Golf Cas TIO Magazine



BEYOND

The Gated Community What Can We Expect From Golf Car Imports and Prices?

DEALER

Profile
Charlotte Golf Carts LLC,
Charlotte, NC

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MAY, 2024

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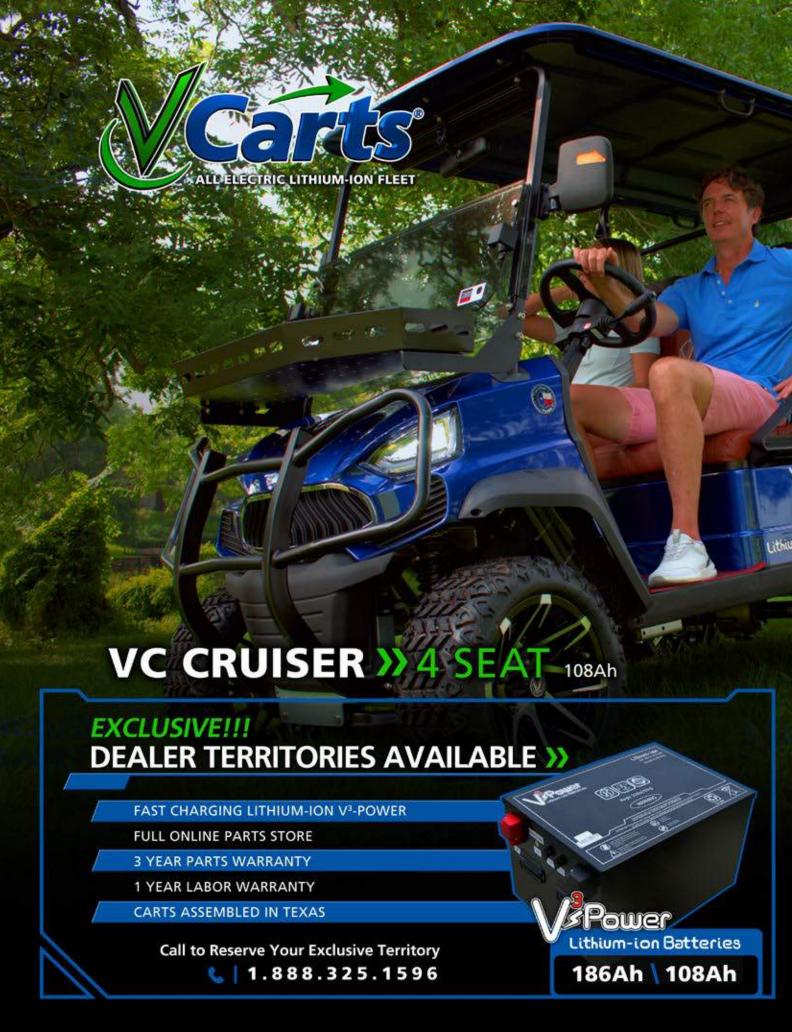
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Hop on board with one of the hottest selling EV's in America

SELECT TERRITORIES ARE AVAILABLE

Cover Story



The batteries are connected in parallel meaning you can scale to get the power needed.

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RE Li³ O N⁸

Why RELiON Lithium Batteries are the Best Option for Golf Cars Today

Are you thinking of offering your customers a lithium battery option for their golf car? You may be curious how these batteries compare and why one would be better than the other. Particularly as lithium battery prices have fallen <u>97 percent</u> over the past three decades, golf car users are increasingly switching to lithium batteries to avoid the maintenance headaches, heavier weight, and more frequent replacement costs associated with lead-acid batteries. In this article, we will dive into battery history and explain how lithium batteries far exceed lead-acid, especially when used in golf cars or personal transportation vehicles.

Golf Car History

In the 1930s and 1940s, several electric golf cars emerged. However, they were mostly modified rickshaws that were never widely adopted. It wasn't until 1951 that an electric golf car specifically designed for golf hit the market.

In the 1970s, the golf car market expanded as people realized golf cars could also be used as a means of transportation in small, private communities.

Lead-acid batteries have had a long run as the first and only solution to power these electric golf cars, and they've done a decent job in providing the basic needs of the market. They've made golf cars clean and quiet compared to gas-powered vehicles, and they've had a relatively inexpensive upfront cost.

RELION

N85 W12545 Westbrook Crossing Menomonee Falls, Wisconsin 53051, USA (855) 931-2466 www.relionbattery.com





RELION's InSight Series® 48V lithium battery was designed specifically to meet the power and energy needs of all types of golf cars.

Advancements in Lead-Acid Battery Technology

The lead-acid batteries used in golf cars have become standardized in terms of form, fit, and function, and there are a few options in terms of capacity which directly relate to mileage range. There are even watering systems integrated in the battery caps that reduce the labor associated with adding water to your traditional lead-acid batteries. There are sealed lead-acid batteries, such as Gel and AGM, available for golf cars, that eliminate the need to add water, but they have not been widely accepted due to some of their performance limitations.

Not to diminish the mighty lead-acid battery and all it has provided, but the reality is, the advancements have been somewhat underwhelming over the years.

Out with the Old, in with the NOW - Enter Lithium Batteries

One fact that is undeniable is that when a particular technology doesn't advance, a new technology will displace it – think Blockbuster and Netflix. Demands increase, expectations evolve, and as other technologies reveal hip, new features, a customer wants the same advancements in their golf car or personal transportation vehicle (PTV). This is where lithium batteries enter the scene.

Lithium batteries have answered the call to improve the performance and overall customer experience of driving a golf car. They are lightweight, making them significantly easier to install - anyone can do it - and there is less wear and tear on the golf car and fairways. There's virtually no golf car

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battery maintenance - no water, no cleaning acid residue - just charge them, and they are ready to go. They are capable of fast charging. They provide higher, sustained power so they are never sluggish. They're difficult to damage, unlike lead-acid batteries that often see premature failure due to improper charging, watering, etc. They also provide 5 to 10 times longer life than lead-acid batteries, which means you aren't replacing batteries every few years. The lifetime cost is less than lead-acid and we've done the math to prove it!

Advancements in Lithium Iron Phosphate Battery Technology with RELION

Though lithium batteries solved many shortcomings of lead-acid battery technology, they also created new challenges. Lithium batteries have created safety concerns due to high heat generation. They include a Battery Management System (BMS) to protect the battery, but it can also cause undesirable power losses and they can be complicated to use. At RELiON, we have designed a wide range of lithium batteries of varying capacities, voltages, and physical sizes to eliminate all of the obstacles facing lithium batteries.

First off, all RELiON lithium batteries use the most environmentally benign Lithium Iron Phosphate (LiFePO4) chemistry, which is inherently safe and chemically stable due to strong covalent bonds. LiFePO4 produces a fraction of the heat generated from other popular, cobalt-based lithium battery chemistries like nickel manganese cobalt (NMC), lithium cobalt oxide (LCO) and lithium cobalt aluminum oxide (NCA). Unlike lithium-cobalt based batteries, LiFePO4 is not prone to thermal runaway and fire.

RELiON's sophisticated, yet easy-to-use, BMS also provides an additional layer of protection when it comes to temperature, voltage, cell balance, and short circuits. The BMS protection parameters have been intentionally selected to protect the battery without compromising the customer experience. In other words, the vehicle will not experience unexpected power losses and come to a sudden stop as they do with other lithium batteries.

RELION lithium batteries are also very easy to install and make the golf car lithium battery conversion a simple process. The company offers batteries that are the same size as the lead-acid batteries they are replacing, so it fits right in

the same battery tray. The batteries also utilize parallel connections so you can scale the system easily to provide increased power and energy. We couldn't have made it any easier!

Customer Experience with RE-LiON Lithium Batteries

The first thing people notice when they drive a golf car with lithium batteries is the feel. The car feels lighter, faster, and smoother. We all know golf cars are speed-limited, so why do they feel faster? It's because the higher voltage of a lithium battery provides more power, which increases the vehicle's ability to accelerate. The vehicle can reach top speed faster and more often. When driving up a hill with lead-acid batteries, you just can't reach full speed but with lithium batteries, you can and do!

What's equally important is what you don't experience. This includes unexpected stops, acidic messes on the top of the batteries, in the battery compartment, and on the floor, stress or worry about whether or not you left your battery uncharged, or did several other things that can destroy a lead-acid battery because none of these will damage the lithium battery. With Lithium Iron Phosphate, the biggest benefit is peace of mind.

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Local Family Educates Public on Golf Cart Safety

olf carts are a way of life for some people, even when they aren't on the course. Such is life for the Moore family who use their cart for routine chores and transport around their property in Warwick. One summer day in 2023, routine became a nightmare.

Oren had been seated in the back of the cart when his dad tapped the gas, lurching the cart forward and sending Oren backward and into the ground, headfirst. His grandmother, a practicing nurse, sprung into action. At first, all seemed OK. He recovered quickly and didn't have visible signs of fracture. As minutes ticked on, though, he began getting drowsy and vomiting—telltale signs of a concussion. He was rushed to the local emergency department where a CT scan showed a skull fracture and small brain bleed. They knew Oren needed pediatric specialists and called the Children's Rural Access Line Pilot (CHRP) to reach neurosurgery at Children's Healthcare of Atlanta, Scottish Rite Hospital.

A summer storm with heavy rain prevented the Children's flight team from reaching Crisp Regional hospital, so an ambulance brought him to Macon where the Children's helicopter was able to safely land.

Oren and his mom Amanda boarded the helicopter together, and once on the helicopter, Amanda remembers being overcome by a feeling of calm.

"The nurses took charge and knew just what to do to care for him and comfort me," said Amanda. "They reassured me they'd seen this type of injury before, explained everything they were doing and told me they had full confidence in Dr. Wrubel, the neurosurgeon who was waiting for us on the ground."

Amanda wore a headset and could hear the constant communication between the flight team and the hospital team.

From the moment the helicopter landed on the helipad at Scottish Rite, Amanda stayed by Oren's side—down to the Emergency Department, into a trauma room and eventually up to recovery in the PICU.

Thankfully, the swelling subsided on its own and didn't require surgery. After three nights, Oren was discharged. Two weeks later, he'd made a complete recovery.

SOURCE



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> 210Ah

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manufacturer NEWS

may 2024



From Nevada to Florida, Carteav's autonomous golf carts have been making rounds in the U.S.

In 2024, Carteav started U.S. operations with a road show, and began marketing and sales operations in Florida in February of this year. Now, Carteav is well on its way to conquering the U.S. market.

Pilot Program at Epperson Lagoon

- Led by DriveWhere distributor in Tampa , FL
- Operated on daily basis

- for 3 weeks already in a gated community
- They asked to have the solution and requested 10 vehicles
- Since the customer is a
- distributor, they asked to distribute it in Tampa area
- Great feedback from the users (see testimonials including a short clip (below).



We held a private demo at a resort in Orlando

In March, a small group of individuals witnessed a glimpse of the future.

At the Hyatt Regency Grand Cypress Resort, a select group of people enjoyed exclusive rides around the resort and got to experience our self-driving carts and supporting technology suite first-hand.

Attendees were blown away by how much the carts are capable of. It was A LOT of fun.

Everyone at the event understood that THIS is the future of autonomous transportation. Now, they know where mobility is heading. And they know how to stay ahead.

As for us, we're more convinced than ever before that autonomous low-speed vehicles have an essential role in the future of transportation.



Some exciting upcoming potential collaborations include:

- Evermore: the new huge resort in Orlando
- On Top of The world: Retirement village
- Eagles Rentals: want to be our distributors for Surveillance solution as well. Set up pilot at Holiday inn in Orlando

Carteav a finalist in the prestigious Edison Awards

We're shortlisted for a Thomas Edison Award! We're in the Top 3 for Automotive and will find out our final position soon!

Next month's planned activities

There's A LOT going on at Carteav as we continue to expand, especially in the U.S:

- Pilot at COX automotive, Manheim Tampa: huge auction area for second hand cars, and there are many areas in the U.S. like this. They plan to drop drivers autonomously, and save half of their drivers
- Demo at the Thomas Edison Award event. We have been selected among the top 3 of the "Automotive" category for 2024. We will know our position (Gold/Silver/ Bronze) at the event towards the end of April
- Plan a pilot at the Holiday Inn Club Vacations at Orange Lake Resort on the middle of May
- · Continue building the pipeline in Florida
- Manufacture more carts in the USA

To learn more visit https://carteav.com/

MAY 2024 2 1

WARNING SIGNS

Tony Cantafio is a retired corporate communications executive and avid golfer who resides in the Coachella Valley of CA.

A recent report from the Driver Cognitive Assessment Center offers evaluations of older drivers. The report suggests that anyone with concerns about the driving skills of elderly drivers should be on the lookout for the following signs:

- Close calls
- Driving too slow or too fast
- Dents and scrapes on the car, fences, mailbox, garage doors, curbs
- Drifting across lane markers or into other lanes
- Unaware of other vehicles or errors
- · Ignoring traffic signs and signals
- Getting lost or confused in familiar places
- Having difficulty finding the parked vehicle
- Feeling uncomfortable, nervous, angry, or fearful while driving
- Confusing the brake and gas pedals or late-braking
- Being easily distracted or having difficulty concentrating while driving
- Difficulty judging gaps in traffic
- Being honked at by other drivers
- Friends or relatives not wanting to ride as a passenger

As an 81-year-old golfer, here's a tongue-in-cheek overlay of similar signs of concern for those elderly (and some not-so-elderly) drivers still behind the wheel of a golf cart:

- · Misaligning a one-foot putt
- Ready golf seems a lot slower
- Damaged ball cleaners, tee boxes and tire marks in sand traps
- Trouble staying on cart path
- Driving to the next shot without waiting for partner to hit ball

FOR ELDERLY CAR AND GOLF CART DRIVERS

By; Tony Cantafio. Tony is a retired corporate communications executive and avid golfer who resides in the Coachella Valley of CA

- Driving past the starter without stopping
- Getting lost after making a relief stop in the bushes
- Trouble locating the beer cart after a triple bogey
- Heart palpitations on first tee
- Bumping into the other twosome's golf cart
- Listening to other players telling jokes during golf swing
- Hitting into the group in front
- Getting hit into by the group behind
- Riding alone in a fivesome.

If any of these signs ring a bell while I happen to be on the same course as you, please allow me to play through—and don't forget to wait for others in your group to leave the parking lot before you drive home.

I promise to do the same when that day comes for me.





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Battery System	Total Volts	Total Amps Approx	Travel Distance
6-6 Volts	36 Volts	1,350	Approx 22 Miles
4-12 Volts	48 Volts	600	Approx 12 Miles
6-8 Volts	48 Volts	1,020	Approx 19 Miles
8-6 Volts	48 Volts	1,800	Approx 35 Miles
6-12 Volts	72 Volts	900	Approx 17 Miles









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BEYONDTHE



What Can We Expect From Golf Car Imports and Prices?

Most of us are aware of the significance presence of Chinese-built golf cars in the market. The majority by far are the result of a partially-assembled import, shipped to a final assembly facility in various locations in the United States.

For the most part these vehicles are participating in the LSV/PTV segment, not in the fleet segment (used on golf courses). Within the industry it is well-known that partially-assembled units greatly increased in volume in the wake of COVID crisis and the disruption of the supply chain for parts and accessories on which domestic manufacturers depended. The question now is whether the volumes that have been experienced over the past three or so years can be sustained.

Import trend since 2020

The table below lays out the trend in import growth and the clear dominance of China in this market. From an average

level of about 18-19 thousand units in 2019 and 202, the numbers more than doubled in 2021, and from 61 thousand units in 2021 doubled more than double again to 142 thousand plus units in 2023.

As can be further seen, China dominates the market with a share of over 90% from 2019 to 2021 and over 80% for 2022 and 1023. In 2022 and 2023 Japan came on strong with over 13 thousand units in both years.

	Golf Car Impo
Country	2019
China	15,795
Japan	1,193
Taiwan	0
Canada	4
South Korea	0
Denmark	41
Subtotal	17,033
Rest of World	53
Total	17,086
China Share of Imports	92.4%
C 11C D	((

Source U.S. Department of Commerce

COMMUNITY

By Stephen Metzger Managing Director Small Vehicle Resource, LLC smetzger@smallvehicleresource.com www.smallvehicleresource.com

Implications of the import upsurge

The upsurge in imports has had the following significant results:

- Many new brands, associated with final assembly operations have come into the market;
- For consumers a greater variety of models and options to choose from;
- A shift rightward of the supply curve (meaning a greater number of u units at each price level;

orts, 2019-2023 (Units)				
2020	2021	2022	2023	
18,997	57,482	105,373	117,382	
155	110	12,628	19,006	
0	0	235	4,893	
168	736	968	863	
0	0	11	32	
531	322	651	20	
19,851	58,650	119,866	142,196	
177	2,368	5,982	61	
20,028	61,018	125,848	142,257	
94.9%	94.2%	83.7%	82.5%	

- With new supplies outstripping current market demand, a decrease in prices at retail, which is good news for consumers, but not-so-good news for OEMs;
- A potential shake-out of companies, in all likelihood some of the new entrants.

Has the wave of imports crested?

Certainly, the increase from 2022 to 2023 of 13.1% was quite a bit smaller than the leap of 106.1% from 2021 to 2022. Yet, one could question whether another double digit gain would be possible, given the pressure on prices that has already been experienced.

Import data for the current year covers just three months, but a comparison between year-to-date figures is useful. The table below shows a small overall decline in imports of about 1 thousand units through the first three months of the year, as compared to the same period in 2023.

Continued on next page

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BEYOND THE COMMUNITY

Golf Car Imports, Year-to-Date (Units)		
Country	2023 YTI	2024 YTD
China	14,657	17,372
Japan	3,519	0
Taiwan	14	0
Canada	223	5
South Korea	0	13
Denmark	0	0
Subtotal	18,413	17,390
Rest of World	0	0
Total	18,413	17,390
China Share of Imports	79.6%	99.9%
Source U.S. Department of Commerce		

Despite the small overall decrease, China's imports rose to 17.3 thousand, a gain of 18.4%, and at a pace even greater than the 2022-2923 overall gain of 11.2%. The big difference between the overall import numbers in the year-to-date table is Japan, which went from 3.5 thousand to zero, so far.

Thus, it is fair to say at this point, that the market may not have seen a tapering off, much less a cresting of the import drama. Chances for another double digit gain in imports is certainly possible. This despite the toll it would take on dealer margins and increased pressure for the weaker entrants to drop out.

Oversupply is not necessarily good news for consumers

High levels of supply can benefit consumers through a wider variety of options to choose from, as noted, and lower MSRPs, but it adds to the risk of the purchase. The risk is simply that the great buy you make, a vehicle with all the bells and whistles, may be from a company that has had to shut down. Even if the company stays in business, it may be reluctant to provide dealer support in terms of parts supply and dependable warranties.

Given the speed with which the internet can apprise would be purchasers with potential fault-finding data, a company struggling to remain viable could experience the "nail in the coffin" via negative reviews.

In summary...

What the next two quarters reveal about the market and its OEM is pretty difficult to predict. One clear factor to consider whether on the buy or sell side of market, is the increased risk that what appears to be an oversupply of vehicles brings to the table. The better news is that the market will definitely be growing, albeit in the short term not as rapidly as

supply, and the longer term prospects are quite positive.

Check out the full story and analysis in Small Vehicle Resource's upcoming comprehensive report (see below).

Small Vehicle Resource (SVR) publishes new market analysis

SVR announces new analysis of the small, task-orient vehicle (ST)V) market, with outstanding growth potential, and covering:

- Impact of new industry entrants;
- Segment analysis—LSV.PTV, light duty utility vehicles, and fleet (electric & gas);
- Trends from 2016, including the COVID disruption;
- Forecasts by segment and by electric vs. gas to 2030;
- Electrification of the off-road market;
- New market opportunities and benefits of a national dealers' association

Authored by Stephen Metzger, small vehicle industry expert and longtime contributor to Golf Car Options, this new analysis of industry trends is a must-read for developing market strategies and product development. If you would like to find out more about the SVR market analysis, you can contact him at: smetzger@smallvehicleresource. com or (914) 293-7577



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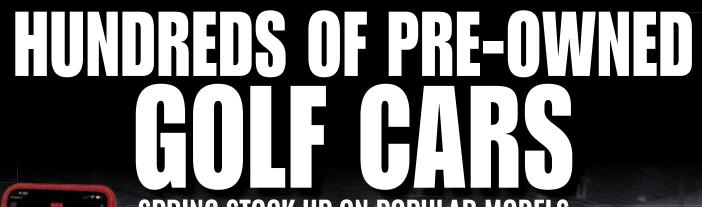




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Lithum Low-Down

Oh batteries... We have always loved electric, but we have had this love hate relationship with batteries themselves. The watering of cells, the overflowing when charging, the acid stains on the garage floors, the lack of range when they are not watered, the corroded battery cables, the melted battery posts...we've seen it all.

Enter lithium: We first started "playing" with lithium in 2012. I flew down to California to meet with a "company" who said that they were successfully producing lithium packs that would work for our application. I drove up to the location provided and quickly realized that it was just a house where a couple guys were assembling test packs in their garage using CALB cells. They were a long way off from having a useable production system. Since that time, we built a couple batteries of our own (which are still in use today), we worked with various off-the-shelf products, and finally we have landed on a system that we designed with a lithium manufacturer to meet our needs.

I truly believe that using anything other then lithium batteries at this stage of the game is archaic. That is why, in August of 2021, we made the decision at SC Carts to exclusively power our vehicles with lithium. Lithium has been a learning curve for the industry, and we have done a tremendous amount of learning ourselves. Is lithium a perfect power source? No, it's not; but it in our opinion, it is currently the best power source.

The move to lithium wasn't without its challenges. In the early days it was that lithium couldn't keep up with the amperage demand that our vehicles required. The lithium packs would shut down under hard acceleration, heavy load, or hill climbing. We countered this by detuning our vehicles to match the performance that the lithium could provide. Next, we were faced with cold temperature issues; after a certain temperature, the battery would simply not charge or function. We were also challenged with being able to accurately display the state of charge of the battery, as lithium is so linear it stays at a very consistent voltage throughout the charge cycle making it challenging to monitor. Another challenge we encountered was the fact that we have made our drive systems so efficient that when fully charged and going downhill the battery management system would shut the pack down cutting power to the vehicle.

Even with all the above (and trust me this was the very abbreviated version of the challenges) we still feel that lithium is by

Author: Jeff Holomis, CEO SC Carts www.sccarts.ca



far the best solution for powering our vehicles.

With our knowledge, research, and development over the years, we have been able to manage all the problems that are inherent with lithium. We now have a battery pack that

can handle the full amperage draw of our vehicles. We have added smart heating to ensure our batteries work during even the coldest months of the year, and we have increased our battery packs capacity to allow for the regenerative braking to be able to add more charge without cutting out.

If you are looking for a new cart, LSV, or doing a lithium conversion from your current lead acid batteries, I fully encourage you to go lithium. Just be sure to ask the questions

and work with a reputable supplier that can answer them. They should be asking you the application; flat terrain or hilly; temperature range that the vehicle will be operating in; speeds you plan on attaining; controller and motor size. If the company you are purchasing your cart or lithium from cannot answer these questions, then you need to move on and find someone that can. Best of luck and enjoy the ease of owning lithium.



At SC Carts, we want only the best for our vehicles and customers. That's why we use cutting edge 72v Lithium Battery packs.



OWGOLFB -Onward Golf Bag Attachment Round Tube

M&M VEHICLE CORP.

OWGOLFB6 - Onward Golf Bag Attachment with 6" drop



RXVGOLFB - RXV Golf Bag Attachment

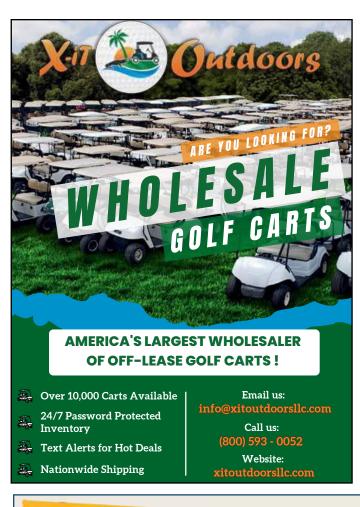


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MAY 2024

AROUND the MARKETPLACE

ABYSS BATTERY



from Abyss Battery| abyssbattery.com

Improve your golf cart with the powerful, light-weight technology of our Lithium-Ion batteries. Abyss Battery provides plug-and-play LiFeP04 battery solutions that produce more power and mileage than ever before - less weight, longer life span & fast acceleration up hills! No maintenance required; just enjoy improved performance at a lower cost, plus zero emissions for an eco-friendly ride. Our 36V, 48V, and 72V lithium-ion options are unbeatable in terms of safety & strength.

When compared to the traditional lead-acid battery, lithium golf cart batteries are half the size. This lightweight option makes your golf cart easier to maneuver while allowing it to reach higher speeds more quickly. And when it comes to speed, these batteries can charge up to four times faster than lead-acid batteries. Say you forgot to recharge overnight—when you use your batteries, you can get on the field faster. This way, you don't have to worry as much about making sure your golf cart is ready to go before your next game.

KID CADDIE



from Kid Caddie | kidcaddie.com

A golf club carrier that transforms your stroller into a push cart so you can bring your kids golfing.

Kid Caddie fits nearly any stroller!

All you need is a handbar that is 12 inches wide and a basket underneath and you're ready to spend the day on the course.

Avoid the cost of baby sitters, carts and the inconvenience of carrying a golf bag. Bring your kid and all your clubs by turning the stroller you already own into a push cart.

Make golf a family activity, grow the game, and spend more time on the golf course. Trade time on the couch for time on the course with your little one! Load the stroller up with snacks and give your spouse some well deserved me time while you go play.









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KEY BENEFITS



EASY INSTALLATION

No need to modify the battery trays, and no extra components needed.



LONGER LIFE

Lasting up to 10x longer than lead-acid batteries.



SCALABLE CAPACITY

Parallel connections allow you to meet the desired mileage range.



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Why Allied Battery?

Our Differentiating Features:

- Grade A EV Cells: Allied uses true 48V 105AH cells unlike others who have switched to cheaper storage cells, not designed for EV use. This causes shorter range and battery life.
- Hi-performance Battery Management System (BMS): Designed to work hi-performance vehicles and with regenerative braking systems, for carts such as the EZGO RXV.
- Bluetooth technology and a user-friendly mobile app: Gain easy access to State-of-Charge, cell voltage, cycles and much more. Includes a robust OEM dashboard to allow off-site maintenance and troubleshooting, ensuring efficient and timely fixes for optimal customer experience.
- Innovative sleep mode: Eliminates risk of over discharge if customer leaves headlight or other accessories on. When paired with an Allied Solenoid the system will disconnect ALL draw from motor, controller and accessories, eliminating the risk for over discharge and protecting the customers investment.
 - CAN bus and RS485: Allied Batteries include

CAN bus and RS485 protocols natively, allowing seamless integration with various controller and display screens.

- Integrated Active balancer: Balances cells 80X faster than batteries depending on just the BMS. The Allied active balancer ensures cells are fully balanced when charging and discharging. This will extend the life of the battery and ensure a consistent state of charge due to every cell being at the same voltage.
- Thick Steel Case: The structural integrity of Allied Battery's casing is designed to prevent any potential for dents or punctures. The thicker steel walls not only ensure physical resilience but also promote optimal heat dissipation, contributing to the battery's overall efficiency and performance.
- Fire Suppression Technology (FST): In the event of excessive heat or a fire near the battery, Allied's FST discharges a proprietary chemical mixture, enveloping the interior of the battery. This process eliminates oxygen within the battery case to provide a shield from external threats.

ALLIED BATTERY

Golf CAR BATTERY specs

Allied Battery LLC St L	ouis, MO				and .	
alliedlithium.com						
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	CELL TYPE
Drop-in-Ready Batteries						
36V 36AH	38.4	10.2"	7"	9.75"	31	Cylindrical LiFePo4
48V 30AH	51.2	10.2"	7"	9.75"	38	Cylindrical LiFePo4
72V 18AH	76.8	10.2"	7"	9.75"	30	Cylindrical LiFePo4
Commercial Series Batterie	?S					
36V 105AH	38.4	17.5"	10.75"	9"	86	Prismatic LiFePo4
48V 65AH	51.2	18"	9.6"	8.5"	71	Prismatic LiFePo4
48V 105AH	51.2	18.3"	10.5"	9.6"	108	Prismatic LiFePo4
48V 160AH - Square tray	51.2	18.2"	17.9"	9.5"	152	Prismatic LiFePo4
48V 160AH - Rectangle	51.2	28.6"	12.4"	10"	165	Prismatic LiFePo4
48V 210AH	51.2	20.94"	20.2"	10.2"	203	Prismatic LiFePo4
72V 105AH	76.8	25.9"	13.6"	9.75"	157	Prismatic LiFePo4

OLF CAR

BATTERY Pack Vollages

The most popular golf car battery voltages are 36V and 48V, although there are other voltages present as well, but they are not that common.

The following chart lists the number of required batteries in order to achieve desired voltage of the battery pack - connections are in series:

Individual Batteries	36 Volts	48 Volts	72 Volts
6 Volts	6 Batteries	8 Batteries	12 Batteries
8 Volts	-	6 Batteries	9 Batteries
12 Volts	3 Batteries	4 Batteries	6 Batteries
24 Volts	-	2 Batteries	3 Batteries
36 Volts	1 Battery	-	2 Batteries
48 Volts	-	1 Battery	-

As one can see, in order to make, for example, 48 volts battery pack, one needs eight (8) 6V batteries, six (6) 8V batteries, four (4) 12V batteries, two (2) 24V batteries, or one can simply take one (1) 48V battery.

MAY 2024

Golf CAR BATTERY specs

Bolt Energy	Largo, FL
boltenergyus	sa.com

boitenergyusa.com		× •				
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	CELL TYPE
BE10538M	38	11.14"	10.58"	10.67"	90lbs	105AH Pro Kit
BE10538M	38	11.14"	10.58"	10.67"	90lbs	105AH Std Kit
BE10551M	51	14.76"	12.01"	10.42"	120lbs	105AH Pro Kit
BE10551M	51	14.76"	12.01"	10.42"	120lbs	105AH Std Kit
BE10551T	51	21.97"	8.46"	10.65"	120lbs	105AH Std Kit
BE10551T	51	21.97"	8.46"	10.65"	120lbs	105AH Pro Kit
BE10572P	72	22.05"	10.75"	10.39"	165lbs	105AH Pro Kit
BE10572P	72	22.05"	10.75"	10.39"	165lbs	105AH Std Kit
BE1605B	51	31.54"	10.17"	9.13"	190lbs	160AH Std Kit
BE1605B	51	31.54"	10.17"	9.13"	190kbs	160AH Pro Kit

						and the second second		
Crown Battery Mfg., Co. Fremont, OH crownbattery.com								
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	MINUTES OF DISCHARGE		
6CRV220	6	12.25"	7.06"	10.94"	66 (wet)	@75A:105		
6CRV260	6	10.24"	7.13"	11.38"	79 (wet)	@75A:150		
CR-205	6	10.25"	7.06"	10.94"	56 (wet)	@75A:105		
CR-220	6	10.25"	7.06"	10.94"	60 (wet)	@75A:110		
CR-235	6	10.25"	7.06"	10.94"	63 (wet)	@75A:122		
CR-240	6	10.25"	7.06"	10.94"	68 (wet)	@75A:135		
CR-260	6	10.25"	7.06"	11.63"	63 (wet)	@75A:122		
CR-150	8	10.31"	7.06"	10.82"	60 (wet)	@56:90 @75:65		
CR-165	8	10.31"	7.06"	10.82"	64 (wet)	@56:117 @75:82		
CR-190	8	10.31"	7.06"	10.82"	69 (wet)	@56:135 @75:95		
CR-GC150	12	12.92"	7.06"	10.53"	81 (wet)	@56:103 @75:61		
CR-GC155	12	12.92"	7.06"	10.53"	88 (wet)	@56:110 @75:75		

GIVE YOUR BATTERY A POWER-UP FOR EXTENDED LIFE AND TOP-NOTCH PERFORMANCE!



Golf CAR BATTERY specs



Deka Batteries/East Penn Mfg., Co Lyons, PA dekabatteries.com								
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	MINUTES OF DISCHARGE		
GC8V	8	10.25"	7.125"	11.125"	68 (wet)	@25A:318 @75A:85		
GC10	6	10.25"	7.125"	10.875"	60.5 (wet)	@25A:395 @75A:60.5		
GC12T	12	13"	7.125"	11"	85 (wet)	@25A:280		
GC15	6	10.25"	7.125"	10.875"	64 (wet)	@25A:448 @75A:120		
GC25	6	10.25"	7.125"	10.875"	68 (wet)	@25A:488 @75A:132		
GC45	6	10.25"	7.125"	11.875"	77 (wet)	@25A:530 @75A:145		





ecobattery.com	1				·	
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	ТҮРЕ
A-038105-04	38.4V	13 3/8"	10 3/16"	11"	70 lbs	LifePo4 105Ah
A-051072-05	51.2V	13 3/8"	10 3/16"	11 3/4"	75 lbs	LifePo4 72Ah
A-051105-01	51.2V	13 7/16"	12 1/4"	10 3/16"	94 lbs	LifePo4 105Ah
A-051105-03	51.2V	22"	9.75"	10 7/16"	103 lbs	LifePo4 105Ah
A-051160-06	51.2V	22"	12 1/8"	10 5/8"	146 lbs	LifePo4 160Ah
A-070105-06	70.4V	22"	12 1/8"	10 5/8"	136 lbs	LifePo4 105Ah

Essential

es-en-tial - (/əˈsen(t)SHəl/)

- 1. *adj.*: absolutely necessary; extremely important SEE also Safe, IP67 Water-Proof Construction, Long-Lasting, Maintenance-Free, Scalable
- 2. n: something that is absolutely necessary See also 48 Volt, 105Ah, State-of-the-Art BMS, Lithium Iron Phosphate(LFP)



DEEP CYCLE LITHIUM-ION BATTERIES



Golf CAR BATTERY specs

Fullriver Battery USA Camarillo, CA fullriverbattery.com							
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	MINUTES OF DISCHARGE	
EGL200-6	6	10.24"	7.13"	10.33"	74.07	@25A:375 @75A:100	
EGL220-6	6	10.31"	7.13"	11.06"	82.67	@25A:470 @75A:118	
EGL170-8	8	10.25"	7.17"	11.35"	81.57	@25A:330 @74A:120	
EGL100-12	12	12.95"	6.73"	9.09"	78.48	@25A:175 @75A:43	

Nanointech Energy Solu nanointech.co.kr	ıtions Johi	ns Creek, (GA			
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	CELL TYPE
N Series (Under the seat ty	pe)					
N48156 156Ah	48	24.8"	12"	7.4"	99.2	
N48234 234Ah	48	24.8"	9.1"	11.8"	145.3	LG & SK Lithium-lon
N48312 312Ah	48	24.8"	12"	11.8"	176.3	NMC (Nickel-Manganese-
N72078 78Ah	72	24.8"	9.1"	7.4"	77.1	Cobalt)
N72156 156Ah	72	24.8"	9.1"	11.8"	145.3	
X Series (Skateboard type -	on the fram	e)				
X36278 278Ah	36	51.5"	27"	5.3"	326.2	
X48156 156Ah	48	22.9"	27"	5.3"	105.8	LG & SK Lithium-lon
X48312 312Ah	48	34.5"	27"	5.3"	194	NMC (Nickel-Manganese- Cobalt)
X48468 468Ah	48	45.8"	27"	5.3"	282.1	
X72156 156Ah	72	28.3"	27"	5.3"	149.9	
X72312 312Ah	72	45.8"	27"	5.3"	282.1	



BEST SERIES

4 Gauge Copper Cable with MAX Lugs & Heat Shrink Tube

LENGTH	5/16" STUD HOLE
7"	205750
9"	205752
12"	205754
14"	205758
16"	205762
21"	205769
26"	205774

BETTER SERIES

6 Gauge Copper Cable with Zinc Plated Thimble

LENGTH	HOLE SIZE	COLOR	PART NUMBER
9"	5/16"	Red	205601
9"	5/16"	Black	205602
12"	5/16"	Red	205603
12"	5/16"	Black	205604
20"	5/16"	Red	205605
20"	5/16"	Black	205606
9"	3/8"	Red	205607
12"	3/8"	Red	205609
20"	3/8"	Red	205611

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12"	205704
14"	205708
16"	205712
21"	205719



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Golf CAR BATTERY specs



Trojan Battery Co. Santa Fe Springs, CA trojanbattery.com										
MODEL	VOLTAGE	LENGTH	WIDTH	HEIGHT	WEIGHT	KILOWATT HOURS @ 100 Hr Rate kWh				
6 Volt Deep-Cycle Flooded Batteries With T2 Technology™										
T-605	6	10.30"	7.11"	11.07"	58	1.39				
T-105	6	10.30"	7.11"	11.07"	62	1.50				
T-105+	6	10.30"	7.11"	11.07"	62	1.50				
T-125	6	10.30"	7.11"	11.07"	66	1.60				
T-125+	6	10.30"	7.11"	11.07"	66	1.60				
8 Volt Deep-Cycle Flooded Batteries With T2 Technology™										
DC-8V	8	10.21"	7.10"	11.14"	61	1.42				
T875	8	10.21"	7.06"	11.14"	63	1.51				
T-890	8	10.21"	7.10"	11.14"	69	1.59				
Ranger 160	8	10.21"	7.10"	11.90"	76	1.8				
12 Volt Deep-Cycle Flooded Batteries With T2 Technology™										
T-1260+	12	12.96"	7.13"	10.71"	78	1.86				
T-1275	12	12.96"	7.13"	10.71"	82	1.99				
T-1275+	12	12.96"	7.13"	10.71"	82	1.99				
Deep-Cycle VRLA Batteries With T2 Nano Carbon										
T105-AES	6	10.30"	7.06"	10.73"	70	1.35				
T875-AES	8	14.97"	6.94"	14.07"	72	1.35				
T1275-AES	12	12.96"	7.06"	10.96"	85	1.69				
Deep-Cycle Lithium-lon Batteries										
TRL-GC2-24-M	24	10.4"	7.1"	10.9"	37					
TRL-GC2-36-M	36	10.4"	7.1"	10.9"	37					
TRGC2-48-G	48	10.4"	7.1"	10.9"	37					

AR BATTERY specs

U.S. Battery Mfg., Co. Corona CA usbattery.com									
MODEL	VOLT- AGE	LENGTH	WIDTH	HEIGHT	WEIGHT	TYPE/ MINUTES OF DISCHARGE			
US 1800 XC2	6	10.25"	7.13"	11.25"	55 (wet)	@56A:151 @75A:107			
US 2000 XC2	6	10.25"	7.13"	11.25"	57 (wet)	@56A:164 @75A:114			
US 2200 XC2	6	10.25"	7.13"	11.25"	62 (wet)	@56A:175 @75A:122			
US 125 XC2	6	10.25"	7.13"	11.25"	66 (wet)	@56A;198 @75A:140			
US 145 XC2	6	10.25"	7.13"	11.89"	70 (wet)	@56A:217 @75A:154			
US 250 XC2	6	11.63"	7.13"	11.63"	75 (wet)	@56A:224 @75A:159			
US 250HC XC2	6	11.63"	7.13"	11.63"	77 (wet)	@56A:250 @75@178			
US 8VGCE XC2	8	10.25"	7.13"	11.25"	60 (wet)	@56A:110 @75A:75			
US 8VGC XC2	8	10.25"	7.13"	11.25"	62 (wet)	@56A:118 @75A:82			
US 8VGCHC XC2	8	10.25"	7.13"	11.25"	67 (wet)	@56A:136 @75A:95			
US 8VHATB XC2	8	10.25"	7.13"	11.88"	73 (wet)	@56A:164 @75A:115			
US 12VE XC2	12	14"	7.06"	11.38"	81 (wet)	@56A:95 @75A:62			
US 12VRX XC2	12	13.13"	7.06"	11.38"	86 (wet)	@56A:110 @75A:77			
AGM Deep Cycle Batteries									
US AGM 2000	6	10.24"	7.09"	10.79"	60 (wet)	@56A:175 @75A:120			
US AGM 2224	6	10.24"	7.09"	9.96"	67(wet)	@56A:118 @75A:135			
US AGM 8V170	8	10.2"	7.17"	11.3"	76 (wet)	@56A:120 @75A:74			
US AGM 12V150	12	12.87"	7.09"	10.79"	93 (wet)	@56A:120 @75A:90			
ESSENTIAL Li® Lithium-Ion Deep Cycle Batteries									
US 48V GC2	51.2	10.24"	7.09"	11.04"	32.2	30Ah			



BATTERY WATERING GUIDE

92.6

10.32"

TOO LOW:

US 48V105

When the electrolyte level is too low, the plates are exposed. Exposed plates can sulfate causing material to become inactive. This will negatively impact a battery's capacity.

51.2

17.44"

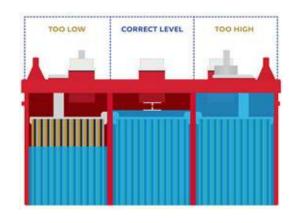
12.6"

CORRECT LEVEL:

The electrolyte level of the battery should be kept 1/4" below the bottom of the fill well in the cell cover. This will ensure that the plates are completely submerged.

TOO HIGH:

Overfilling the cell can cause it to leak. This can cause corrosion, damage, and possible personal injury. The diluted electrolyte and acid loss will also result in reduced capacity.



105Ah

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THE SC ADVANTAGE

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SAFER RIDES



St. Louis Police are cracking down on uninsured golf carts for hire on Opening Day

St. Louis City Police is cracking down on uninsured golf carts taking fans to the Cardinals game. There are a lot of golf carts buzzing around Busch Stadium Opening Day and Michael Golde with the St. Louis Taxi Cab Commission says drivers transporting fans for hire need to make sure they're doing it legally.

uis City Taxi Cab Commission. Photo credit KMOX By Stuart McMillian, KMOX NewsRadio 1120 KMOX 6 hours ago

ST. LOUIS (KMOX)--St. Louis City Police is cracking down on uninsured golf carts taking fans to the Cardinals game. There are a lot of golf carts buzzing around Busch Stadium Opening Day and Michael Golde with the St. Louis Taxi Cab Commission says drivers transporting fans for hire need to make sure they're doing it legally.

"Other cities have had issues with unlicensed and uninsured," Golde said. "Vehicles for hire get into accidents they come after everyone they can legally. We're trying to avoid that."

"[Locally] drivers have been refusing to identify themselves and refusing to provide proof of insurance. That's why we've asked the St. Louis City Police Department to get involved for a more proactive approach and to get information from the drivers."

Golde says the St. Louis City Police Department is dedicating, at least, one officer who will be giving tickets to uninsured golf cart drivers.

Anything from for hire like buses, shuttles, golf carts, rickshaws all fall under the purview of the St. Louis City Taxi Cab Commission,\.

SOURCE

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AROUND the WORLD

GOLF CART/ LSV NEWS FROM INDIA



hammam engineer makes golf cart that runs on multiple energy sources

Solar power is primarily used for horn, music player, charging mobile phone and indicators while wind power is used to operate the motors that put the vehicle into motion.

Khammam: Taking forward his innovative design and manufacturing of vehicles that run on non-fossil fuels, a Khammam-based engineer has built a golf cart that could be operated with multiple energy sources.

A golf cart is a small motorised vehicle designed basically to carry golfers and their golf clubs around a golf course. Its utility is also found in transporting luggage and old aged and women passengers besides persons with disability in railway stations and airports as well in sports stadiums.

Speaking to Telangana Today, Garlapati Rakesh, explained that the golf cart is fitted with 4.8 kilowatt capacity batteries, which could be powered by solar and wind energy as well as electricity.

Solar power is primarily used for horn, music player, charging mobile phone and indicators while wind power is used to operate the motors that put the vehicle into motion. The vehicle is a six-seater. It took one month's time and Rs 2 lakh to manufacture the golf cart.

Once the batteries are charged with electric power the vehicle runs with that power and when it is moving a miniature wind turbine fitted on the vehicle generates power to charge the batteries, he explained. It costs just Rs 30 to 40 for a single charge and it can be fully charged within three to four hours. It is said to run 100 kms with a single charge. With solar and wind energy being available

free of cost the vehicle's overall maintenance cost is minimal, Rakesh, a mechanical engineer, noted.

It may be noted that the engineer has made an electric car that gives 300 km range and a hybrid electric car with perpetual power in the past. Last November he was selected for TSIC's Intinta Innovator Award and also entered into Miracles World Records book for his innovation.

SOURCE

"Electric vehicle innovator, Garlapati innovator Rakesh, who runs **RDENO Enterprises** EV Mobility in Khammam told Telangana Today about his EV innovations"

Khammam Garlapati Rakesh makes hybrid electric car

The car is a fully eco-friendly vehicle basically operated by batteries, which are charged by 300 watt capacity solar panels in addition to electric power.

Khammam: With an intention to find a solution to vehicular pollution, a BTech mechanical engineer in Khammam has designed and manufactured a hybrid electric car with two way self charging. The car is a fully eco-friendly vehicle basically operated by batteries, which are charged by 300 watt capacity solar panels in addition to electric power. And when the batteries are fully drained it can be powered by either petrol or diesel until the batteries are charged.

Garlapati Rakesh, noted that the car he manufactured is an automatically rechargeable electric vehicle and its batteries are charged in running condition as it has energy regeneration capability.

A 10 kilowatt dedicated brushless direct current (BLDC) motor power is fitted in the car to charge the 5 kilowatt capacity batteries. In addition to that vehicle is fitted with a regenerative braking system to charge the batteries.

The BLDC motor charges the batteries while the vehicle is moving irrespective of the speed of the vehicle perpetually supplying power to batteries to charge. When the batteries are fully charged it gives a range of 500 km, Rakesh explained.

Entire equipment and parts used in making the car are procured from manufacturers certified by Automotive Research Association of India (ARAI) and International Centre for Automotive Technology (ICAT), which test and approve standards for electric vehicles (EVs), he noted.

It took him one month to design and fabricate the vintage model vehicle and it is entirely handmade. The cost of the four-wheeler is around Rs.2.5 lakh with 100 km mileage range and the cost of the two-wheeler is Rs 65, 000 with 100 km mileage range.

Rakesh attended a boot camp organised by TSIC at T-Hub last November selected for TSIC's Intinta Innovator Award, which he received at the 75th Republic Day celebration on Friday.

He also entered into Miracles World Records book for his innovation. If the government extends support he intends to train young engineers and skilled youth to convert internal combustion vehicles into EVs for environmental protection.

SOURCE





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Golf Car Options Car Options Car Options Car Options Car Options Debary Golf Carts | Orlando, Florida

Debary Golf Carts, a leading provider of premium golf carts in Orlando, is excited to announce a strategic collaboration with Kandi America, a pioneer in electric vehicle innovation. Together, they are introducing the revolutionary Collapsible Mini Golf Cart to the Orlando market, offering golf enthusiasts and outdoor adventurers a new standard of convenience and sustainability in personal transportation.

The Collapsible Mini Golf Cart, recently featured on NBC 5 Golf Channel, represents a unique blend of innovation and practicality. Its compact design, engineered by Kandi America, allows for unprecedented ease of storage and transport, fitting snugly into SUVs and other vehicles. This feature makes it an ideal option for golfers, campers, RV enthusiasts, and commuters alike.

What sets the Collapsible Mini Golf Cart apart is its eco-friendly electric design, which aligns perfectly with modern sustainable lifestyles. Powered by a 1,000-watt AC electric motor and equipped with a 48V 38Ah Lithium battery, it offers a silent, emission-free ride with an impressive range of up to 25 miles on a single charge. With hydraulic brakes and a top speed of 9 MPH, this golf cart ensures a smooth and reliable journey across various terrains.

"We are thrilled to partner with Kandi America to bring this innovative product to our customers in Orlando," said Scott Small, CEO of Debary Golf Carts. The Collapsible Mini Golf Cart is a game-changer, offering unmatched convenience, sustainability, and performance. We believe it will revolutionize the way people experience golfing and outdoor adventures."

Designed for riders aged 16 and older, the Collapsible Mini Golf Cart boasts specifications engineered for comfort, stability, and performance. From its 6 inches of ground clearance to

its independent double A-arm front and swing arm straight axle rear suspension, every detail is crafted with the rider in mind.

"We are excited to collaborate with Debary Golf Carts to introduce our Collapsible Mini Golf Cart to the vibrant Orlando community," said Peter Wang, CEO of Kandi America. "Together, we aim to provide customers with a cutting-edge solution that redefines personal transportation, blending innovation with sustainability."

About Debary Golf Carts:

Debary Golf Carts is a premier destination for golf cart sales and services in Orlando [https://debar-ygolfcart.com/orlando]. It offers a wide selection of top-quality carts and exceptional customer service. With years of experience in the industry, it is committed to providing customers with the perfect golf cart to suit their needs.

About Kandi America:

Kandi America is a subsidiary of Kandi Technologies Group, Inc., a pioneering electric vehicle company committed to providing affordable, innovative electric transportation solutions. With a focus on eco-friendly mobility, Kandi America aims to revolutionize the way people think about personal transportation.

Media Contact
Debary Golf Carts
(386) 216-9726
47 S. Charles Richard Beall Blvd.
Debary, Florida
Website: https://debarygolfcart.com

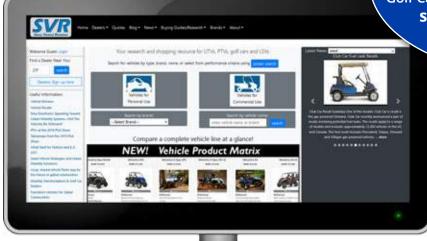
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A Dream Come True for a Veteran in the Transportation Industry

charlottegolfcarts.com | Charlotte, NC

Fred Griffith has always dreamed of owning his own dealership, but he never knew it would be a golf cart dealership! He started a cart rental business in 2022, and the growth in that startup encouraged him to take an early exit from his position as an employ-ee-owner at Taylor and Martin, a wholesale auction house in the transportation industry, to launch the dealership. The dealership is at 5030 E. Independence Blvd, in the heart of the automotive row. When Fred moved to Charlotte in 1991, he worked at Arnold Palmer Cadillac just down the road from where

his new dealership sits. So, you could say Independence Blvd has come full circle for him.

Fred heads up Charlotte Golf Carts LLC with his team members Shawn Blakey, Service Manager, and Stacy Swallows, Administrative Assistant. They are focused on personal use and LSV (low speed vehicle) golf carts. They are a full-service dealership offering cart and e- bike sales and rentals, along with parts and service for all brands.

With the growing popularity of alternative

70

means of transportation, Charlotte Golf Carts can introduce you to their line of ICON E-Bikes and their full line up of golf carts and LSV's from ICON EV, STAR EV, VIVID EV, and ATLAS CARTS. All these manufacturers offer many styles of recreational carts, as well as low speed vehicles, which can be licensed and insured for legal street use. Icon Electric

Vehicles assembles their product line right here in Huntersville, NC. Charlotte Golf Carts is a locally family-owned business and they wanted to partner with manufacturers close by that could support them not only with inventory but serve as a backup support system for their parts and service business. In the last few years there have been many new golf cart manufacturers coming onto the market and their growth has been so rapid they could not keep up with the demand for parts. Fred vetted each company he chose to represent trying to avoid downtime or





delays for his customers. Having them close by like Star EV in Simpsonville SC where for the last 30 years they have been designing and assembling their carts as well as Atlas Carts in Williston, SC. Vivid is also not too far away in Ft Myers, Fla and this year at the PGA show they introduced the Anthem which is their first American made cart. While Fred was there, he was extremely impressed with the Anthem and wanted it to be a part of his lineup.

At Charlotte Golf Cart, they have a saying, come have fun with us. Fred says he knows not everyone will do business with Charlotte Golf Carts, but he wants to be a place if you are thinking about a golf cart you at least visit them and have some fun looking around and learning more about things. He promises to offer a solid product at a fair price but more importantly service after the sale.

Come in and let Fred and his team educate you on the many options for electric bikes and golf carts as well as the rules and regulations of making them street legal LSV's.

5030 E Independence Blvd Charlotte, NCC 28212 https://www.charlottegolfcarts.com

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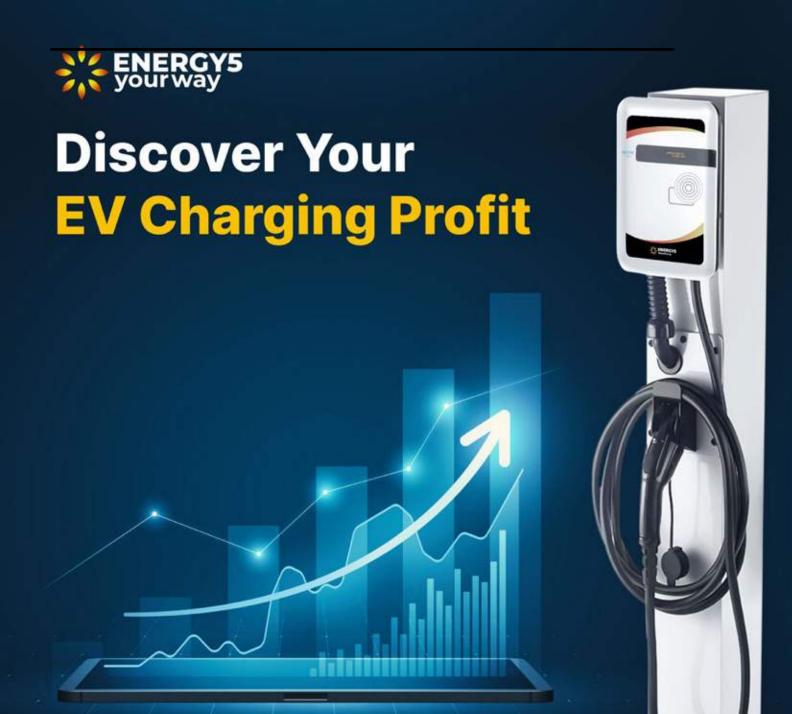






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How Are Lithium Batteries Made?

If you're wondering how lithium batteries are made, you probably already know that they basically run our entire world. These energy-dense little pods pack a punch, and they power everything from our smartphones to our electric vehicles. If we didn't have lithium batteries, we would spend much more time tethered to an outlet. Our cellphones might not even fit into our pockets without this technology. So how are lithium batteries made?

This article takes the mystery out of battery-making by discussing the materials, manufacturing, and assembly. Let's begin.



What Are Lithium-Ion Batteries?

A lithium-lon battery is an electrochemical battery that utilizes lithium ions to move electrons and generate voltage. Lithium-ion batteries are some of the most energy-dense and longest-lasting rechargeable batteries available. From cell phones to home backup power systems, these batteries are frequently the heart of portable and off-grid power systems.

There are many different types of lithium-ion batteries this article references LiFePo4 chemistry.



What Materials Are Used to Make a Lithium Battery?

Now that we've talked about what lithium-ion batteries are, we can discuss all their different components and materials. Let's jump in.



Lithium Battery Cells

Believe it or not, the large lithium batteries you'll see in boats and RVs actually consist of many smaller cells. Within each of these cells are an anode, cathode, and electrolyte. Thus, each of these cells is

a battery that technically could operate on its own. Manufacturers then link them together to create the voltage needed.

A battery produces power when electrons move from the anode through the electrolyte to the cathode. An anode is typically made of some kind of oxidizing metal like graphite or zinc, while a cathode is usually made of some kind of lithium oxide.

Basically, the anode should lose electrons while the cathode should gain electrons. On the other hand, the electrolyte is usually some kind of lithium salt solution that can transport electrons. It's this lithium salt that provides the excess electrons for the battery to operate.



Electronics and Components

So how do those individual cells connect to create a larger, more powerful battery pack? With wires and terminals, of course! Essentially, the cells connect to one another in a way that allows the electrons to flow seamlessly through the system. The positives (cathodes) connect to the negatives (anodes) through copper and aluminum terminals and wires.

Finally, within each battery pack lies a Battery Management System (BMS). This important component monitors everything from the battery's

temperature to the charging and draining of each individual cell.



Battery Casing

Last but not least, there needs to be a way to protect all of these vital parts. The battery case performs this important function. Typically made of plastic, rubber, or silicon, the tough exterior of the battery shields the cells, internal wires, and BMS

from exposure to outside elements that might interfere with the battery's function.



How Are Lithium Batteries Made?

Next, let's explore the process for manufacturing lithium batteries. From cell manufacturing to the battery pack assembly, each step is meticulous to ensure both safety and reliability.



Cell Manufacturing

So how are the cells of the lithium battery made? The anode and cathode will start out separate from each other on a large assembly line. This is to pre-



vent any cross-contamination. They both mix with a conductive binder in order to form a slurry, and then foil (aluminum for the cathode, copper for the anode) coats the anode and cathode. A special oven bakes the foil onto the electrodes.

After this, it's time to wind the cell together and install the terminals. The manufacturer adds vents and other safety measures and puts the electrolyte in through a vacuum (it reacts to oxygen and there-

MAY 2024 75



fore can't have any contact with the air). Once the manufacturer closes the case, they can charge and test the cell.



safe.

high-quality and



Battery Pack Assembly

Now let's look at how those individual cells go together to create a battery pack. First, the manufacturer welds

the cells to plates on both the anode side and the cathode side and then assembles them into packs. The manufacturer tests the individual packs and matches them together to form the desired amphours (for example, 30 individual cells will create a 100Ah battery).

After this, the manufacturer assembles the packs into a case and connects them to the BMS. The manufacturer will test the battery just like they tested the individual cells and packs to ensure safety and reliability.

The Importance of Manufacturing Quality

Making a safe, high-performing battery requires diligence. As you probably already know, lithium batteries have major safety risks. Faulty manufacturing and improper use can increase these risks. This involves a phenomenon called thermal runaway (essentially, a fire that's extremely hard to put out). This can happen when the cells aren't functioning uniformly.

Not only that, but the performance of a poorly made battery will suffer. This is why it's so important to trust your battery manufacturer. Not only do you want to get your money's worth, but you also want to sleep well knowing your batteries are It is possible to recycle used batteries and reuse the lithium from them. At this time, the recycling processes are still relatively new, challenging, and expensive.

Additionally, lithium batteries are a fairly new technology, and they last a long time. Many of these batteries have not reached their end of life and don't need recycling yet. As more batteries need recycling, improving the recycling processes is critical to creating a sustainable future for our natural supply.

Thankfully, companies like Redwood Materials are finding better ways to reuse batteries so we can avoid mining the Earth's precious resources.

SOURCE

- Lithium batteries can be smaller and lighter than other types of batteries while holding the same amount of energy.
- Lithium is the lightest metal, with a density about half that of water.
- In its pure form it is extremely corrosive.
- It ignites on contact with water and can easily burn flesh.
- Lithium is primarily used in batteries, ceramics and glass, greases, pharmaceutical compounds, air conditioners and aluminum production.

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Class rules & information can be found at **Streetcarbragginrights.com**Register today at the link below!

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It's Time to Get Your Golf Car Summer Ready

It The breeze is a bit warmer now for most of the country and the beach awaits. Maybe you are pulling your boat our of storage or opening your pool after a long winter. Whatever you are doing to prepare for the summer months, don't forget your golf car. Golf cars are multi-purpose and can help simplify your summertime fun.

Dust Off Winter

Whether you store your golf car in a garage, a shed, or somewhere else, it is time to dust off winter. Renew Protect plastic restoration treatment is what I use to restore my golf car's appearance. The once a year treatment restores shine to plastics, body, and tires and protects from the summer sun. FYI- It is also great on boat covers and patio furniture.

Keep Cool

Although we long for the summer heat when there is snow on the ground, once it hits, it can be brutal. The Personal Go Fan is the obvious solution for staying cool despite the summer heat. The rechargeable fan fits perfectly into your golf car cup holders and blows a cool breeze wherever you need it the most. The portable fan cools for more than three hours at a time without a charge.

Bring the Cold Drinks

Cold drinks are a must-have for any summertime golf car excursion. Installing a large cooler rack on your golf car allows you to carry your refreshing drinks everywhere your whimsy takes you. Add a cooler rack that doubles as a fishing rod holder and that is the recipe for summer golf car fun.

Have a Seat

Whether you are driving your golf car to the beach, to a sunset concert, or to the park, it is an added benefit to carry a chair or two with you wherever you go. The Doubletake chair rack designed for the Max 5 rear seat kit makes transporting beach chairs a breeze and guarantees that you are prepared for whatever summer adventure presents itself.

Get Comfy

We spend a lot of time driving our golf cars during the warm spring and summer months. Let's face it. Golf cars are built "one size fits all" even though we aren't all one size. To avoid reaching down way too far to shift your golf car,

consider adding a Caddy Shift. The extended shifter is designed to make shifting easier for those of use who struggle to reach a standard shifter.

If back pain is limiting the time you spend driving your golf car, you need the Back Buddy. Perfect for shorter individuals who struggle to reach the pedals and for those who suffer from back pain, the Back Buddy provides a boost and much needed lumbar support.

Play Some Tunes

We all have the one song that instantly makes us thing of summer and the fun it brings. Carry your tunes everywhere you go without having to install a complete overhead stereo system. The RHOX Audio Center is the most convenient way to take your music on the go while keeping your devices charged.

With a few minor additions, your golf car will be transformed into a summer fun machine. Now, go outside!



About the Author: The Founder/Former Owner of WHEELZ Custom Carts & Accessories, Julie Starr, was one of the industry's first online retailers of golf car products. The eCommerce store, www.WHEELZLLC.com, has served golf car owners since 2008 and remains a popular online shopping experience for golf car owners who want to take their golf cars to the next level.



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81

Golfing enthusiasts worldwide are in for a green revolution as lithium golf cart batteries take center stage, promising unparalleled performance and sustainability on the greens. With the rising demand for eco-friendly solutions across various industries, the golfing community is embracing this cutting-edge technology with open arms.

Revolutionizing Colf Course Management of Lithium Golf Calling the Proof Lithium Calling

Traditionally, lead-acid batteries have dominated the golf cart scene. However, their heavy weight, limited lifespan, and slow charging times have long been pain points for golf course operators and players alike. Enter lithium golf cart batteries, poised to disrupt the status quo and elevate the golfing experience to new heights.

These advanced batteries offer a myriad of benefits that are reshaping the landscape of golf cart technology. Firstly, their lightweight design significantly reduces the overall weight of the cart, resulting in improved maneuverability and enhanced performance on the course. Golfers can

now navigate effortlessly through the terrain, enjoying a smoother and more enjoyable ride.

Moreover, lithium batteries boast a longer lifespan compared to their lead-acid counterparts, ensuring greater durability and reliability over time. This translates to fewer maintenance hassles and reduced replacement costs for golf course operators, making it a cost-effective investment in the long run.

One of the most significant advantages of lithium golf cart batteries [https://pashbull.com/lithium-golf-cart-batteries/]is their rapid charging capabil-

ities. Unlike lead-acid batteries, which can take several hours to recharge fully, lithium batteries can be charged to full capacity in a fraction of the time. This means less downtime between rounds, allowing golfers to maximize their time on the course and boosting overall efficiency for golf course operations.

In addition to their performance benefits, lithium golf cart batteries are also more environmentally friendly. They contain no toxic materials such as lead or acid, reducing the carbon footprint associated with traditional battery disposal. As sustainability becomes increasingly important in the golfing industry, lithium batteries

https://www.openpr.com/ news/3472238/revolutionizing-golf-course-mobility-unleashing-the-power

ower and Sustainability

offer a greener alternative without compromising on performance.

The adoption of lithium golf cart batteries is already gaining momentum across the globe, with golf courses of all sizes making the switch to this innovative technology. From local clubs to renowned resorts, operators are recognizing the value of investing in lithium batteries to enhance the golfing experience for their patrons.

In conclusion, the rise of lithium golf cart batteries [https://pashbull.com/lithium-golf-cart-batteries/] represents a significant milestone in the evolution of golf

cart technology. With their lightweight design, extended lifespan, rapid charging capabilities, and eco-friendly profile, these batteries are transforming the way golf is played and enjoyed. As

the demand for sustainable solutions continues to grow, lithium batteries are poised to become the new standard in golf cart power, ushering in a greener and more efficient era for the sport.



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E-Z-GO RXV (patented design) FULL Dashes & Trim Plate



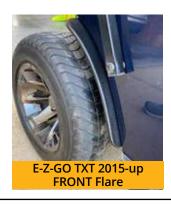
GMT dashboards for all major brands promote quick trouble-free installation. Available in all of GMT's popular colors. Club Car dashes available in two and four-cup holder models as above.

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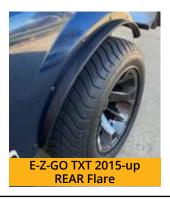
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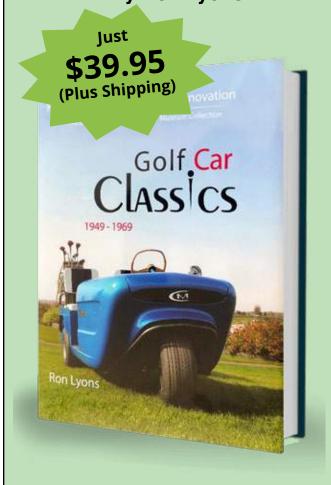
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Alaska Golf **CART** Laws & Regulations (What You Need To Know)

Alaska is a unique state because its distance from the rest of the United States of America often makes its state laws much different than those in other areas.

In some cases, state laws may have more of an impact on the day-to-day lives of residents than federal laws.

The same is true for golf cart use.

The federal government typically leaves such rules and regulations to the state, which makes it crucial to take this information into account before you start your upgrades to a cart.

Alaska Laws Regarding Cart Use

Alaska state law currently does not go into great detail regarding golf cart use on public roads.

However, the laws do currently have various regulations for certain types of vehicles, particularly those designed for more off-road purposes.

These rules are important to take into account if you want to change up your cart to use on public roads.

Though state laws are imprecise, this information should help you stay within proper legal bounds when riding your golf cart on the city or state roads.

Definition of a Golf Cart

Alaska's state laws currently do not define golf carts specifically for riding on public roads.

However, state law does strictly define motor vehicles as "any vehicle which is self-propelled except a vehicle moved by human or animal power" or "an electrical motor vehicle" that is used as an "electrical personal assistive mobility device" that uses a self-balancing system and two or more non-tandem wheels that transport only one person.

By these laws, golf carts qualify for the first but not the second element.

Further reading of the Alaska Administrative Code makes it clear that golf carts are, very likely, considered off-highway vehicles.

These vehicles are defined as those vehicles incapable of reaching high levels of speed and which are not designed for highway use.

All vehicles of this type need a permanent seat on which the driver can sit and which is designed to manage safety for all riders on the cart.

However, municipal rules may vary depending on what specific cities or counties signify.

These laws do not supersede state rules and must take them into consideration when controlling carts on various Alaskan public roads.

Private roads or cart use on private property is up to the owner of the property to manage, though legal ramifications for accidents or injuries will fall on their shoulders when they occur.

Municipal Laws May Vary

Although state laws are not specific when it comes to golf cart use, many cities and counties have specific regulations to control them.

These rules will vary depending on the area and can be quite precise.

Therefore, it is important to investigate your specific city or municipality when modifying a cart for road use.

A failure to do so could result in legal issues that would otherwise be easy to avoid for you and others on the road.

For example, the municipality of Skagway created a variety of rules and regulations regarding

the use of golf carts on local roads.

They do not set restrictions or rules for cart use on state laws, so it is important to keep off of these streets because it is likely illegal to utilize such carts on state roads.

These regulations do not set a strict definition for golf carts but assume a specific definition.

Many of these rules are important for renters as well as cart renting agencies to fully understand.

Basic restrictions include having a valid driver's license from the State of Alaska.

However, carts on municipal roads also need to be upgraded to enhance their power and safety.

For example, they need at least one seat belt for each occupant in the cart.

Driving more people than the cart has seat belts is dangerous and illegal.

Importantly, these rules restricted where carts could be used on the streets of Skagway.

These included only a handful of roads throughout the town and through various alleys.

Upgrades to the cart included not only the previously mentioned seat belts but horns, turn signals, brake lights, headlights, tail-lights, brakes, throttles, and mufflers.

These restrictions also forbid driving on railroad tracks or on private property without permission from the owner of the property.

Drivers must also pay attention to a few rules that may seem strange at first.

For example, all crossing must be done at a 90-degree angle to the direction of the street the cart is crossing.

This rule is designed to keep carts from crossing multiple lanes of traffic, which could be dangerous for both the cart driver and others on the road.

Speed restrictions range to about 15 miles per hour, which is typically easy to top by most modified carts.

And all riders under the age of 18 must wear protective helmets at all times.

Federal Golf Cart Laws Click Here

Helpful Links

https://www.skagway.org/sites/default/files/fileattachments/ordinance/28771/ord_16-18_amending_title_10_golf_carts.pdf

Disclaimer

Because local and state laws can change, we recommend that you perform your research and check with your local municipality on rules as well.



AROUND the MARKETPLACE

BATTERY TERMINAL PROTECTION KIT



from Winters Recreation | wintersrec. com

Protect your golf carts batteries with the Deka Marine Battery Terminal Protection Kit. Includes everything you need for optimal installation of your Marine battery, which will ultimately extend battery life. For Post and Side Terminal Batteries

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NOTE: Compatible as a replacement for ICON golf cart screens and select other vehicles. Please contact us to verify compatibility if you do not have an ICON cart.

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Key Features:

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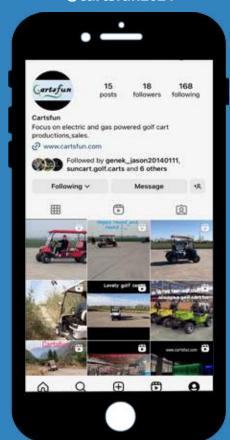
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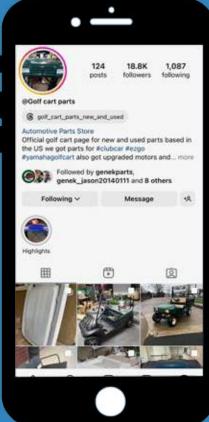


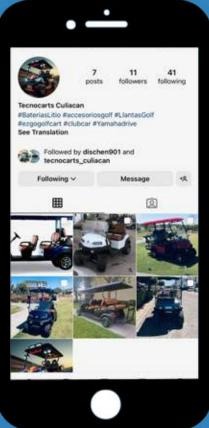
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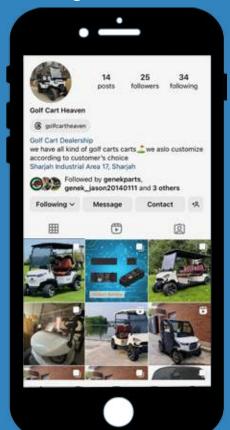
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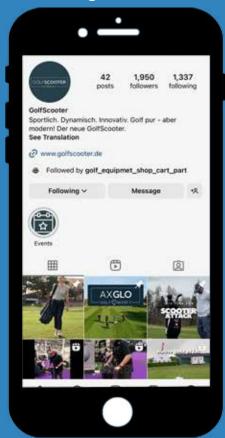




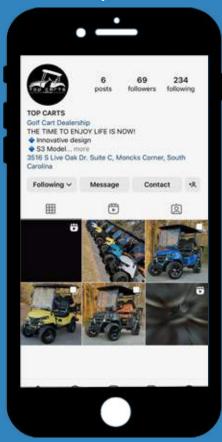
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EVOLUTION SEAT KIT





roject Golf - Austraila. https://project-golfau.com/charging-golf-cart-batteries/

Charging Golf

8 Key Questions Answered

Golf carts are one of the most fun ways to navigate your way around the golf course. For some players - especially those who are elderly or not physically able - a golf cart is necessity; for others, they are a luxury item given the Average Joe will be more likely to be seen shunting around a push cart, or perhaps an electric cart if their budget permits. But regardless of the reasons why you own a golf cart, one thing remains consistent for everyone: the need to keep the batteries charged and properly maintained (along with rotating the wheels to ensure they wear evenly). Golf cart batteries aren't cheap, so it's important you

take care of them and charge them properly – if you can do this, not only will you save money, but you won't suffer the annoyance of breaking down halfway through a round. I've scoured the internet and found the answers to the eight most common questions golfers have about charging golf cart batteries, which I've put together in this easy-to-read guide for you.

How often should you charge golf cart batteries?

Golf cart batteries should be kept fully charged at all times – this means hooking them up to a charger as soon as you are finished using the cart. Regular charging will prevent damage to the battery and give it longer-lasting life.

It's important not to let golf cart batteries go dead as this can cause them harm and potentially reduce their ability to maintain charge.

For this reason, you should place your golf cart on a charger each time you finish using it.

As battery experts **Golf Cart Garage** explained in a helpful
YouTube video:

"Deep cycle batteries that power golf carts are best maintained when they're kept fully charged during downtime.

"This doesn't mean they should always be actively charging; it simply means once they're used for a while, they should be charged up to full and that charge maintained at regular





intervals to make sure they don't go dead, as this can cause damage."

This creates a nice segway into the next question, which I've already partially answered (but will elaborate on further).

Should golf cart batteries be charged after every use?

Yes. Charging your golf cart batteries after every use – even if you've only spent five minutes driving – is crucial for maximising their lifespan. Leaving batteries in a prolonged state of low charge can decrease their capacity over time and wear them out quicker.

Golfers may find themselves only playing a quick nine

holes alone, or with friends, in their golf cart after work or if they're pressed for time, and a common mistake would be to assume that they haven't drained the battery enough in this short time to warrant placing it on charge.

This, however, is incorrect: regardless of how much time you spend using your golf cart – whether it's two minutes, or two hours – it is essential to connect your batteries to a charger afterwards, and let them recharge.

Your batteries should be fully recharged after 8-10 hours, but may require longer if they are older.

You can purchase automatic golf cart battery chargers – such as this one from manufacturer **LIYYOO** – which will shut off once peak charge has been reached, ensuring the batteries aren't overcharged as a result.

Should you charge new golf cart batteries?

Yes. New golf cart batteries should be charged every time they are used as this will extend their lifespan, help them retain their capacity for longer, and prevent discharge. It is vitally important to charge new golf cart batteries, even after their first use.

Basically, new batteries love to be charged. If want them to last, you'd best make sure you connect them back up to the charger every time you finish your round.

Avoiding using a new battery when it's not fully charged will go a long way to prolonging its life and preventing discharge (and the same habits should be applied if you have an electric golf push cart).

But should your golf cart be on or off when hooked up to a charger? That brings us to the next question.

Should your golf cart be turned on when charging?

No. You should turn your golf cart off when charging its batteries. Trying to charge a golf cart while it is running is a pointless exercise, as the battery will be draining while you're trying to charge it. A golf cart should only be turned on once its batteries are fully charged.

Leaving your golf cart running while trying to charge its batteries is akin to filling up a bucket of water that has a couple of small holes in it.

Sure, you'll eventually fill it up if you leave the water running long enough, but it will drain quicker as soon as you turn off the tap.

The same goes for a battery: if you try charging them while your golf cart is running, you may eventually get them to full capacity; but it will take

longer, and they will drain faster as soon as you disconnect them from their power supply.

For this reason, it's definitely recommended you turn your golf cart off when charging its batteries.

Should golf carts be plugged in all the time?

No, you should not leave your golf cart plugged in all the time. While automatic battery chargers are designed to shutoff once at full capacity, leaving a battery connected to power for long periods leaves it susceptible to damage should the electrical circuit be overloaded.

For example, if you had your golf cart hooked up to a charger during an electrical storm – and the power circuit surged as the result of a lightning strike, or a power line being knocked down by strong winds – there is a risk the extra current could fry your battery.

To be safe, it's recommended that you disconnect your golf cart from power once its batteries are fully charged (most chargers will indicate this by the use of a green light, or something similar).

Should golf cart batteries make noise or bubble when charging?

If your golf cart uses a standard 12 volt flooded lead acid battery, then it is quite normal to hear a bubbling sound when it's charging. However, if your cart uses a sealed battery (such as a gel or AGM battery), then a hissing or bubbling sound may indicate damage.

Basically, the bubbling sound is created via a process called electrolysis, which is electrical current passing through water or electrolyte solution causing it to release hydrogen and oxygen.

Some chargers may pass a current through the battery at a higher level, and this can intensify the noise that it makes.

While it is normal for a flooded lead-acid battery to make a bubbling sound during the charging process (and water can be added to replace evaporated fluid), a sealed lead acid should never be made to bubble since any vented gases cannot be replaced and air pockets form in the battery, which ruin its conductivity and lifespan.

So, in summary: flooded lead acid batteries making noise while charging is perfectly normal, however if you have a sealed lead acid battery, you don't want to hear any bubbling or hissing sounds.

How long should golf cart batteries last?

If you play golf twice a week
- and use your golf cart for

each round – you can expect a standard, brand-new battery to last just under 10 years before needing to be replaced. If you charge your battery correctly after use, you can maximise its shelf life.

According to **RMI Golf Carts**, manufacturers usually provide a two-year or limited four-year warrantee on new sealed lead-acid golf cart batteries, which are meant to output approximately 20,000 energy units – about 1000 rounds of golf – when properly maintained.

Most modern-day golf cart batteries come in either 6, 8 or 12 volts (the voltage being the force needed to create an electrical current, indicating the strength of the battery).

If you find yourself needing to replace your battery, be sure to check with the manufacturer's specifications to determine you have the right one.

Failing this, you can either: count the number of acid holes on top of every battery, and multiply the number of acid holes by two to determine the voltage requirements; or take visit your local battery distributor and seek specialist advice.

Golf cart batteries do come in different types and models – including Flooded Lead Acid; Gel Lead Acid; and AGM Lead Acid – so it's important

to seek clarification if you're uncertain about which replacement to buy.

How do I keep my golf cart batteries from dying or corroding?

To ensure long-lasting life for your golf cart batteries, make sure you: keep them fully charged at all times; keep the water level in your battery cells at an optimum level; and keep the terminal connections on your battery clean. Doing these three things will prevent your battery from corroding or dying.

Golf cart maintenance website **Go with Garretts** has some handy tips that cover each of these three points in a little more detail, but in a nutshell, here are the takeaway messages.

Keep your batteries charged

As explained earlier in this article, make sure you fully charge your batteries each time you use your cart. Driving your cart on a partially flat battery may damage it and reduce its ability to hold charge.

Keep the water levels correct

The water line in a battery cell should be above the lead element, around an inch from the top. If it's below this, add some distilled water (regular tap water may contain

damaging trace chemicals). Keeping your battery cells hydrated will prevent the plates inside the battery from drying out.

Keep terminal connections clean If you spot any signs of corrosion building up around your battery terminals, you could remove them as soon as possible. An easy way to do this is simply by mixing some water and baking soda together, and scrubbing gently with a light, steel-wire brush. Once clean, rinse with water and add some battery terminal protector spray to prevent corrosion returning.

Final message

Golf cart batteries can last anywhere up to 10 years if you charge them correctly. Making sure your batteries are fully charged (ideally by using an automatic charger to prevent over-charging) before you take your golf cart out for a spin around the course is the best thing you can do to ensure their longevity. Also, checking for signs of corrosion and also the water levels of your battery cells once every couple of months will further prolong their life and limit the chances of you breaking down halfway through your round.

MAY 2024

AROUND the INDUSTRY



BINTELLI

BINTELLI GOLF CARTS OPENS NEW DEALERSHIP IN THE WOODLANDS

Golf cart manufacturer Bintelli officially opened a new dealership in The Woodlands (Texas) in late March.

According to store members, the location opened April 28 as a dealership and golf cart servicing location. Bintelli offers two types of golf carts and focuses on providing a variety of accessories and services to golf carts.

The Woodlands location is 26333 I-45, Ste. D. Or you contact by phone at: 346-351-6600

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Bintelli Electric Vehicles is your home for the most extensive selection of street-legal electric vehicles, including electric golf carts, electric



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INVENTHELP

INVENTHELP INVENTOR DEVEL-OPS SUN ROOF FOR GOLF CARTS AND SIDE-BY-SIDES (LBT-8313)

PITTSBURGH, April 15, 2024 /PRNewswire/ -- "I wanted to provide golf cart and UTV enthusiasts with a means of fully enjoying an outing," said an inventor, from Cottonport, La., "so I invented the

SUN ROOF IMPROVEMENT. My design would afford riders a great view overhead to the sky."

The patent-pending invention provides a clear upward view through the rooftop of a golf



cart or side-by side. In doing so, it offers an alternative to the traditional rooftop on a UTV or golf cart. As a result, it enables the rider to enjoy the view upward to the sky, and it offers a more open and luxurious feel. The invention features a unique and attractive design that is easy to use so it is ideal for the owners of golf carts or UTVs, golf courses, etc.

The original design was submitted to the National sales office of InventHelp. It is currently available for licensing or sale to manufacturers or

marketers. For more information, write Dept. 22-LBT-8313, InventHelp, 100 Beecham Drive, Suite 110, Pittsburgh, PA 15205-9801, or call (412) 288-1300 ext. 1368. Learn more about InventHelp's Invention Submission Services at http://www.lnventHelp.com.

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INDUSTRY MARKET UPDATE

GOLF CART AND NEV MARKET PROJECT-ED TO REACH USD 11.8 BILLION BY 2031 AS REVEALED IN NEW REPORT

Golf Cart and Neighborhood Electric Vehicle (NEV) Market (Propulsion Type; and Type: Golf Cart and Neighborhood Electric Vehicle [NEV]) - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast, 2021-2031

The global market for golf carts and Neighborhood Electric Vehicles (NEVs) reached an estimated value of USD 4.85 billion in 2023 and is projected to grow to USD 11.8 billion by 2031, registering a robust CAGR of 10.80%.

This market is witnessing steady growth, primarily driven by increasing environmental awareness, urbanization, and the growing

demand for sustainable transportation options. Here's a comprehensive analysis of the Golf Cart and NEV market, including market dynamics, competitive landscape, key market segments, recent developments, opportunities, and challenges.

Key Market Segments:

- By Vehicle Type: Golf Carts, Utility NEVs, Low-Speed Vehicles (LSVs)
- By Application: Golf Courses, Planned Communities, College Campuses, Security Patrols, Other Applications
- By Region: North America, Europe, Asia Pacific, Latin America, Middle East & Africa

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MECUM AUTO AUCTION

'FLINTSTONES' FLINTMOBILE GOLF CART SOLD FOR \$40,7000 AT MECUM AUTO AUCTION IN TEXAS

Over the weekend the Mecum Auto Action was held in Houston.

Hundreds of classic automobiles were up for grabs, even some dating back to the Stone Age!

One of the vehicles sold was a golf cart designed to look like the Flintmobile, the family vehicle of the cartoon family the Flintstones!

According to Dallas Texas TV, the cart sold for \$40,7000!



CLUB CAR

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Looking for a fun way to spend that refund?

Club Car's premium option for pre-owned vehicles will take your summer plans to the next level! Available with our premium Lithium-Ion power option, your new Club Car will have the performance of our highest-tier vehicle for as low as \$7,500 MSRP!

Backed by our legacy of excellence and a 2-year factory warranty, pre-owned Club Cars have

been known to last for decades. This is a used vehicle you can trust! Get a Club Car for \$180 a month with a qualified financing program! Contact your local dealer to learn more.

Reach out to your local dealership today to learn more. To stay up to date on Onward news, visit and follow our Facebook page. You'll be the first to know what's on the horizon.

PRE OWNED

FIND A DEALER

ALLIED BATTERY

THE NEW PRE-WIRED AL-LIED SOLENOID

The new Allied Pre-Wired Solenoid protects your battery from over-discharge related to parasitic drain from your controller or golf cart accessories. If you store your cart for even a couple of weeks at a time

off the charger, we recommend you consider adding our solenoid product alongside all commercial-bank Allied Lithium installations.

After hearing feedback from our valued customers, we updated our solenoid offerings to come pre-wired, with the needed cables included and wired to the correct places right out of the box.



MTX

CUSTOMIZABLE SLEEK ALL WEATHER BAR MOUNT SPEAKERS WITH RGB LIGHTING

Discover the perfect solution with our PS65C-BP speaker pods. Our unique low-profile mounting design with included clamps gives you a multitude of installation options and a low-profile appearance. Our new dual tweeter construction ensures you hear every crisp detail no matter how loud the environment. With our IP67 rating and durable construction, we will make sure you never have to worry about the music stopping in any condition.



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POWERFILM SOLAR

NEW PRODUCT

The 60W Foldable Solar Panel with Overlaminate is designed to charge small to medium electronic devices using DC power or one of many available accessories.



The top sheet of lamination on the panel provides improved moisture resistance and durability for the solar modules and the fabric.

Features:

- 12V battery charging
- Small DC electric coolers
- Camp lighting
- HAM Radio and similar communications gear

Benefits:

- Easy to Use Unfold the panel and start charging in seconds.
- Durable marine grade connectors, weather-resistant fabric, military tested.
- Low Light Operation provides some power even in hazy or shaded environments.
- Lightweight No frames, no special stands or mounting brackets needed.
- Portable Folds into a small package that fits in most backpacks.

PowerDrive Golf Car Solar Panel: Electric golf cars rely on large batteries that will eventually run down and need to be charged. Additionally, these batteries will become unusable after enough use and need to be replaced.

By installing a solar panel on

the existing roof of a golf car, you can drive up to 50% farther and keep the batteries in your golf car up to 50% longer.

Benefits:

- Extended Battery Life Extend charge cycles up to 50 percent.
- Increase Driving Range -Increase driving range by as much as 50 percent.
- Reduced Charging Costs

 Save an estimated 20
 percent in yearly electrical costs.
- Environmental Advantages
 Offset over 250 pounds of carbon dioxide production per year.
- Easy Installation Weighs less than ten pounds and installs quickly, with no special tools.

Learn more at: www.power-filmsolar.com

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Sunday Carts LLC combines over 40 years of manufacturing and distribution experience. Founded by entrepreneur and manufacturing guru Jason D, and partnered with automotive legend Rick D, Sunday Carts brand has grown in recognition as the most competitively priced, safest, and highest quality LSV's and Golf Carts on the market today.

Sunday Carts is constantly evolving and pushing the boundaries of Style, Features, and Safety in the ever growing LSV and Golf Cart market. Our Arizona based manufacturing incorporates state of the art technology, high quality parts, expert technicians and expansive warehousing and distribution. Our commitment to quality starts with high end components such as Triple coated frames, integrated electronics with dual cann, "APower" brand Lithium Iron Phosphate battery, "Navitas" Controllers and our own custom upholstery

and paint shops. Our hands-on approach to business ensures our dealer network has more than a supplier, they get a partner!

"Redefining Luxury Golf Carts" Experience the Sunday Carts difference today!



Contact: 623-273-3516, sales@sundaycarts. com, www.sundaycarts.com or see their ad on page 24

BATTERIES PLUS

SPARKS SPRING ADVEN-**TURES WITH SEASONAL 'POWER ON' CAMPAIGN**

With the spring season upon us, consumers are filled with the excitement of reviving their golf carts that have been packed away all winter - for the upcoming months of sunny days and warm weather. However, due to the neglect of these vehicles during the off-season, consumers may find dead batteries on the first

day of use in months. In an effort to combat this disappointment, Batteries Plus stands ready to assist consumers not only in testing and replacing their depleted batteries but also in providing valuable education, ensuring that their purchases seamlessly transition from spring to fall.

The brand's "Power On" Spring Campaign, is not just about providing consumers with batteries; it's about ensuring

seamless functionality of life's essentials, from workdays to weekends in a world where being "off" is not an option. Batteries Plus is dedicated to making sure it is done right. By visiting one of its locations, in-store experts are available to provide free battery testing and offer advice to customers in order to help them identify the right battery.

Visit www.batteriesplus.com to find your nearest location.

How To RECYCLE Different Types Of BATTERIES

Recycling batteries not only bring happiness to our Earth, but also to our future generations. Recycling batteries is the process wherein abandoned or used batteries, that might be viewed as waste and unsafe to the earth, are processed. There are numerous misunderstandings about what battery materials can and can't be reused. These confusions only bring hindrances to the cost effectiveness and success of battery recycling projects running across the globe. Nevertheless, by imparting a little more knowledge to consumers, battery recycling might become an imperative and ecologically sound answer to battery waste management.

Following is some information about how different batteries are recycled in recycling plants:

- a) Lead Acid Battery Recycling: Hammer mill is used to break down the battery into small parts, which are then set into a vat. In the vat the lead and other heavy materials tumble down and the plastic particles float because of their usual weight/density properties. Then both top and bottom fluids are separated and sent to separate recycling chambers for further processing.
- b) Alkaline/Zinc Carb on/Zinc Air Batteries: All these types of batteries need specific temperature for their successful mechanical partition process, where the battery parts are broken down into 3 final products: a) Zinc & Manganese Concentrate, b) Paper & Plastic and c) Steel. Finally, all these separate products are sent to their respective commercial centers for reuse in new items.
- c) Nickel-Cadmium, Nickel Metal Hydride Batteries and Lithium Ion Batteries: Preceding the purifying process, metal parts are separated from their plastic counterparts. The metals are then recycled by means of a HTMR (High-Temperature Metal Reclamation) method, wherein heavy metals (i.e. nickel, iron, manganese, and chromium) are sent for a hot metal bath. Finally, the separated metals and plastics are sent for reuse in new products.

All these types of batteries can easily be fully recycled (100%).



Canyon Lake Firefighters Association to host 2nd Annual Golf Cart Show

he Canyon Lake Firefighters Association invites the community to its 2nd Annual Golf Cart Show on Saturday, June 8, from 12 to 4 p.m. in the Canyon Lake Towne Center.

This event features a golf cart competition with trophies awarded for Best in Show and People's Choice, games and prizes, raffles, and food trucks.

All golf carts are welcome to enter the show, whether it's a custom, standard, big, small, new, or old cart. Registration is a \$20 minimum donation and includes a raffle ticket.

Vendor spaces are available for a \$100 minimum donation and a raffle prize donation.

To register a golf cart or purchase a vendor space, visit www.canyonlakefirefighters.org and click on the donations tab. For additional information, email events@canyonlakefirefighters.org.

Proceeds from this event will benefit the Canyon Lake Firefighters Association, a 501(c)3 established to represent the firefighters of the Canyon Lake Fire Department and to ensure that current and

future members continue to be a part of the community through sponsored events, community involvement, and public relations.

Canyon Lake Firefighters Association 31566 Railroad Canyon Road, Suite 2, PMB #132

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MAY 2024

AROUND the COURTS

Trojan Battery Awarded \$9.3 Million In Suit With Golf Cart Maker

Trojan Battery Awarded \$9.3 Million in Suit With Golf Cart Maker https://www.law360.com/retail/articles/1819059/trojan-battery-co-gets-2-6m-win-in-tm-row

Law360 (March 29, 2024, 6:03 PM EDT) -- A Texas federal judge has sided with Trojan Battery Co. in its trademark infringement and unfair competition case against Trojan EV LLC and Golf Carts of Cypress LLC, ordering a permanent injunction and an award of millions of dollars.

The judge said in a Thursday decision that Trojan EV owes \$1,187,699 in disgorged profits and Golf Carts of Cypress owes \$1,422,727.

Those profits were owed based on what the judge said was Trojan EV and Golf Carts of Cypress' infringement on four counts in the complaint. Those were for federal trademark infringement and unfair competition, also under Texas state law, according to the decision.

Trojan Battery sued in 2021, accusing the defendants of infringing its trademarks for electric storage batteries and deep-cycle electric storage batteries, both of which are commonly used in golf carts. It also sought an injunction blocking them from using Trojan Battery's trademarks in connection with the defendants' golf carts.

"Defendants identified two cases — both preliminary injunction decisions from the Western District of Texas — that they argue have treated the scope of the plaintiff's trademark registration as a threshold issue," the judge said on the issue of trademark. "As an initial matter, these cases would be unpersuasive even if they undertook the analysis defendants contend."

The judge said the evidence in the case showed that the defendants tried to use "the goodwill" of the plaintiffs' brand.

For one thing, the judge wrote, "a defendant's intent to benefit from the reputation of the plaintiff's products is compelling evidence of likelihood of confusion."

"We are extremely pleased that the court's verdict recognized the strength and reputation of our Trojan brand, and vindicated our legal position in its entirety," Trojan Battery Chief Legal Officer Mara Williams said in a statement to Law360 on Friday. "The decision is a product of our investment in protecting our trademarks, the commitment and perseverance of our legal team and is a victory for brand owners facing the type of infringement we did in this case."

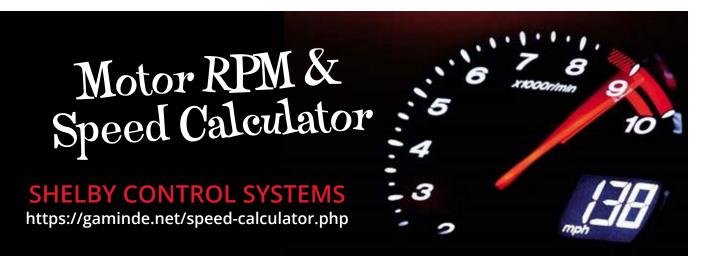
Counsel for the other parties did not immediately respond to requests for comment Friday.

Trojan Battery Co. is represented by Gilbert A. Greene, Nicole K. McLaughlin and Tyler Marandola of Duane Morris LLP.

Trojan EV LLC and Golf Carts of Cypress are represented by Jerry R. Selinger, Aaron D. Perkins, Kyrie Cameron and Simon J. Harrall of Patterson & Sheridan LLP.

The case is Trojan Battery Co. LLC v. Golf Carts of Cypress LLC et al., case number 4:21-cv-03075, in the U.S. District Court for the Southern District of Texas.

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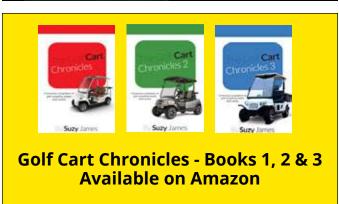














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