MARKETABILITY OF THE RIDEK CONCEPT

by Gordon Dower

Putting CO_2 emissions and global warming aside for the moment, what are the two most important considerations when buying a car, or should be if common sense prevails? They are *cost* and *convenience*. If two cars are otherwise equal but one has a lower initial cost and over-all cost of operation, which would you choose?

What does over-all cost imply? Initial payment, depreciation, maintenance, insurance, tax, licensing, and fuel immediately come to mind. Soon, we may need to add a "carbon tax" to remind us how our driving harms the environment.

And what does "convenient" imply? What is the major inconvenience of car ownership? For most owners it is probably servicing. Even a new car requires that it be left for periodic servicing. Failure to do so may void its warranty. An appointment must be made and alternate transportation arranged. Other things being equal between two cars except that one did not require servicing, which would you choose?

If the car you would choose for its lower cost and less servicing inconvenience were not merely equal but better in other respects derived from its radical new design, you'd definitely want it, wouldn't you?

What other respects might there be?

A car is a transportation device that makes transportation easier. Out of this, it follows that a car should be sufficiently roomy. A two-seater runabout would not score well as a family or general-purpose vehicle, although it might do well as a second car. Convenience requires that the car should be easy to drive. Other considerations are performance, handling, visibility, maneuverability and footprint. The footprint of a car and its capaciousness pull in opposite directions so convenience implies the efficient use of a car's footprint. A low, streamlined design cannot do as well, hence the popularity of the minivan and the SUV, either of which serve well as a family car. This leads to the next consideration: ease of entry and exit. We might generalize this to "user-friendliness." In general, SUVs are not very easy to enter or leave, although handles are provided to make it easier. Minivans are better. Perhaps a good reference for comparison would be sedans made in the 1930s, because of their "running-board" steps and tall bodies. Finally, a car would rank higher on a convenience scale if refueling could be minimized. With convenience thus broadly defined, and if you should find a car that outranked all others then, surely, price being favorable, you'd want it, but you'd probably ask about performance and safety.

Performance is important as a matter of drivability and convenience but too much horsepower is wasteful and could encourage unsafe driving. Safety is enhanced by better visibility, already mentioned, and placement of the seats above bumper height in a T-bone collision. These are features that attract buyers to the SUV, but there is a negative: because of its high center of gravity, rollovers tend to be more common. The "better in other respects" qualifier given above implies acceptable safety.

At this point, we can no longer set aside CO_2 emissions and global warming for these are considerations that will profoundly affect the car of the future and even the future of the car. Because it is not necessary that cars should emit CO_2,

in future they will probably not be allowed to do so. Most likely they will run on electricity fed from the grid and stored in batteries. Batteries are heavy, expensive, store much less energy than a fuel tank, and take much longer to replenish. This renders the design of the modern car—which has evolved around the fuel-burning internal combustion engine—fundamentally inappropriate. An appropriate design is a *modular car* in which the motive component forms a separate module, just as the motive element (the horses) formed a separate exchangeable module from the stagecoach. It is amusing to realize that the early name for the automobile was *horseless carriage* because it would seem that, ever since, the automobile has been thought of as an integrated unit rather than two fused modules.

The fully modular vehicle, in which the chassis and body modules could be quickly exchanged, did not receive a patent until 2000. Its inventor (the author) has coined for it the portmanteau word *Ridek*, combining *Ridon* and *Modek*. Modek is short for motorized deck; it constitutes the running gear and major mechanical and energy-storing components. Riding upon the Modek chassis, the Ridon body not only consists of the seats and coachwork but also steering, accelerating and braking controls operated by the driver and all linked to the Modek below in such a manner that they become operative when the Ridon rests upon and latches to it.

For a battery-electric Ridek, the analogy of the Ridon and Modek to the stagecoach and horses is very close. They are different economic units, with different life expectancies, requirements and ownership. Horses have a limited range and need a night's rest. To avoid delay, they may be replaced by a fresh team, just as the Ridek's range may be extended, without delay, by exchanging its Modek for one that is fresh. Modek exchange, like horse exchange, favors separate ownership whereby Modeks are supplied to a Ridon owner under a Modek Exchange Contract. However, unlike the horses, the Modek is not visible, except for its wheels, beneath the Ridon. The importance of this is that, so long as it performs as it should, the Ridek becomes as impersonal as the road it runs on, while the driver's pride of ownership and, we hope, affection belong only to the Ridon. The family who owns it would care for it and keep it clean as they would a conventional car.

For buyers of new cars, depreciation is the major component of the overall cost of ownership. The life of the average car in USA is 12 years, although most of its mechanical parts are reusable. It appears that dilapidation of the body, rather than the works, terminates its life. The life of electric trolley buses suggests that the useful life of the Modek would be 30 years. This is all the more likely because of the easy access to its components when a Ridon does not cover them, in contrast to the modern automobile, whose mechanical inaccessibility declares itself whenever the hood is raised.

The cost of operating a Ridon relates only to its cost of manufacture, which is potentially much less than that of making a whole car. Depreciation costs should be correspondingly less. One can foresee Ridons being manufactured locally and their refurbishing and repair being practical to a much greater extent than for a dilapidated automobile.

The cost of a Modek Exchange Contract relates to the cost of manufacturing the Modek. A significant factor when gauging what this might be, in quantity,

is that the electric drive system is much simpler than an internal combustion system. Furthermore, the standardization of Modeks that is an essential condition for exchange favors economy of scale. The assembly line is much simpler because of Modek's intrinsic simplicity and the enhanced accessibility from having no body to contend with.

The longer a piece of equipment is idle, the greater its overall cost of operation. Prolonged idleness of a Ridon need not involve the Modek, which could be returned to the exchange pool. This economically sound principle gives Ridek operation a cost advantage that is denied the owner of a private automobile.

The shortcomings of the battery have bedeviled the electric automobile ever since Henry Ford bought one for his wife. In response to recent demand, batteries have improved but their capacity, life, expense and slowness to recharge make the battery electric automobile, constructed on conventional lines and used with conventional infrastructure, unable to compete without tax inducements. Since the California Air Resources Board reached that conclusion, a marked resurgence of interest in the zero-emission battery-electric car has developed, yet a satisfactory answer to its problems is lacking, or would appear to be. Actually, it isn't. Ridek gives the solution.

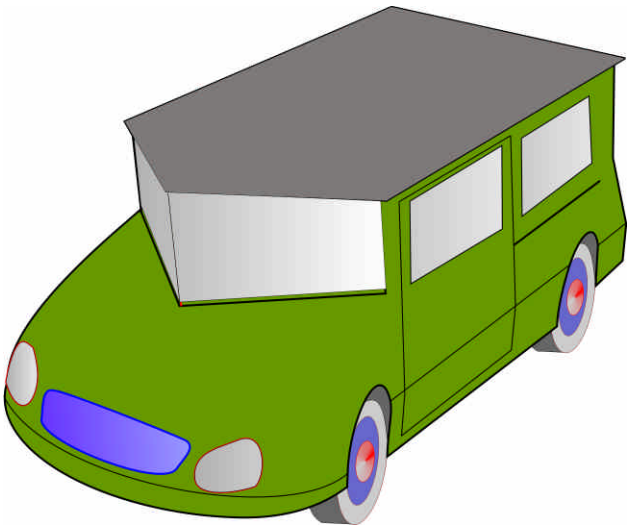
The electric car should normally be recharged from the grid using overnight rates, because they are cheaper. For most drivers, a range of 50-100 miles between charging is sufficient, most of the time. Although more expensive batteries may extend the range to a few hundred miles, this is not necessary. Most of the time a modest range will do, especially if it may be extended indefinitely through Modek exchange—which takes less time than for a fill of gasoline. The main advantage of the fuel-burning car's greater range is that refueling is required less frequently, which is a convenience, of course. This consideration does not apply to the battery-electric Ridek if its overnight charge is usually sufficient but even when it is not, occasional Modek exchange would be less inconvenient than buying fuel several times per month, especially if it is quicker. To answer the objection that there would be the chore of plugging into the grid in the home garage, inventive people will find means for making this automatic. Indeed, the author has already found one!

So much for a battery's capacity and slowness to recharge, but what about life and expense? The deep-cycle sealed lead-acid battery is not expensive and may last a few years without maintenance but it is heavy in relation to its capacity and it adds significantly to the mass of the Modek. This gives the Ridek a low center of gravity and greatly reduces any risk of rolling over such as we noted for the SUV. At present (2007), this is a good choice for a range of 50-100 miles. Batteries with several times the capacity of the lead-acid, a longer life, and the ability to accept much greater recharging rates are becoming available, but they are expensive. In terms of energy, gasoline costs about ten times as much as electricity. This saving will handsomely cover battery replacement cost and lower the overall cost of Ridek operation. A future carbon tax, already present in some countries, will increase this difference.

Once our thinking has adapted to the battery-electric Ridek, other changes present themselves. Streamlined styling has greatly reduced the roof area of today's automobile. For the Ridek, we should like to increase it to provide area

for a solar panel to allow a cooling system to operate when stalled in traffic. A few hour's delay on a Los Angeles freeway with an air conditioner running could deplete our battery, but not if a solar cell could keep our vehicle cool. How pleasant it would be to enter one's vehicle parked in the sun and find its temperature to be only 70 degrees, instead of perhaps 150 degrees!

The third Ridek prototype exploits the possibilities that arise from the Ridek concept. One of these is the design of the steps. Remember "user-friendly?" Entering the Ridek is like entering a house—you don't need handles to help you. Leaving is just as easy. Visibility is unmatched. The vehicle is a delight functionally and has a presence; once seen is never forgotten. Marketability? You bet.



Ridon modification to give a more streamlined nose and make room for a heat pump.