

QuantumWorks/L3Rs First Commercial Product- High Performance Exotic Sports Car Hybrid Electric Vehicle – “L3-Nemesis Supercar”

Market Research

QuantumWorks/L3R (QWC/L3R) mission is to exploit an emerging and untapped as of yet niche market for exciting, high performance, ecologically appealing sports car class automobiles using innovative control technologies, unique modular powertrain architectures and applications of, wherever possible, uniquely configured low-risk off-the-shelf components.

CUSTOMER PROPOSITION - Imagine you are a current sports car owner or soon to be one, and a U.S. designed and manufactured supercar became available with the following features:

- Visceral styling of the 2000 Lamborghini Diablo 6.0 Replica Roadster or Coupe (Replica is almost 99% visually exterior identical to the original Italian vehicle built and engineered by a reputable North American based kit/turnkey builder company - actual pictures of the parts and finished turnkey kit car that will be used for the new product shown below),



- Features of a “terrestrial space-craft” we were all dreaming about in our youth with safety features one would expect from a world-class sports car, i.e. panoramic full blind spot minimization rear/side view CCTV system,
- Superior aerodynamics (stable downforce at speed and lower Cd of ~.29),
- 0-60 mph acceleration achieved in 3.4 seconds vs. 3.9 of the original Lambo,
- ¼ mile distances achieved in 11.5 seconds reaching 135 mph vs. 13.5 secs. of the original,
- Top speed of ~195 mph vs. 202 mph of the original,

- Power to Weight Ratio of ~.25 hp per lb.
- Lateral skidpad capability of .99g,
- Anti-Lock Braking from 60 mph to 0 mph in 110 ft. & 80 mph to 0 in 185 ft.
- Range of 260 miles driving “moderately aggressive”,
- Imagine having enough torque, if the driver wishes to switch the computer traction control off, to break the wheels loose at almost any legal speed, due to the almost flat torque curve and greater usable horsepower of the unique QWC/L3R Hybrid Electric powertrain. “Full plug-in hybrid” capabilities afford the driver of flexible electric charging options. Highly efficient internal combustion engine (ICE) based auxiliary power unit (APU) has one of the greatest power to weight ratios and fuel economy ratings available today. Field usable generator power output available as option.
- Engineered with methodologies and talent bred from both the auto and the aerospace industries and proven off-the-shelf components wherever possible - high strength to weight, highest reliability and quality to achieve the diverse missions for this vehicle – built on a custom CAD/CAE designed tube frame exceeding the strength of the original Lamborghini frame additionally using Corvette aluminum suspension pieces, front spindles with heavy duty hubs, largest cross-drilled brake rotors which will fit - High quality adjustable coil-over shocks on all four wheels. (depicted in images above).
- With a Fuel economy, for the car’s full range, of **53 mpg in city aggressive driving and 50 mpg cruising on the highway – an unheard of combination of Performance and Economy. Also ~30-40 miles of all electric mode driving with zero emissions and fuel consumption will also be possible.**
- Priced at \$140K U.S., which ranges from about the same to less than half the price of exotic sports cars which can match this performance,

Would this car be desirable to you?

With your positive response, and patronage, this automobile will be the first high performance hybrid commercial product, to be available 18 months after full project funding. Fully refundable deposits are being accepted now to reserve one of these cars which will be produced at a rate of 10-12 per month.

PROPOSED PRODUCT - The L3R-Nemesis has the styling and performance similar to current Supercar Exotics at a price ranging from about the same to less than half their price, or ~\$140K U.S. The aerodynamics of the 2000 Lamborghini Diablo Roadster or Coupe are already proven in order for the **L3R-Nemesis** to attain its aggressive economy AND performance. Unlike other exotics, the **L3R-Nemesis** is being designed as a high performance, eco-minded, comfortable street legal vehicle, not as a “race-able” platform. The car will not compromise drive-ability, stability, safety or comfort for performance and fuel economy, yet it will match and in important ways exceed the performance of these competitive vehicles. The car will have luxury and electronics driver assistance packages competitive to those contained in most of these “race focused” exotic automobiles. When it comes to raw performance, L3R’s unique hybrid electric powertrain design and technology will deliver a performance matching exotic sports cars costing up to twice as much.

Initial specifications estimated to be as follows:

Curb Weight	2,950 lbs vs. 3,582 lbs. of the original	Distribution F/R	45% / 55%
Wheelbase	104 inches	Height	43.5 inches
Length	176 inches	Width	80.3 inches
Suspension, Frame, Drive train / control	Custom tube chassis, Corvette suspension, AWD with auto traction control, height control and anti-lock braking system	Ground Clearance	4.5, 5.5 to 7.5 inches
Aerodynamics	Cd - .26, Frontal area – 1.85 sq. meters, undertray downforce @ dynamic aero features such as; manual/auto air-ride height/pitch control		
Powertrain operational modes	Flexible electric charging options of a “full plug-in hybrid” – plug-into standard 110vac single phase – electric only “no-emissions nor fuel usage” of 30 miles – full recharge from ICE based APU in 15 minutes.		
Luxury, safety and performance features	All that is required to make driving this car as enjoyable as a state-of-art luxury sports car of today but with 4-5 times the fuel economy.		

HISTORY & TEAM - The key project members who developed the now famous “Lotus Elise looking” Enigma-L3 (pictured below) hybrid powertrain test bed project at San Diego State University (SDSU) formed L3R in 2001. The Enigma-L3 project set out to prove the feasibility of high performance hybrid



electric vehicle (HEV) concepts ignored by the major automakers.

Under the direction of Dr. Burns, this team, with partial sponsorship from California Energy Commission's \$300,000 grant and with project monitoring from U.S. Department of Energy, first drove the **Enigma-L3** powertrain test bed within two years of project initiation in January 2001. Not only was such product development cycle compression an engineering feat unto itself, this test bed project proved key engineering design strategies and demonstrated the potential of a very different and more capable hybrid powertrain than major automakers have tested and produced for public sale. As a result, the **Enigma-L3** sports car is in a technical class shared with major car companies producing hybrid electric vehicles. The **Enigma-L3** has been used as a powertrain test bed to validate a new hybrid vehicle design philosophy; one that relies on a majority fraction of clean electric power for the aggressive performance requirements of a car's driving profile while applying a much smaller ICE based APU to meet the average driving power demands. L3R's design configuration is directly opposite of the automakers' drive train implementations, where their electric subsystem is sized smaller to assist their larger ICE only during high performance demands.

The **Enigma-L3** powertrain test bed is a 260 HP carbon fiber body sports car capable of a 0-60 mph times in the 6-second range, superior braking, lateral acceleration capabilities coupled with 80 mpg on the highway. No automaker has yet to publicly show a prototype having these performance characteristics.



Of additional merit to this project, is that in order to optimize the quality, lower the risk and the costs, the FAME HEV team used the latest and best-in-class aerospace and automotive CAE (computer aided engineering), a.k.a. design, analysis, simulation and manufacturing software from Parametric Technology Corporation (PTC) to create the Enigma-L3 vehicle test bed. The entire design was created, analyzed and simulated in the software and no physical drawings were required for the manufacturing. The manufacturing went so smoothly that there were almost no fit, access or component failure problems during assembly and initial tests. Due to the incredible success of the entire design-to-

manufacturing experience on the L3 Enigma project, the team counts on this approach to design, as a core competency for all future research and commercialization efforts. Building on this competency allows more aggressive projects to be undertaken without large new investments in costly engineering and production resources. The picture below depicts the Enigma-L3 in the PTC computer-aided-engineering software.

The Enigma saw its first mile January 2001, and was campaigned at the 2001 Michelin Challenge held later in the year where it posted the second fastest slalom time ever and captured international media attention. The Enigma also saw action at the Electric Transportation Industry Conference where former GM CEO Bob Stempel and other major figures in the transportation community had a chance to favorably compare it to other concept and production cars during a ride/drive event. The Enigma has been featured in the following journals: The Green Car News, ProUser Magazine, San Diego Union Tribune, EV World, Popular Mechanics, Car and Driver, Road and Track.

As a result of such initial successes with the Enigma-L3 **powertrain test bed** during Phase 1, QWC/L3R is now actively searching for investment and development partners to invest in the first commercialization of this technology in a totally new styled and designed vehicle called the **L3-Nemesis** Supercar (internal project name – marketing study will finalize the vehicle's commercial product name). This new exotic-level sports car will be for sale to the public 18 months after full project funding. Accomplishment of this goal involves three phases of development. QWC/L3R has identified all of the management, engineering and production talent required to execute this project. Additionally L3R solely owns the innovative control software, new drive train design and other key intellectual property generated since the conclusion of the Enigma-L3 testbed project. The fresh new ideas suggested and now proven by the powertrain prototype will be the technological basis for L3R's first product, the **L3-Nemesis** Supercar.

CONSUMER FEEDBACK REQUESTED – QWC/L3R has the proven technology, experts from the automobile manufacturing, sales and service business and a proposed product that the major world automobile manufacturers will not offer to consumers anytime soon at the price proposed. Performance projections are a result of experience with the Enigma prototype and simulation software output and may be altered as car nears testing and final production.

So what do you think ? What do you like or dislike about our proposal ? Any changes to the feature set outlined ?

Please feel free to e-mail us with your comments : info@quantumworks.com