LIGHT WEIGHT + SYNERGIES ADVANTAGE

Automakers are striving on developing lightweight vehicles to increase efficiency and provide a better driving experience. Manufacturers are using lightweight materials such as high-strength aluminum for structural applications to reduce the weight of the vehicle. Aluminum alloy wheels are lighter than steel wheels and enhance performance and handling of the vehicle. With the growing demand for lighter vehicles, manufacturers are offering lightweight aluminum wheels.

Graphic: Business Wire

The global aluminum alloy wheel market 2019-2023 is expected to post a CAGR of more than 2% during the forecast period, according to the latest market research reports. As auto industries are forced to comply with stringent environmental regulations, cost reduction, improving fuel economy and performance; resorting to light weighting is inevitable.

SYNERGIES manufactures a variety of aluminum alloy wheels and conducts computer modeling to optimize the weight of the wheels. The growing demand for lightweight vehicles will drive the need for the aluminum alloy wheel market during the forecast period.

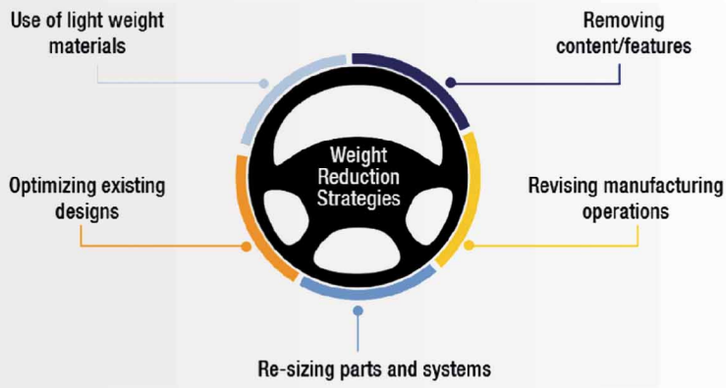
SYNERGIES constantly explores the endless possibilities of weight reduction at the component level striving to meet customer requirements, where weight of the wheel is one of the key deciding factors for award of business.

SYNERGIES CASTINGS LIMITED

...the leader in Alloy Wheel Manufacturing!

LIGHT WEIGHTING STRATEGIES

A variety of weight reduction strategies are adopted by different automakers to minimize weight in automobiles. Using lightweight materials such as aluminum and carbon-fiber or optimizing existing vehicle designs are some of the key strategies adopted by manufacturers in the automotive industry. Synergies addresses the weight reduction challenge in following ways.



MATERIAL

Strength to Weight Ratio is the key as far as the light weighting of the ALUMINUM ALLOY WHEELS are concerned in comparison with STEEL WHEELS. The strength-to-weight ratio - also known as specific strength - relates to material strength (Force per unit area at failure) divided by Density.

SYNERGIES has realized the potential of light weight structures of the wheel and has been deploying Premium Grade aluminum alloy for wheel production sourced from the global market.

THE WEIGHT RATIO BETWEEN - ALUMINIUM VS STEEL WHEEL

1 : 2.8 KG OR 10KG : 28 KG

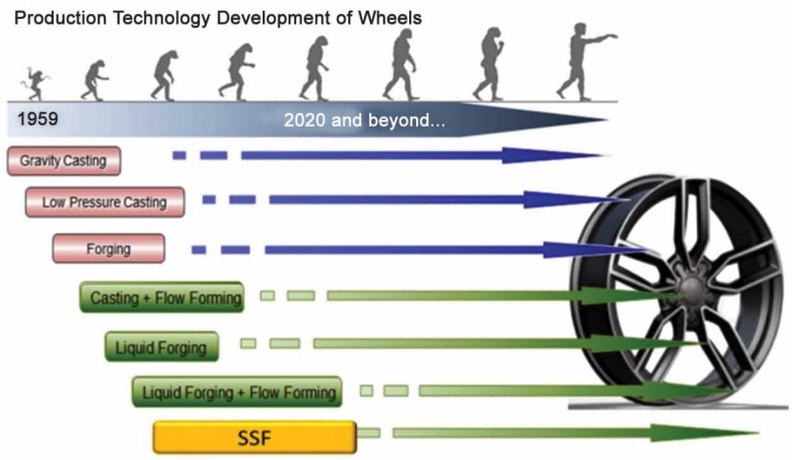
Pound for pound aluminium can absorb
TWO TIMES THE ENERGY IN A CRASH compared to steel.

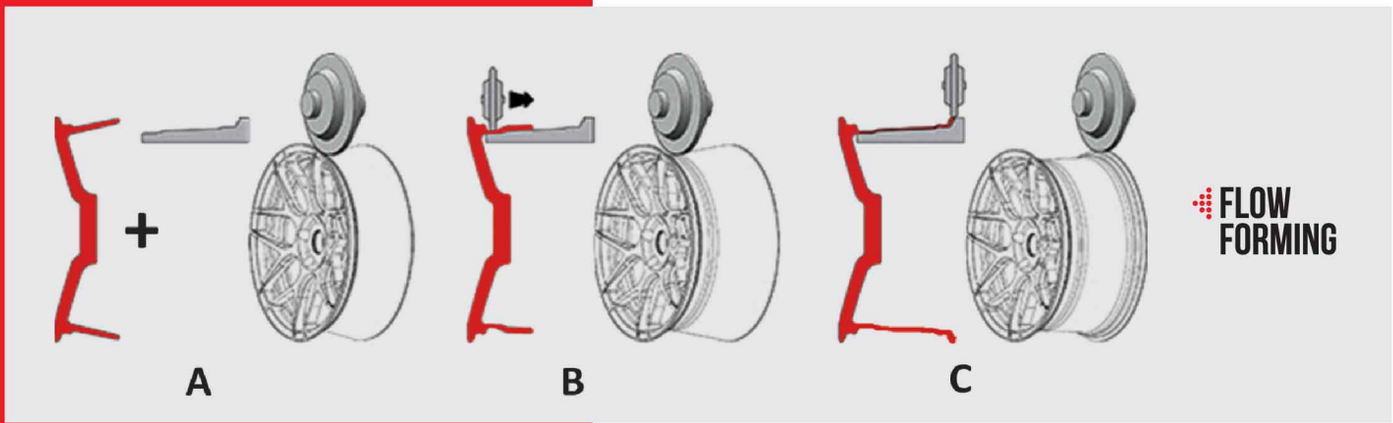
PROCESS

There are a range of processes to manufacture wheels and those are characterized by its unique features. The most commonly deployed process is casting and accounts for >85% alloy wheels globally. Forging and sheet metal fabricated wheels are at a lesser ratio. Synergies deploys the relatively latest casting process - Low Pressure Die Casting. LPDC, being an economical process for mass production facilitates casting relatively thinner sections without any additional feeders to compensate volume contractions - results in lighter wheels at reduced cost and energy.

LPDC + FLOW FORMING (FF)

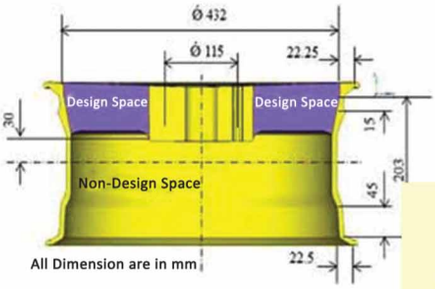
COMING soon...! @SYNERGIES is in the process of producing wheels deploying LPDC + Flow Forming (FF) process, offering LIGHTER RIMs by 15-18% than that currently being supplied. FF process is based on the plastic deformation principle where force is exerted on the cast profile using rollers and stretching to the required size. R&D on deployment of Semi Solid Forming process is in progress at Synergies which can further contribute to significant weight reduction in alloy wheels, as it would promote cast thin sections due to thixotropic behavior of slurry aluminum.





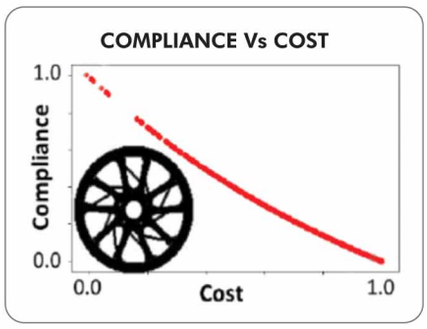
DESIGN

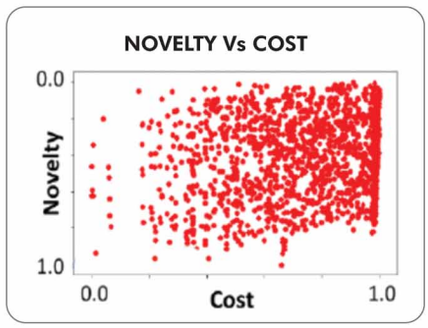
Apart from using lighter material and upgrading processes, the designing of wheel geometries (that which can be controlled by machining or formed by casting) can result in weight reduction. Synergies R&D on weight reduction has taken its elevation in design concepts leveraging the critical characteristics of aluminum - Strength-to-Weight ratio. The principle of balancing ratio of weight and stability enables the design of HOLLOW SPOKE wheels which offer better stability with less rotating Mass. Synergies supplies wheels with UNDERCUTS which help in weight reduction meeting all customer reliability and durability requirements.

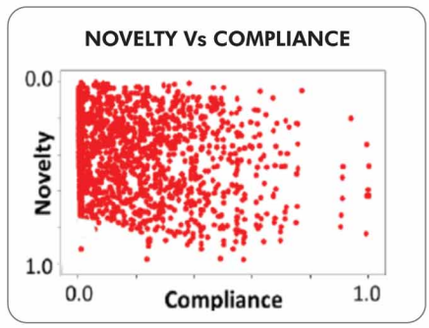


Lightweighting is necessary to meet demands **without sacrificing safety** or functionality.

Synergies values customer requirements and hence considers design attributes such as Compliance, Cost and Novelty of our designs. Trade off in the attributes is considered as per the need.

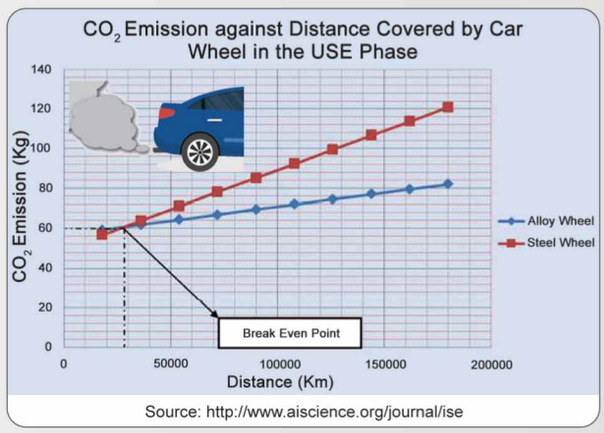






Alloy wheels - A boon for the environment - It was found through an ECO-AUDIT that ~35-40% CO2 was saved by Aluminum alloy wheels for a period of 10 years/180,000 km life span and over 60% saving in fuel consumption.

SYNERGIES manufactured and supplied over 12 million wheels over the last two decades, significantly contributing to the reduced CO2 emission by offering aluminum light weight wheels over steel wheels



Source: http://www.aiscience.org/journal/ise

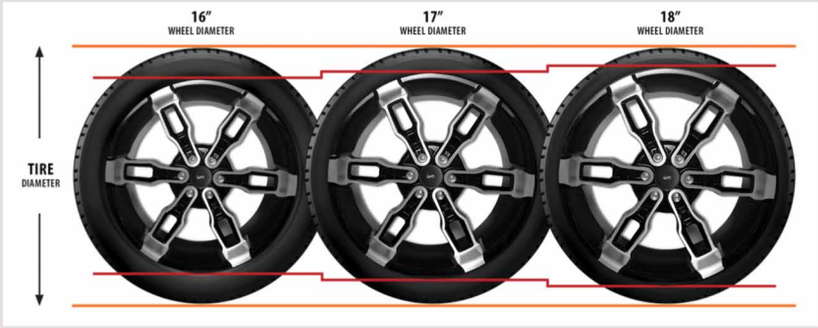
WEIGHT REDUCTION TECHNOLOGY DEVELOPMENT INITIATIVE

Under Chassis components: SYNERGIES developed an indigenous technology for manufacturing under chassis components such as Steering Knuckles and Suspension links using Aluminum Alloy and deploying advanced LPDC process (which are originally made of steel/iron deploying forging/casting).

The project was initiated with the intention of providing light weight components for auto OEMs and successfully demonstrated the capability with 20% reduction in weight compared to steel/iron equivalents

Resizing Parts/Systems – Through design for light weight

SYNERGIES manufactures wheels from 13″-24″ in diameter with widths up to 12″. A steel wheel size is limited to max 17″-18″ as the weight would dramatically increase. Synergies latest introduction 24″ diameter wheels are designed for Lighter weight - through rigorous shape and topology optimization and analysis. Various diameter and width combinations of alloy wheels would enable the customers to 'PLUS SIZE' the wheel and tire system, which greater aesthetics and fuel economy.



The process combines the convention of Advanced Die Manufacturing, sophisticated Maintenance system, Real time data feedback system and Universal Material Handling.

Advanced LPDC process focuses on optimizing the prevalent LPDC technology through a hybrid strategy in a soft computing paradigm.

The hybrid strategy evolved on a mechanistic process model, combines iterative results from numerical simulations with real time results by examining the technical issues pertaining to the casting process, deploying highly sophisticated process models and intelligent systems.

SYNERGIES, as a responsible supplier, constantly endeavours to reduce the un-sprung mass of the vehicle, to maintain a higher sprung to un-sprung mass ratio, which in turn results in better handling, traction, steering control and fuel efficiency.

SYNERGIES is the pioneer and leader in the manufacturing of Aluminium alloy wheels in India and specializes in producing extremely high precision, high quality, high-end alloy wheel for various global vehicle manufacturers. SYNERGIES is amongst the few wheel manufacturers capable of making OEM grade CHROME wheels upto 24″ (less than 3% of the world's wheel manufacturers can do this).

Currently SYNERGIES is a globally approved alloy wheels supplier to several automobile majors like General Motors-USA, Ford-USA, Chrysler-USA, General Motors-India, Ford-India, TATA Motors, Toyota, Hyundai, Fiat, Volkswagen, Honda and Mahindra & Mahindra amongst others. The Company has an impeccable record of serving the global OEM Customers in multiple continents for almost two decades, and has won several awards for its quality and delivery performance.

The World's **Best Cars**
ride on
SYNERGIES
Alloy Wheels

SYNERGIES CASTINGS LIMITED
...the leader in Alloy Wheel Manufacturing!

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