in search of cheaper modes of transport. The GIs kept wartime Harley-Davidson and Indian motorcycles going as best they could, stripping off damaged or broken components and replacing only those that were really needed. Pretty soon, a new stripped-back style of bike evolved: known as the bobber, this style saw key components like the frame, forks and engine remain intact but the rest would be cut back, customised or removed altogether.

From Bobber to Chopper

In the 1960s the Chopper evolved, like the Bobber but with 'chopped,' modified frames and long, extended forks. A vocabulary evolved around them too, like "sissy bars" for the high backrests or "ape hangers" for the impossibly tall and sculpted handlebars. The chopper was immortalised in the film "Easy Rider" and became such an iconic style of motorcycle that manufacturers began producing their own, albeit less extreme, ready-to-ride versions.

Throughout the 1940s, 1950s and 1960s the American motorcycle evolved into an art form and one that is deeply rooted in the country's history and culture. During that time, a reversal took place, from form following function to the opposite, of function following form. A cruiser can be as practical or impractical as the owner wants, from a no-nonsense style icon to touring 'baggers' equipped with elaborate luggage pods or side bags.





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The Sturgis Motorcycle Rally (left) is the biggest of its kind in the world and demonstrates the renaissance of the US motorcycle market. The multi-award winning Indian Scout motorcycle (above) was the subject of a successful collaboration between Ricardo and Vepro predating the formation of Ricardo Motorcycle (see also box on page 14)

By the 1980s foreign manufacturers had already identified the scale of the potential business. By the late 1990s cruisers would account for 60 percent of the US motorcycle market and the trend has continued – yet for a new motorcycle product to succeed, it has a lot to live up to. Function is taken as a given in today’s hi-tech society, but an authentic heritage ‘look’, with desirable accessories and the right handling feel, is the true key. A cruiser can be a practical tool but, more importantly, it must be the stuff of legend.

Cruisers: a 100-year heritage

Thus the cruiser’s heritage can be traced back almost 100 years, and

during that time an array of styles have evolved. The type of customer has evolved too, one of the latest being the ‘weekend warrior’ – someone who may spend weekdays toiling in the office and who at weekends wants to escape the rat race and take to the open road. To that customer, the motorcycle is a panacea for the stress of modern life, an extension of personality, a style icon and fashion accessory whose aesthetic appeal must hit the spot exactly to be successful.

Neil Wright, former Vepro founder and managing director, and now Head of the Ricardo Motorcycle UK business unit, explains the intricacy of delivering products that the market will consider authentic. “We offer geographical

sensitivity; we understand the minute details that are important to buyers, and that’s important,” he says. One of Wright’s prime recommendations to European or Asian manufacturers developing a product for the US cruiser market is to make use of American test riders during development, to be sure of achieving the right feel and riding experience in the finished result.

The development of high-quality accessories good enough to tempt even the diehard enthusiast should also be high on the agenda: Wright believes these equipment lines form a substantial chunk of the profit centre for manufacturers of a cruiser. “We would never consider starting a project without a full definition of the

Case history: The rebirth of the Indian Motorcycle

Ricardo Motorcycle's more recent experience in the cruiser market dates back to the 1990s, and in 2003 Vepro and Ricardo were engaged to work on a new cruiser platform from which the "Indian Spirit" would be launched for the 2006 model year. Two versions of the Spirit were to be powered by all-new 1667 cc, 55 degree V-twin engine driving through a six-speed gearbox and belt drive. Unusually, the technical development of the engine went hand-in-hand with a powertrain styling exercise, something that was considered crucial to the bike's success.

The programme included detailed analysis with full vehicle and powertrain benchmarking, and with the focus on brand value, styling and design. The Ricardo-developed V-twin concept underwent full performance simulation and port design: this included modelling and test validation

of the competitor benchmarks using proven Ricardo analytical and test techniques.

The intake and exhaust systems were carefully developed with the emphasis on acoustic quality. Ricardo acoustic development techniques played a major part in honing this crucial aspect of the brand character and an expert 'listening panel' provided experienced subjective opinion.

The parent company of the Indian brand went into Chapter 11 before the Spirit could be launched, but in 2011 Vepro and Ricardo were again asked to help with the rebirth of the brand by its new owner, Polaris. The bike in question was the Indian Scout, winner of the Best Cruiser in both the Cycle World 'Ten Best Bikes', and the 2015 Motor Cycle News Awards, with MCN particularly praising the free-revving V-twin engine and build quality.

Vepro and Ricardo also worked



together on another Polaris brand, Victory Motorcycles. The successful working partnership between the two companies in these and other projects spanning more than a decade is what eventually led to the acquisition of Vepro by Ricardo to form Ricardo Motorcycle.

→ accessories planned for it," he explains. "Overseas manufacturers have traditionally developed cruisers back at base, then contracted US companies to develop accessories afterwards. That approach can result in a lack of integrated feel and there are frequently fit and finish issues which buyers are sensitive to. Our approach is to develop accessories as part of the programme, achieving perfect integration of style and colour matching of components."

New products: look, sound and feel before technology

When contemplating designing a new product from scratch, Wright is adamant about the best approach: "It's time to throw out the engineering rule book," he says. "In this market, styling and character rule. The engine look, sound and feel is far more important than the technical specification. Show off engineering, but prioritise it over styling at your peril."

With cruisers, the normal sign-off criteria for combustion stability, gear shift quality, vibration and other similar parameters take on a different perspective. Firing angle is critical to achieve the 'right' sound. Cooling is critical not just for full power, but for 'parade duty' where the engine idles or runs at low speed for extended periods.

Despite the obvious technical challenges, air cooling should still be considered over liquid cooling. Buyers rate it as an authentic feature, along with large displacements of up to 1800 cc. The market prefers pushrod engines

to overhead camshaft types, so the appearance of the cam cover, heads and barrels is crucial. A long primary drive is preferable. Engine management and electrical systems need to cope with plenty of low speed work, as well as the addition of accessories like straight through pipes and aftermarket air filters. Gear ratios are important; a low first gear ratio is essential for parade work and there must be a belt-driven final drive, never a shaft.

The list of style-related 'must-have' features is not endless but it is certainly long. That does not mean that good-quality engineering no longer counts, but the balance between form and function is quite different to what it might be for a utilitarian scooter designed for a life of commuting. So rigorous engineering practice must still be followed, beginning with a full and detailed programme of benchmarking including road and dynamometer testing.

Listen to competitors

All aspects of key competitors' engines are analysed, including NVH performance, thermal performance and sound quality. Vehicle performance benchmarking includes a full dynamic and performance evaluation taking in handling and brakes, an ergonomic assessment for both rider and passenger, gear change evaluation, refinement and rider experience. After that, performance and dynamic targets are set for the new product.

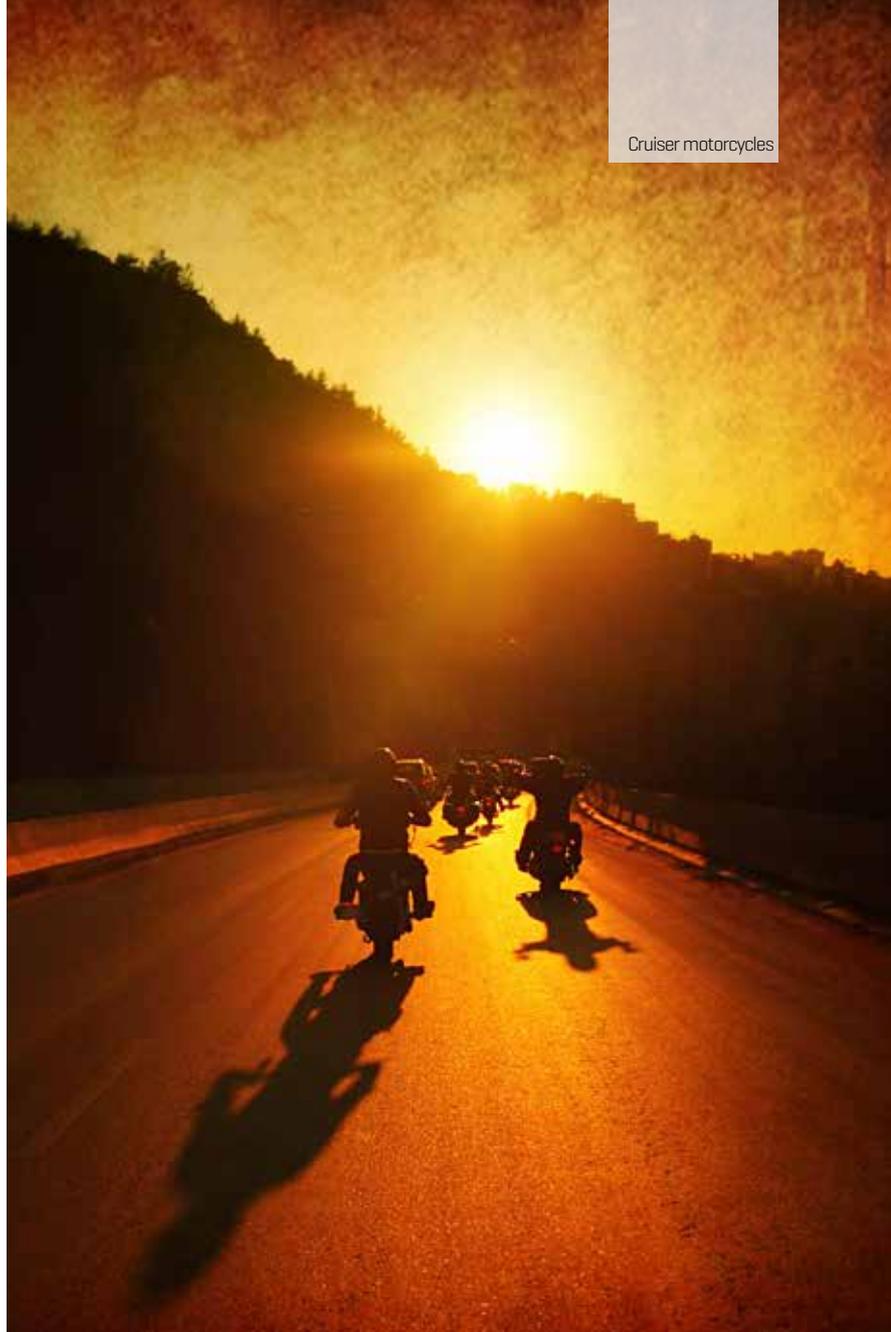
Benchmarking includes producing CAD schemes of competitor



motorcycles to allow accurate comparisons and the setting of objectives for the first concept. CAD schemes also make it possible to evaluate components for cost, complexity, manufacturing processes and their good and bad design points. Detailed studies follow on basic packaging, volumes and location for tanks and airbox as well as exhaust routing and the positioning of other key components.

With the groundwork exhaustively covered, it is time to establish the architecture and spatial relationships. Defining the vehicle layout is one of the most exciting stages of designing a cruiser, because at that point the bike literally starts to take shape. The biggest priority at this stage is to evaluate aesthetic and market appeal, as well as functionality, service considerations, durability and manufacturability.

Above all though, the key to developing a successful cruiser is to understand its cultural significance and the emotion that lies behind the hardware. The DNA of the genuine article is something the people at Ricardo Motorcycle have spent more than two decades unravelling. They have a deep understanding of what it takes to develop a successful cruiser and, with the massive engineering expertise of Ricardo to draw on, the teams are looking forward to helping others develop many more great American motorcycles in the future. 📺



The importance of sound

A cruiser's character comprises a complex blend of attributes, one of which is the noise it makes. "Sound quality is subjective," explains Matt Maunder, Ricardo technical specialist, powertrain noise and vibration. "People have an expectation of the way a product should sound based on their cultural awareness of it.

"If we want to engineer to meet those expectations then there are some additional steps required over and above what would be done in a normal engineering programme," continues Maunder. "One of those would be the subjective evaluation of sounds by riding bikes, but there are disadvantages to that because the rider is exposed to plenty of other factors that can influence subjective judgement." It's also impossible to evaluate machines back-to-back when a new project is still at the concept stage and no hardware exists, he notes.

Sound files are used to make subjective judgements and this approach has the advantage of excluding other factors that may influence a road tester such as appearance, feel, smell or touch. 'Blind' evaluations of the sound files [to ensure there's no subliminal brand-related bias] are made by a panel of expert listeners made up from the staff of both the client and Ricardo Motorcycle. A sound quality target is benchmarked against around six bikes, and the panellists score the sounds on a scale of one to 10, each describing their emotional responses in terms of feel and style.

Ricardo's WAVE software is used to predict the all-important exhaust noise, which forms a major part of a V-twin's character. Those predicted sounds can also be played back to the panel and assessed subjectively, as well as being compared directly with the



target sounds. WAVE is also used to develop the muffler system and to modify the sound to match the targets. This modelling phase can involve hundreds of iterations, of which perhaps two or three will be built and fitted to production motorcycles.

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