

## ***PFADT RACE ENGINEERING: SUPPLY CHAIN ISSUES IMPACT THE VALUE CHAIN***

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Delivering on their promise to provide the most technologically advanced after-market suspension systems for the Chevrolet Corvette, Pfadt Race Engineering experienced explosive growth. Nonetheless, founders Robbin Sowinski and her husband Aaron Pfadt discovered that rapid growth had a downside. Robbin sat in their Salt Lake City, Utah office and stared at the four clocks that symbolized both the potential and the biggest potential obstacle to Pfadt's continued success. The clocks were set to local time as well as the correct time for their most-important European suppliers and the location of two key employees, currently off-site. The latest indicators signaled only minor positive changes in the economy. Was the slowing growth in sales a symptom of economic slowdown, or further evidence that the company would need to accelerate its move into other performance car products? Would Pfadt need to change its mix of suppliers to gain more flexibility?

Additional products or adding to the automobiles that Pfadt would build for would complicate operations. Already factor complicating operations was the long boat-to-train connection to Belgium for their two most critical imports: steel and precision machined parts. Costs were high, lead times were long, and delays that rippled to customer back orders were bedeviling the owners. Could Robbin and Aaron make things less complicated? Could they accept cheaper, rawer inputs and shorten delivery times?

## Industry Background

Pfadt Race Engineering operated in the \$10 billion U.S. Automobile Steering and Suspension Industry (Danova 2012). The industry included an extremely diverse group of companies making and selling shock absorbers, steering columns, steering gears, gear boxes and related parts. Although many industry players sold primarily to original equipment manufacturers (OEMs) or the major automotive companies, Pfadt was part of the “*aftermarket*,” with revenue also generated from professional racing teams. Aftermarket companies manufactured or re-manufactured part and add-ons for automobiles. Firms not associated with the major car OEMs added or modified automobiles or automotive systems. The entire industry was complementary to the automotive industry.

The market consisted of car enthusiasts who upgraded the performance of their vehicles through the installation of non-standard equipment. The industry was tracked by the Specialty Equipment Marketing Association that subdivided it into three product categories (Appearance and Accessory, Racing and Performance and Wheels, Tires and Suspension) and monitored nine sub-niches within these product segments (Knapp 2011). Pfadt chose not to participate in the entire market and focused on a few sub-niches although the industry was in a state of flux with growing numbers of domestic, U.S.-built trucks and automobiles by international firms (see Exhibits 1, 2 and 3).

While larger competitors manufactured parts for several different automobiles, Pfadt focused on two General Motors vehicles, the Corvette and the Camaro, which shared some common characteristics including passionate devotees who raced and showed off their vehicles. There were more than 1.5 million Chevrolet Corvettes on the road, having been in production since 1953. One of the most famous cars in the world, the Corvette had survived its seventh major re-design, or generation, including the 1963-67 Stingray version (2<sup>nd</sup> Generation, or “C2”) which was named the “Coolest Car of all Time” by Automobile Magazine in 2008. Estimates put the number of Camaros, which entered production in 1966, at approximately 900,000. The Camaro

had seen four re-designs in which the fifth generation was largely a re-creation of the most popular version. Pfadt produced primarily products for 1996 and newer models of the Corvette and 2010 and newer models of the Camaro.

Pfadt kept an extensive line of stock keeping units (SKUs) for both the Corvette and the Camaro, including both individual components and multiple part kits to account for the range of products under these two banners (Exhibits 4, 5, 6, and 7). In part because the true needs of its customers were unclear, Pfadt had relationships with many installers and received reports from them about which parts and kits were the most popular. That was only part of the market - many of Pfadt's customers were part of the do-it-yourself crowd. A few even had private mechanics.

The issues facing automotive aftermarket firms were nearly universal:

*"...We've identified the 90 core product/market and geographic segments, my marketing people tell me they can't develop the necessary facts to develop winning strategies because the data just aren't available..."* (Garda 1981: 18).

There were many classic and performance cars in the marketplace (Exhibit 3), but the Corvette held a special place in the hearts of so many owners, including Robbin. Robbin's family owned a succession of the cars throughout the years; her Dad drove a white 1973 Stingray. With a large and active base of collectors and racers, the Corvette was perfect for aftermarket parts. The Camaro was a good complement given its reputation among the Corvette audience. Other brands also lent themselves to the aftermarket. Dodge and Ford cars were actively collected and raced throughout the United States, but they were very different than the twin muscle cars that formed the basis for Pfadt's business model.

### Upstream Geography

Western Europe (England, France, Germany, Belgium, and Italy) was home to many of the automotive industries biggest names. Many key car components came from European companies. In addition to high-end electronic components such as Blaupunkt, Europe also supplied the auto industry and the aftermarket companies with inputs such as high-grade stainless steel and machine-crafted precision parts. ArcelorMittal, the world's largest steel manufacturer, was headquartered in Luxembourg, and its spin-off stainless steel manufacturing division, Aperam, S.A., had its main facilities in France, Belgium and Brazil. With fewer domestic sources for U.S. auto industry companies, the European companies were becoming the main source of stainless steel.

The issue for firms in the Western United States like Pfadt was that countries like Belgium were thousands of miles and several time zones away. Coordination with suppliers at this distance was problematic. Big bulky steel shipments traveled to the coast and then by boat across the Atlantic, up the Saint Lawrence Seaway to the Great Lakes, and then across the country to Salt Lake City (Exhibit 8). Salt Lake City was much less convenient than traditional regions such as the Upper Midwest (stretching from Detroit, MI through Toledo, OH and Youngstown, OH) or Southern states such as Tennessee.

While Chinese, Indian, Eastern European and Brazilian steel manufacturers were also a possibility, their lack of a premium reputation added to the language, cultural, temporal and transportation difficulties they presented. Pfadt's exacting specifications were the main reason for purchasing specialty steel from Belgium rather than from U.S. suppliers. The company experimented with purchasing steel from China but after an entire shipment proved unusable, the experiment ended.

Likewise, the calipers and other specialty-machined parts were Belgian in origin. Difficult to replicate locally, prices for these parts were largely the cost of the steel plus the cost of labor.

Labor costs varied widely by nation (Exhibit 9). Pfadt rejected buying from U.S. firms due to the high cost, but quality became an issue as well. The company had experimented with several suppliers from the U.S., South Korea, and later China, but encountered high reject rates. U.S. firms delivered parts that required scrap or re-work at 10% higher rates than the Belgian supplier. Chinese and South Korean firms delivered parts that required scrap or re-work at 30% higher rates. Pfadt looked into opportunities to source from Germany, Italy and several Eastern European nations. Finding others in the industry who had experience with suppliers from these nations was difficult, particularly from Poland and the Czech Republic where costs would have been significantly lower. Pfadt also had on-going discussions with the manufacturer of machine parts from Brazil but could never come to terms on quality.

Pfadt paid on time, was willing to wait on backlogs, and sent engineers to Belgium several times a year to discuss ways to make the partnership better. As quickly as it was growing, Pfadt was a tiny customer for the large multi-national steel supplier. Both steel and machined-parts manufacturers supplied a wide-range of industries. Customers outnumbered suppliers, and many of the customers were much larger than Pfadt.

### Downstream Geography

Western Europe had long had a racing culture that rivaled the circuits in the United States. Western Europe's emphasis was on European cars to the point of near exclusivity. Enthusiasts upgraded and raced BMWs, Fiats, Porsches and other European brands in a crowded marketplace. Some teams raced Chevrolet products as well. The vehicles were heavily modified for the highest levels for races such as the World Touring Car Championship in Germany, France, Hungary, Russia, Portugal, Slovakia, the Czech Republic, as well as the non-European countries of Argentina, Qatar, Morocco, China, Japan and Thailand. The Championship no longer traveled to the United States for a race ([www.fiawtcc.com](http://www.fiawtcc.com)).

As evidenced by their inclusion in the most prominent races, after-market performance enhancements were becoming big business in Asia and the Middle East. As wealth and car-ownership proliferated in these two regions, private and semi-professional racing increased. American muscle cars like the Corvette and Camaro were welcome along with top-of-the-market European cars. Smaller Japanese and Korean cars, often dismissed by enthusiasts, were a growing part of the after-market in Asia and were seen as fun, colorful alternatives to the muscular Americans and the stately Europeans.

Pfadt's reputation within the industry was sterling. It had clients from among the big NASCAR and Formula One teams, which helped attract amateurs. Pfadt engineers worked with teams on integrating parts, testing performance parameters, and pit rows. Formula One raced every other weekend in cities around the globe. Formula One circled the globe from Australia to Asia and Europe before hitting North America, South America and back to Asia. Typical race cities could be as large and metropolitan as Abu Dhabi and Mexico City or as out-of-the-way as Baku, Azerbaijan, or Silverstone, England.

The NASCAR schedule, in contrast, stayed entirely in the United States; it offered races almost every weekend from February to November. The schedule took the race teams to 22 different states mostly in the American South, but stretching from Southern California to New Hampshire.

The logistical and staffing commitment for Pfadt was daunting. Even though visibility with the racing teams at the highest-end of the market had created credibility with buyers (both end-users and installers), it came at a high cost to Pfadt.

Although NASCAR and open-wheel racing dominated the coverage on the major media outlets, hundreds of amateur and semi-professional racers jumped onto their motorcycles or into their modified personal autos every Friday night or weekend day. About 17% of the U.S. population participated in racing at some level (Amari 2012). These people wanted the latest innovations

in engine power and handling. Pfadt attracted a following among amateur racers whose day jobs included Olympic athletes, rock musicians, and movie stars. These clients were perfect for Pfadt as they were more concerned with performance and appearance than cost. The Western U.S. was a hotbed of driving enthusiasts year-round thanks to the climate, and hobbyists were able to locate and restore older models that had been protected from rust-inducing road salts.

The Western U.S. was a big place. Driving enthusiasts enjoyed long stretches of open roads with high speed limits (75 miles per hour in some states) and massive open spaces such as salt flats and old runways. Drivers faced little in the way of on-coming traffic or speed restrictions. Population centers were widely scattered with the exception of a few major metropolitan areas, primarily Los Angeles and its satellite of affluent communities stretching along the coast.

Only a percentage of Pfadt racing customers were able to use Pfadt's products right out of the box because most products required complicated additions or alterations to the key systems in expensive automobiles. While the movie stars and musicians could afford the Pfadt team engineers for custom installations, more than half of Pfadt's customers ordered parts that were shipped to an automotive body shop.

Pfadt used various marketing channels (see Exhibit 10), including the internet, catalogs and trade magazines, and shows with independent shops. While racing was an important proving ground and marketing tool, most of Pfadt's products were installed on *'daily-driver'* cars. These vehicles were owned by enthusiasts who liked to make performance modifications, but still drove the vehicle to work or out to dinner. Online marketing had grown in importance, so Pfadt hired a person to handle direct online sales and customer service.

The period of 2009 to 2011 was great for the company and for racing in general. New teams were formed and the biggest dilemma Pfadt faced during this period was keeping dealers happy. Individual novice customers took advantage of volume discounts to purchase Pfadt parts for resale or drop ship at dealer locations. These customers found Pfadt through the on-

line marketplace and after reading about the company in magazines dedicated to the automotive market. Being out-of-stock was a problem as the company moved backwards in the supply chain and came into competition for raw materials with international firms ten- and hundred-times its size. Transportation costs rose as Pfadt turned to European suppliers of high-grade components.

The decision to focus on the top of the market and high performance equipment led to a secondary revenue stream: the team consulted with racing teams, including on race day. Being credited by teams who had won at Daytona Racetrack opened doors. It is not unusual to find Aaron or one of the engineers on pit road or back in the garage offering tweaks and testing the parameters of Pfadt's products. Races were held around the country and in Europe which generated a lot of travel and down time for the staff. The business was lucrative both from the professional teams willing to pay for incremental advantages in power, torque or handling and the pro-am racers paying top dollar for Pfadt engineers to join their entourages.

As the brand had established cachet in racing, merchandising deals were pitched to Robbin as well. Although she thought them premature, t-shirts and toy cars emblazoned with Pfadt Race Engineering could be in the offing.

The first few months of each calendar year had typically been slow with U.S. customers from the East, Midwest and even the South focused more on digging snow out of the driveway than the toys parked in the garage. For the past several years, the slow months had allowed Pfadt to resolve back inventory issues and build inventory reserves. But sales did not accelerate over the summer months as they had done in past years and Pfadt's owners grew worried. Word of mouth was still unanimously positive, but the rate of sales growth declined. There was more traffic on Pfadt's websites from potential customers cajoling, pleading, demanding Pfadt parts for their Ford Mustangs and Dodge Chargers. The discussion boards filled with talk of European cars and the Japanese racers. Any change to servicing customers, or seeking new ones, would ripple through the organization all the way back to the decisions about inputs and staffing.





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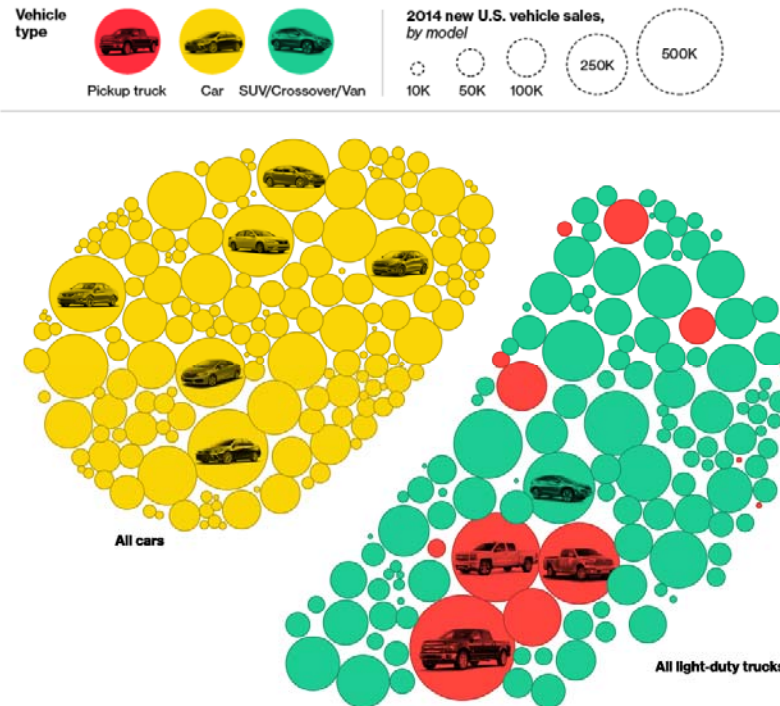
**Exhibit 1. SEMA Sector Matrix (Pfadt Race Engineering Products Indicated with X)**

Source: Automobile Magazine, 2008

	Appearance and Accessory	Racing and Performance	Wheels, Tires and Suspension
Light Truck			
Off Road			
Racing		X	X
Compact Performance			
Street Performance		X	X
Restyling			
Restoration		X	X
Custom		X	X
Other			

**Exhibit 2. New Automobile Sales Moving Towards Trucks**

Source: [www.bloomberg.com/graphics/2015-auto-sales/](http://www.bloomberg.com/graphics/2015-auto-sales/)



**Big vehicles are booming and cars aren't keeping up.**  
 Sales of light trucks grew five times faster than cars last year, increasing 10 percent compared to 1.8 percent for cars.

Since the end of the recession, sales of cars and trucks had been neck and neck: Americans bought about 39,000 more trucks than cars in 2013. But in 2014, light trucks dramatically pulled away, outselling cars by 685,000 vehicles. Sales of midsize cars, which include the typical family sedan, actually shrank 0.5 percent.

**Exhibit 3. Comparative U.S. Registrations***Source: Knapp, 2011*

<b>Registration Data for Popular Street-Performance Vehicles</b>					
	<b>1960s</b>	<b>1970s</b>	<b>1980s</b>	<b>1990s</b>	<b>2000s</b>
<b>BMW M3</b>	-	-	1,711	28,826	46,559
<b>BMW M5</b>	-	-	757	972	12,435
<b>Cadillac CTS V</b>	-	-	-	-	9,455
<b>Chevy Camaro</b>	72,406	19,309	155,304	373,981	94,024*
<b>Chevy Chevelle</b>	35,391	48,828	-	-	-
<b>Chevy Corvette</b>	21,816	114,573	146,437	167,799	286,558
<b>Chevy Nova</b>	10,811	51,707	-	-	-
<b>Dodge Challenger</b>	-	9,242	-	-	31,021
<b>Dodge Charger</b>	6,045	8,979	-	-	379,058
<b>Ford Mustang</b>	67,397	42,708	174,311	729,683	1,245,479
<b>Ford Torino</b>	-	3,029	-	-	-
<b>Infiniti G37</b>	-	-	-	-	45,614
<b>Lexus IS 200/300/350</b>	-	-	-	-	253,195
<b>Plymouth Barracuda</b>	-	7,493	-	-	-
<b>Plymouth Roadrunner</b>	4819	4785	-	-	-

**Exhibit 4. Pfadt Product Line***Source: Westcoastcorvettes.com***Coils & Shocks**

Pfadt Race Engineering designs, tests and builds coil overs and shock absorbers specifically for the Corvette, offering easy to adjust damping, ride-height flexibility, and superior quality. Our coil over and shock absorber products give your Corvette the handling performance of the super car that it is.

**Swaybars**

Professional level sway bars from Pfadt Race Engineering offer the ultimate in balance and roll-stiffness. Our lightweight, adjustable, three piece sway bars are the absolute leading the in the high-end performance market. Your Corvette will respond to turns with precision and comfort.

**Engine / Transmission Mounts**

An excellent solution for high horsepower or high-performance Corvettes, Pfadts Race Engineering's Engine and Transmission mounts reduce the massive power train shake that's common in the C5 and C6 Corvette. Put more power to the ground with our purpose built powertrain mounts.

**Silicone Radiator Hoses**

Silicone hoses from Pfadt Race Engineering withstand temperature and deterioration better than the stock rubber for a worry-free engine bay. Stainless clamps included.








**Control Arm Bushings**

Installing the Pfadt Race Engineering polyurethane control arm bushings & sleeves adds poise and responsiveness to your corvette.

[Home](#) → Pfadt Race Engineering

**Exhibit 5. A Selection of Pfadt Products**


Source: Westcoastcorvettes.com

 <p><b>Corvette Coilovers - Drag Racing FeatherLight Generation Coilovers - Pfadt Racing : 1997-2013 C5, C6 &amp; Z06</b> \$2,489.95 <a href="#">Add to Cart</a></p>	 <p><b>Corvette Rear Drag Racing Sway Bar - Pfadt Racing : 1997-2013 C5, C6 &amp; Z06</b> \$849.95 <a href="#">Add to Cart</a></p>	 <p><b>Corvette Drag Race Spherical Bearings - Pfadt Racing : 1997-2013 C5, C6, Z06</b> \$1,274.95 <a href="#">Details</a></p>	 <p><b>Corvette Racing Clutch Kit - Pfadt Racing : 2005-2013 C6 &amp; Z06</b> \$2,699.95 <a href="#">Add to Cart</a></p>
 <p><b>Corvette - Pfadt Tri-Y Header Package : 2005-2008 C6 Z51 - LS2 LS3</b> Regular Price: \$2,100.00 <b>On Sale For: \$1,890.95</b> <a href="#">Details</a></p>	 <p><b>Corvette Spherical Control Arm Bearings - Pfadt Racing : 2006-2013 Z06</b> \$1,890.95 <a href="#">Add to Cart</a></p>	 <p><b>Corvette Spherical Control Arm Bearings - Pfadt Racing : 1997-2004 C5 &amp; Z06</b> \$1,890.95 <a href="#">Add to Cart</a></p>	

**Exhibit 6: Ordering Pfadt products**

Source: Westcoastcorvettes.com


**Corvette Coilovers - Drag Racing FeatherLight Generation Coilovers - Pfadt Racing : 1997-2013 C5, C6 & Z06**

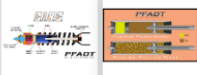


SKU: 3310  
**Manufacturer Part Number:** 1110245  
**Availability:** Usually Ships In 3-5 Days  
**\$2,489.95**

[Add to Cart](#) [Add to Wishlist](#)

**FREE Shipping!**  
 Email this product to a friend  
 Request more product info





[View Larger Image](#)



**Exhibit 7. A Video on Pfadt Racing Products**

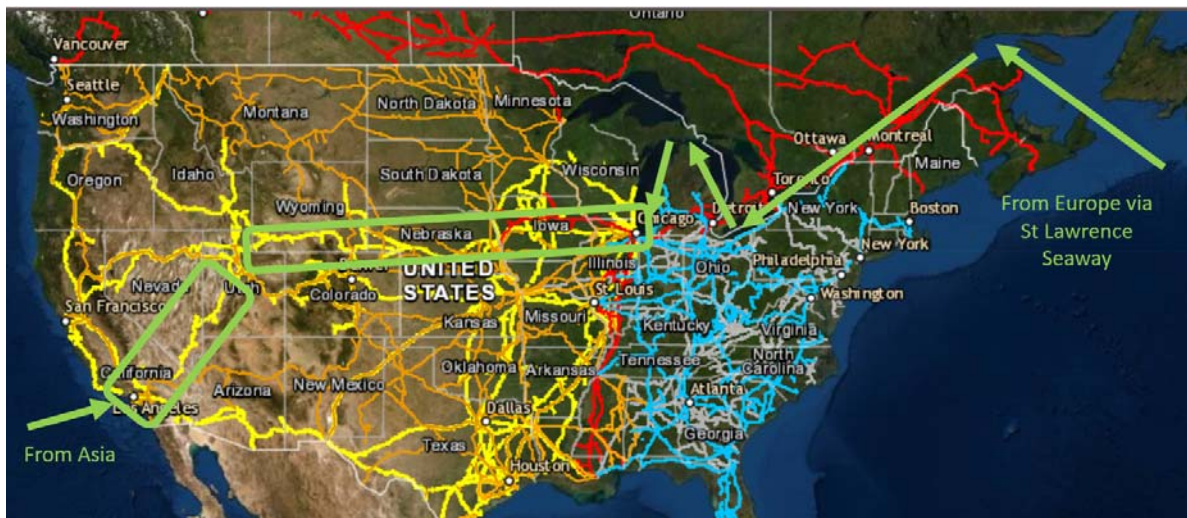
Source: [https://youtu.be/az\\_lof7\\_LEc](https://youtu.be/az_lof7_LEc)

**BOA MOUNT, THE NEW STANDARD IN CORVETTE SHOCK UPPER MOUNTING:** An idea taken directly from its much more expensive bigger brother, the Feather Light Generation DA; the new BOA mount is a no-compromises solution to Corvette shock upper mounts. Our mount is a zero-maintenance, completely sealed design that allows the FULL articulation required for the Corvette suspension. A common problem in coilover mounting for the Corvette is how to effectively mount the upper shock to the chassis without losing much shock travel and articulation. Common solutions are a clevis design that severely limits shock travel and will effect ride quality, and a "pin top" design that relies on compliance in consumable rubber bushings to deflect and bind the shock, creating an unsealed mount needing eventual replacement. The BOA MOUNT suffers none of these shortcomings as it is a solid mount similar to a control arm ball joint (quiet, durable, maintenance free), that is locked in place and then articulates with the suspension utilizing a low friction internal monoball that is sealed from the exterior elements. On top of all of this, the installation procedure could not be any easier. A simple easy to torque washer and nut retain the whole assembly. If your coilover doesn't have the BOA mount, be aware of the potential future problems. Take a look at the video to see the new BOA MOUNT in action!



**Exhibit 8. U.S. Railway System and the Sea/Rail Pathways to Salt Lake City, Utah from Europe and Asia**

Source: [Acwr.com](http://Acwr.com)



**Exhibit 9. Hourly Compensation Costs in Manufacturing, as Percent of U.S. Costs (U.S. = 100), for Selected Countries Engaged in this Industry**

Source: Conference-board.org

Belgium	47.26
Germany	43.18
Italy	32.49
South Korea	22.98
Slovakia	11.57
Czech Republic	10.71
China	9.82
Poland	8.53
Brazil	7.98

**Exhibit 10. Market Channels**

Source: Knapp, 2011

Retail Channel	Purchase Most Parts	Find Information*
Internet-Retail Store Website	24%	37%
Catalog Mail Order	21%	47%
Internet-Manufacturer’s Website	15%	61%
Internet-Auction Website (i.e. eBay...)	11%	25%
Custom Shop/Installer	8%	20%
Chain Auto Parts Store	5%	18%
Independent Parts Store/Installer	5%	17%
Internet-Classifieds	4%	19%
Car/Truck Show	3%	36%
Magazine Mail Order	2%	45%
Retail Department Store	1%	5%
Vehicle Dealership	1%	11%
Newspaper Classifieds	0%	4%

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