

## Innovative Technology Drives Demand for Automatic Mopeds

We have introduced the LEXAM next-generation automatic moped in Vietnam. Equipped with our exclusive, cutting-edge technologies, the LEXAM is poised to tap the strong growth potential in the ASEAN region, delivering a new chapter in ASEAN motorcycle history.

### Behind the LEXAM Launch

As with other products and markets, the global economic slowdown also had a negative impact on the motorcycle business in emerging nations. However, demand has been steadily rebounding. In the ASEAN region, Yamaha launched a series of automatic commuter vehicles ahead of its competitors, in 2002. These have been particularly popular in the five ASEAN nations<sup>Note</sup> where Yamaha Motor operates, spearheading the steady profitability of our motorcycle business — which accounts for about 70% of consolidated net sales.

Mopeds, in turn, comprise about 60% of motorcycle demand in the five ASEAN nations, a hot market segment for Yamaha Motor to launch the LEXAM. This automatic model,

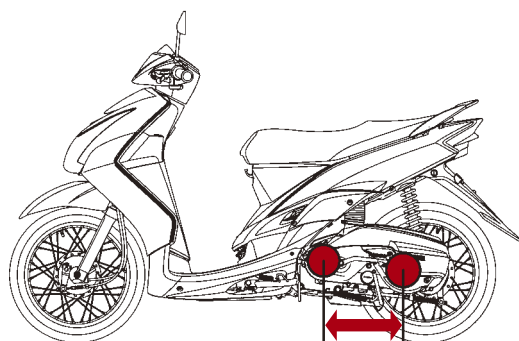
featuring an air-cooled four-stroke 115cc engine, first went on sale in Vietnam. Strategically, the LEXAM is designed to solidify the superior position of the Yamaha brand in ASEAN markets and improve profitability.



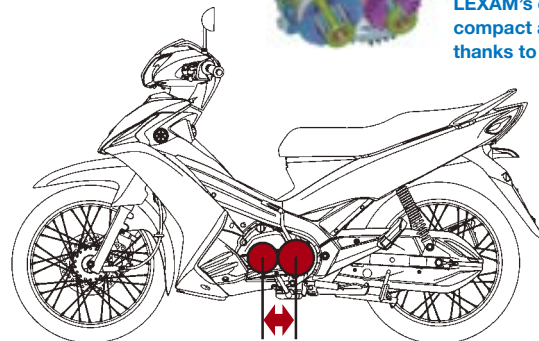
**Note**  
**Five ASEAN nations:**  
Indonesia, Thailand, Vietnam,  
the Philippines, and Malaysia

The LEXAM next-generation automatic moped

### Comparison of distance between sheaves Mio vs. LEXAM



Mio commuter vehicle: 283.15mm



LEXAM moped: 119mm



LEXAM's engine is as compact as a moped's, thanks to Y.C.A.T.

### Overcoming Development Obstacles

Underbone-type motorcycles with 17 inch front and rear tires, called mopeds, are an everyday transportation mainstay for people in the ASEAN region. Their large-diameter tires offer stable performance. Coupled with high mobility, versatility, straightforward design, and affordable price, this makes the moped a popular choice across all age groups.

We were looking to develop a next-generation moped with a user-friendly automatic transmission, capable of delivering premium riding performance, while remaining true to the classic moped mission of dependable basic transportation. The LEXAM development project was born from the belief that we could produce a high-quality fit for the market, based on our superb technology. Although the core concept is relatively simple — shrinking an automatic transmission mechanism to the size of a conventional moped manual transmission — in practice it was a major hurdle for the development team to overcome in bringing the LEXAM to market.

### Revolutionary Y.C.A.T.

The Continuously Variable Transmission (CVT) — an automatic transmission system — connects the engine-side and rear wheel-side sheaves with a V-belt. Because it provides a stepless transmission ratio variation, the CVT represents an ideal, smooth-running drive system for a commuter vehicle. However, a CVT is structurally difficult to mount on moped-type motorcycles.

Therefore, manufacturers had considered it impossible to equip an automatic transmission unit to a moped without making major external changes.

To meet this challenge, the project team envisioned a completely new and innovative belt construction, with special sheaves suitable for the belt, and a highly efficient cooling system. From the inception of the LEXAM project, the team focused on developing a breakthrough CVT system. It finally succeeded in 2009 — seven years after the development project was initiated — with a compact CVT suitable for mopeds, known as Y.C.A.T. (Yamaha Compact Automatic Transmission). Without this compact automatic transmission, the project team could never have developed the next-generation LEXAM premium moped while still retaining the basic performance of standard mopeds.



The LEXAM cruising Vietnamese streets

# Innovative Technology Drives Demand for Automatic Mopeds

## Four Key Factors

There are four key factors behind the successful development of the exclusive Y.C.A.T.

First, the Y.C.A.T. uses a newly developed “highly elastic heat-resistant plastic resin drive belt” which provides excellent heat resistance and durability. This plastic resin belt is about twice as durable as the belts in our previous commuter vehicles. It was reduced to about 60% the length of conventional belts, allowing the Y.C.A.T. to fit into a crankcase roughly the size of those on traditional moped crankcase. Furthermore, the proprietary construction has improved drive force transmission efficiency, enabling lower fuel consumption.

The second factor is the special design of the Y.C.A.T.’s sheaves. Factoring in the dissipation of friction heat accumulated in the belt, among other considerations, the sheaves are designed for optimal efficiency in transmitting driving force and minimizing resin belt wear. All this is made

possible by using different materials for the engine-side and rear wheel-side sheaves.

The third factor is the all-new cooling system, developed to resolve the issue of heat created by friction between the belt and sheaves and improve durability. This cooling system offers excellent water resistance and dust removal capability to cope with the frequent flood conditions motorcycles encounter in the ASEAN region. In addition, soundproofing material is used throughout the cooling system and elsewhere to reduce noise in air intake and outflow.

The last factor is a weight roller for more responsive gear shifting, with a direct, linear feel in power transmission. The development team fully exploited the unique high elasticity of the plastic resin belt, re-examined the weight roller for its effects on shifting characteristics, then worked to optimize these characteristics in each stage of the development process.

## Project Team Members Talk about the LEXAM



LEXAM has a true moped silhouette, but we strove to incorporate novelty into its design. We envisioned a futuristic, uncluttered look that creates a clean feel for the viewer.

### Mr. Jun Tamura

Chief Designer, Dynamic Design Dept.  
*GK Dynamics Inc.*

A lot of work went into developing the Y.C.A.T. for commercial production. Developing completely unique technology is a time-consuming process, but we finally got it done. We managed to combine all the benefits of conventional mopeds with the unprecedented smooth operation of automatic transmission. On top of that, we met the demand for agile performance.

### Mr. Tetsuro Ohnishi

LEXAM project leader  
*Yamaha Motor Co., Ltd.*

## Comments about the LEXAM



The LEXAM accelerates smoothly and is easy to ride, thanks to the Y.C.A.T. I brag about its world-leading technology, but I also like the sophisticated design and attention to detail that Yamaha builds into every bike.

**Mr. Nguyen Anh Quan**

LEXAM owner

*Bank employee (Hanoi, Vietnam)*



Customers seem overwhelmingly positive about the LEXAM. Many of them tell us they want to experience the feel of the world's first advanced Y.C.A.T.-equipped automatic moped. In addition to new technology, the LEXAM offers customers a sporty, stylish, innovative, high-quality — yet affordable — product.

**Mr. Tran Van Nghia** (right)

Dealership sales manager

*Yamaha Town Hanoi (Hanoi, Vietnam)*

### Power to Change Moped History

In addition to the convenience of automatic transmission, the Y.C.A.T.-equipped LEXAM offers many other benefits unique to the moped among commuter vehicles.

With the center of gravity in the middle of the vehicle, the LEXAM handles better than its conventional automatic counterparts, for providing more stability. Its compact construction has reduced the unsprung weight around the engine. This allows the suspension to function more effectively, offering both rider and passenger a more comfortable ride. Meanwhile, large-diameter tires common to mopeds improve performance on rough road surfaces.

Another key to developing the LEXAM was the bold and forward-looking design, complementing the machine's Y.C.A.T. cutting-edge technology. The LEXAM design concept marries emotion and technology in a "sprinter moped." With its sporty DNA and striking personality, the

LEXAM look is clean and classy.

In support of the LEXAM release, we are taking the initiative in providing customers test-riding opportunities, allowing them to experience the superiority of this new moped for themselves. Customers who look for Yamaha to continuously offer something new will be pleased with the added dimension of riding pleasure the LEXAM provides — all in a sporty, fashion-forward package.

The next-generation LEXAM moped is about to write a new chapter in the history of the ASEAN motorcycle market, the culmination of user-friendly operation, superior driving performance and riding comfort, unparalleled convenience and captivating design.