

Grüppe B
Aftermarket Rally System



Contents

Project Summary

Research

Stages

Package Diagram

Visual Development



Project Summary

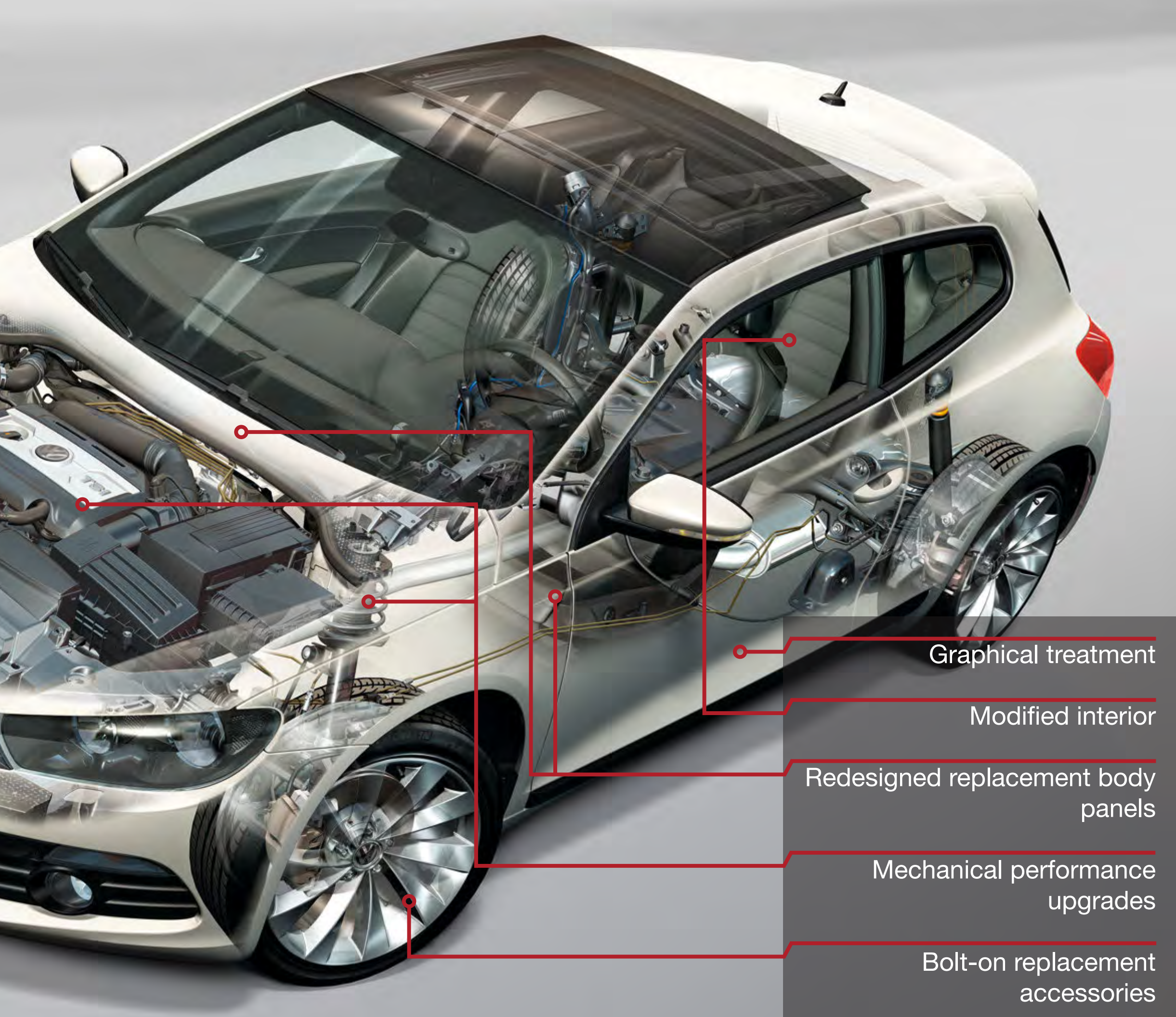
This project is the development of a set of aesthetic modifications and corresponding mechanical alterations for the new Volkswagen Scirocco. The package will include redesigned replacements for all body panels except for the doors and rear quarter panels, as well as the addition of pieces not included with the stock vehicle, all developed with the intention of communicating the specialty mechanical components within, increasing aerodynamic performance, and amplifying the vehicle's desirability and expression of the user. A detailed plan for upgrading the Scirocco's powertrain and chassis will also be developed. Stylistically, all modifications will be centered around the theme of Group B rallying, a popular division of off-road racing during the eighties that is known for almost unrestricted modification regulations, swarming crowds of fans, and no-holds-barred cars. The kit will be divided into what specialty equipment manufacturers call stages: four separate, stepped kits that allow users to upgrade at their own financial as well as resource and skill-based pace. This structure adds economic viability as well as flexibility in that it allows the vehicle to provide both entry level equipment for initial introduction to the sport of rallying all the way up to a high performance showcase vehicle.

Problem Statement

First produced from 1974-1992 and then re-designed and re-released in 2008, the Scirocco (named after a Mediterranean wind) has a pedigree of cars that include the Karmann Ghia and the VW Corrado. It's newest incarnation is a three-door sport compact featuring a front engine, front wheel drive configuration and a four cylinder forced induction engine. VW is a popular niche brand for tuning enthusiasts around the world, and yet their new, attractive sport compact has received little attention from aftermarket part manufacturers. This is due in part to its young age as well as the attention gleaned from its popular older brothers, the Jetta and Golf GTI. The Scirocco platform is an extremely potent base for modification, and an aftermarket suite of parts can be added to it to not only to bring out the model's full, unexplored potential, but also to make a noteworthy example of an under-utilized vehicle among the tuning community. Creating such a kit for the currently Europe-only model would also be timed excellently, providing a few years of user-based trials in order to develop it's sophistication for immediate release during the Scirocco's anticipated immigration to the U.S.

Goals

I intend the end result of this project to be a fully visualized aftermarket package for the Volkswagen Scirocco. The suite of parts will draw character from the cars of Group B and their avant-garde lighting, spoilers, intakes, and flairs. I hope to simultaneously imbue the car with an updated, contemporary style that relates to the stock vehicle and is reminiscent of current racing and customization trends. Mechanically, the car will share the experimental, uninhibited nature of the Group B cars, while being taken a step further to reflect on current advances in performance technology. The deliverables of this project will include a detailed part layout, description, and package drawing for each stage, as well as a 1\5 scale model, final drawings, and a presentation that will display the ideation and development of the project.



Graphical treatment

Modified interior

Redesigned replacement body panels

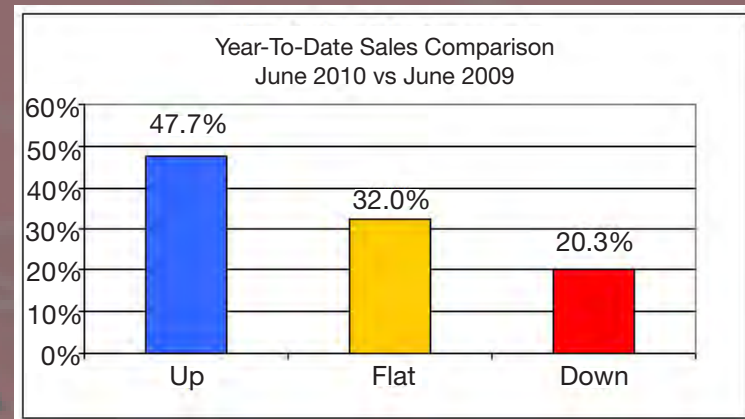
Mechanical performance upgrades

Bolt-on replacement accessories

Research

Market

“New cars are becoming more modular. This serves their own manufacturing efficiencies, but in turn, it also creates an incredible aftermarket opportunity. Automotive manufacturers, working along with the aftermarket can be part of the lifecycle of a car - not for four years, but for 50 or more. The classic Chevy V8 and the newer LS motor are fantastic examples. Their designs have been in service for decades. They can be dropped into just about any car, and mated to more than 100 transmission variations. There are literally thousands of aftermarket upgrades for this engine. Such standardized components are the DNA of a future where a car can be enjoyed for a lifetime. Like our homes, it becomes a personal expression of ourselves.”



DiTullo, Michael. “A POV on the Future of the Automobile.” Core77. Core77, n.d. Web. 12 Feb. 2011.

“Retail sales for the Compact Performance niche reached new heights during 2007, peaking at \$6.688 billion for the year. This accounted for a 12.21% increase over 2006: the 10th consecutive year since SEMA began documenting the segment separately. Product segment changes continue to support the notion that these enthusiasts are seeking better handling, higher performing vehicles and related modifications as the market matures.”

Specialty Equipment Market Association. 2008 Compact Performance Market Update - Executive Summary. SEMA, 2008. Web. 12 Feb. 2011.

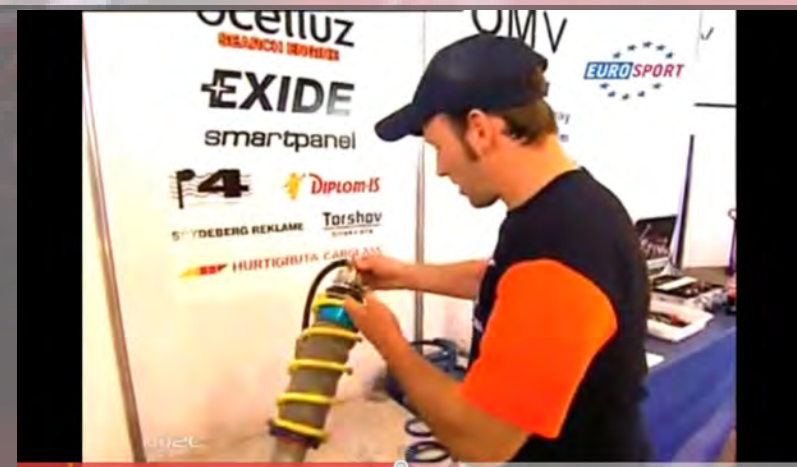
“In order to save costs, the OEMs have condensed their offerings to restricted trim levels in the most popular models of the strongest brands. That contraction in variety will prove to be a boon for restylers, industry leaders say. As the OEMs reduce the range of packages they offer, restylers can fill the gaps.”

Campbell, Steve. “Restyling on a Comeback,” Semanews.com. SEMA, July 2010. Web. 12 Feb. 2011.



User Profile

The ideal consumer for this product is a father and son team that are interested in the outdoors, motorsports, and engineering. They follow rallying and are looking for a way to become more involved with the sport, but have limited resources and skills with which to do so. Carrying out this project would be an enjoyable and memorable experience for the pair, as well as a learning process that they can take with them as they grow in the world of motor-sports.



Technical

WRC Technical. EuroSport: 2007, Web. 10 Apr 2011.
<<http://www.youtube.com/watch?v=B869YPZSLqw&playnext=1&list=PL2F3EDC3C1C3EDB97>>.



Stage 1*

Base

Requirements:

Skills:

- Basic mechanical
- Basic electrical
- Intermediate welding

Tools:

- Basic mechanic's tool set
- MIG Welder

Workers:

- 1-2

Facilities:

- Residential garage

Time:

- 1-2 Days

Parts:

- Instruction manual - \$20
- Shrick 246°/252° camshaft kit – \$1849.99
- ECS quick-spool underdrive pulley kit - \$149.95
- Eurojet Racing CNC aluminum valve cover – \$524.95
- Supertech valve spring/ titanium retainer set – \$369.99

Replacement electronic control unit w/ independent stage presets - \$200

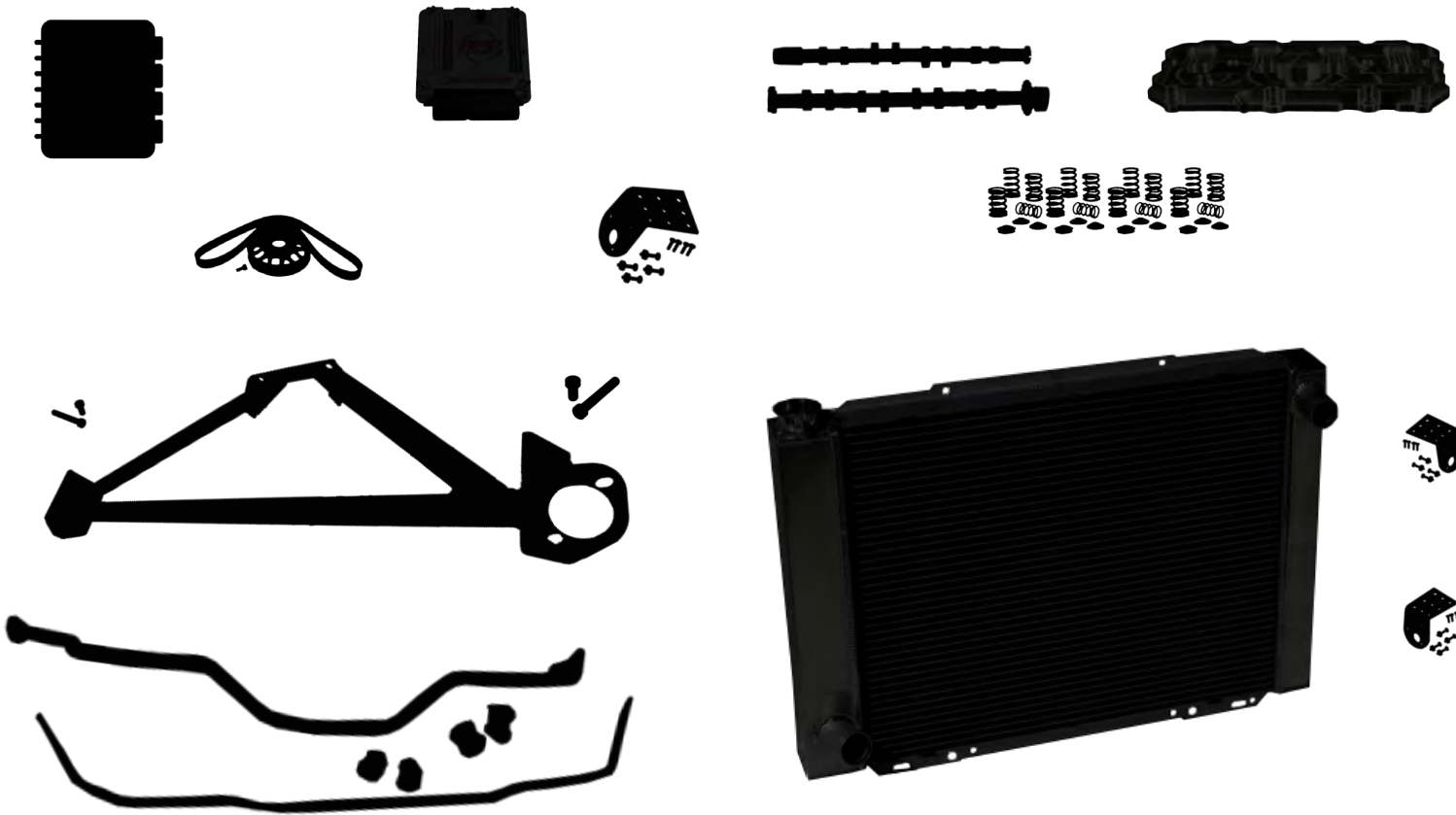
- Mounting hardware
- Chrome moly triangulated strut bar - \$150
- Mounting hardware
- Front sway bar - \$225
- Mounting hardware
- Rear sway bar - \$225
- Mounting hardware
- Aluminum radiator - \$420
- Mounting hardware
- 6-point roll-cage - \$750

Total Cost: \$4840

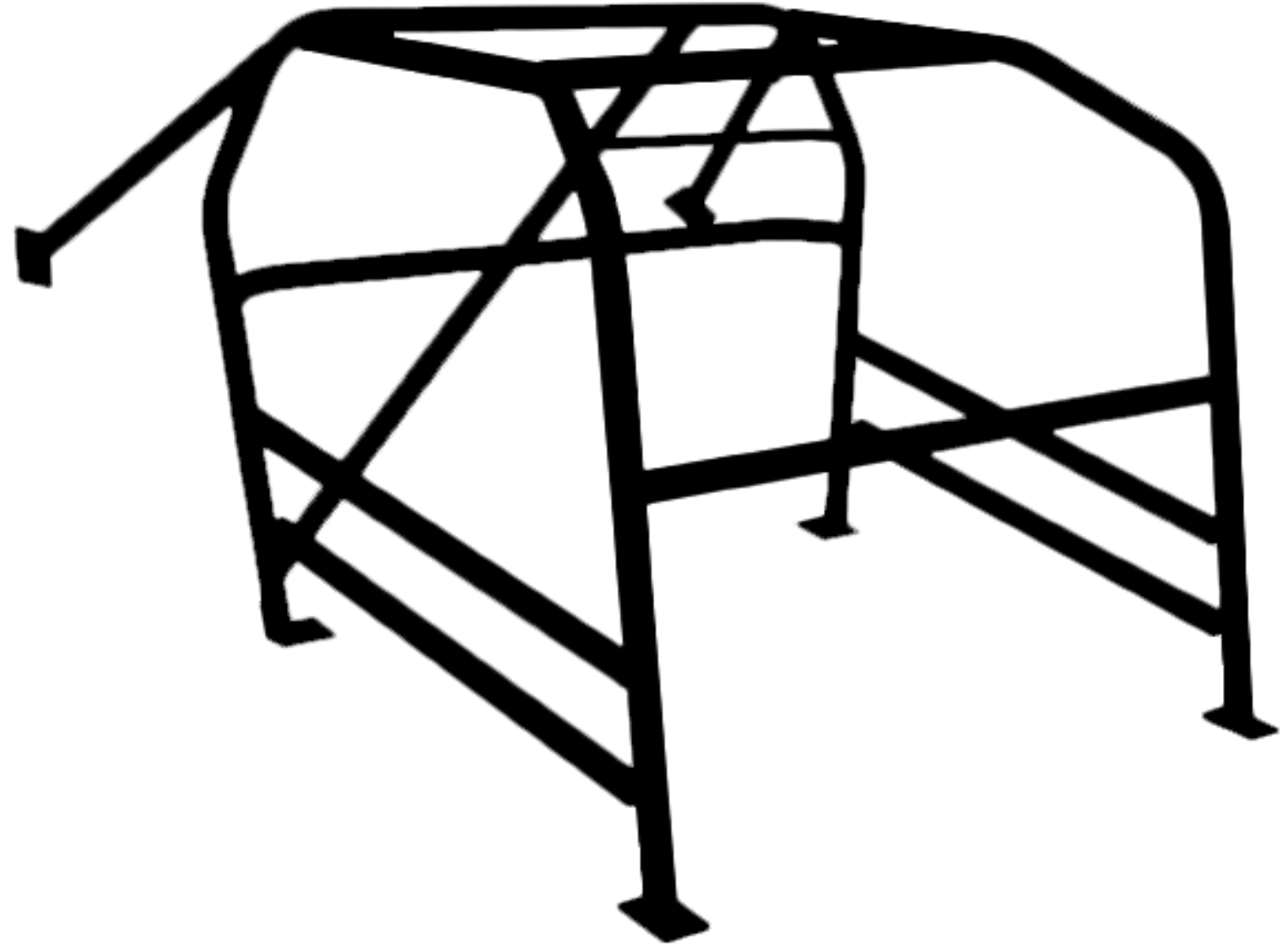
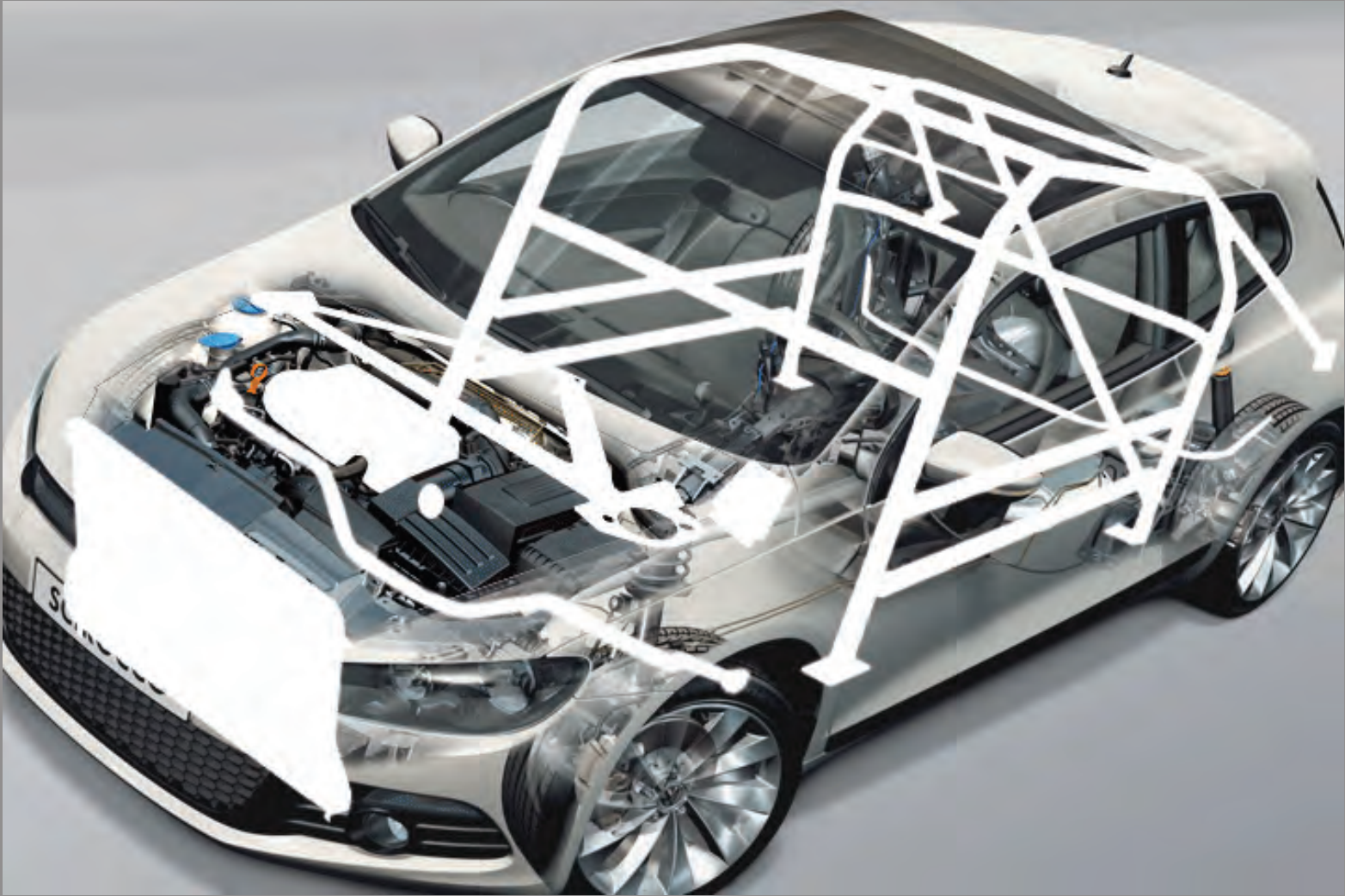
Total Horsepower: (Stock 207) 237 hp

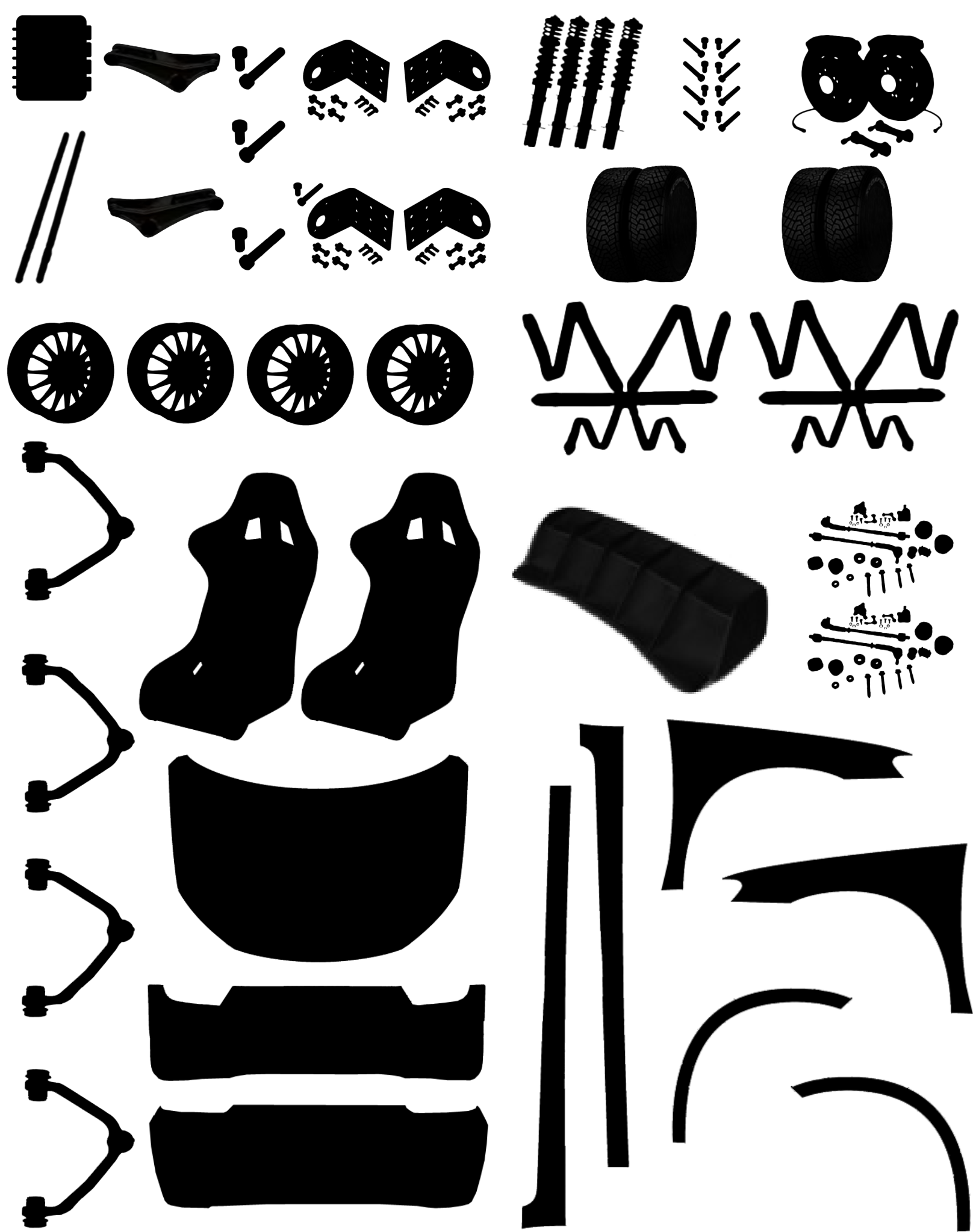
Total Torque: (Stock 207) 237 ft/lbs

Moderate handling improvement



*Sourced performance part
Purpose-built equipment





Stage 2*

Body & Rolling Chassis

Requirements:

- Skills:**
- Intermediate mechanical (chassis-focused)
 - Intermediate/advanced bodywork

Tools:

- Advanced mechanic's tool set
- Specialty chassis tool set
- Basic bodywork tool set

Workers:

- 2-3

Facilities:

- Hydraulic vehicle lift

Time:

- 7-10 days

Parts:

- Instruction manual - \$20
- AP coilover set - \$842.25
 - x2 Billet aluminum rocker - \$50
 - x2 Adjustable chrome moly pushrod - \$50
 - Mounting hardware
- Brembo GT 4 pot front brake conversion - \$2339.50
- x4 15"x10" OZ Superturismo WRC wheel - \$237
 - x4 205/65-15 Pirelli Scorpion tire - \$191
- x4 Upgraded tie rod - \$50
 - Mounting hardware
- x4 Upgraded control arm - \$492.50
 - Mounting hardware
- x2 Sparco EVO racing seat - \$739
- x2 Sparco 6-point competition harness - \$319
- Carbon fiber hood - \$589.99
- Carbon fiber 1-piece front bumper and grill - \$533.62
- x2 Carbon fiber front fender replacement - \$510
- x2 Carbon fiber sideskirt - \$576
- x2 Carbon fiber rear fender flare - \$288
- Carbon fiber rear bumper - \$533.62
- Carbon fiber rear spoiler - \$616.25
- Body panel fastener & adhesive package - \$20

Total Cost: \$14500

Total Horsepower: 237 hp

Total Torque: 237 ft/lbs

Major handling improvement

Major weight reduction

*Sourced performance part

Purpose-built equipment



Stage 3*

Turbocharger & All-Wheel-Drive

Requirements:

Skills:

- Professional mechanical (engine/ drivetrain)
- Intermediate welding (sheet metal)
- Basic metal fabrication

Tools:

- Professional mechanic's tool set
- Large jackstand
- Basic metal fabrication tool set
- MIG Welder

Workers:

- 3-4

Facilities:

- Hydraulic vehicle lift

- Four wheel alignment computer

Time:

- 12-16 days

Parts:

- Instruction manual - \$20
- APR Stage III Turbocharger kit - \$4999
 - APR/Garrett Ballistic series turbocharger
 - Cold air intake
 - Mounting hardware
 - Exhaust manifold
 - 3" Downpipe
 - x4 NGK Laser Platinum spark plug
- APR Front mount intercooler - \$1049
 - Mounting hardware
 - Attachment hoses
- MSD Super conductor spark plug wire set - \$78
- APR High Pressure Fuel Pump - \$934.15
- APR RSC 3" Catback exhaust system - \$859
 - Mounting hardware
- Volkswagen 6-speed manual DSG trans-axle - \$2,295.00
 - VF-Engineering VW / Audi 6-speed short shift kit - \$169.99
 - Chrome moly transmission sub-frame - \$179.95
 - Mounting hardware
 - Steel skid plate - \$50
 - Billet aluminum dual-input bell housing adapter - \$1000
 - Carbon fiber torque tube - \$499.95
 - x2 Carbon fiber driveshaft - \$499.95
- Volkswagen 4motion all-wheel-drive differential - \$125
 - Mounting hardware
 - x2 Volkswagen 4motion half-shaft
- Stamped steel replacement transmission tunnel foldout - \$125
 - Floor pan cutting template
- Sparco 353 steering wheel - \$259.00

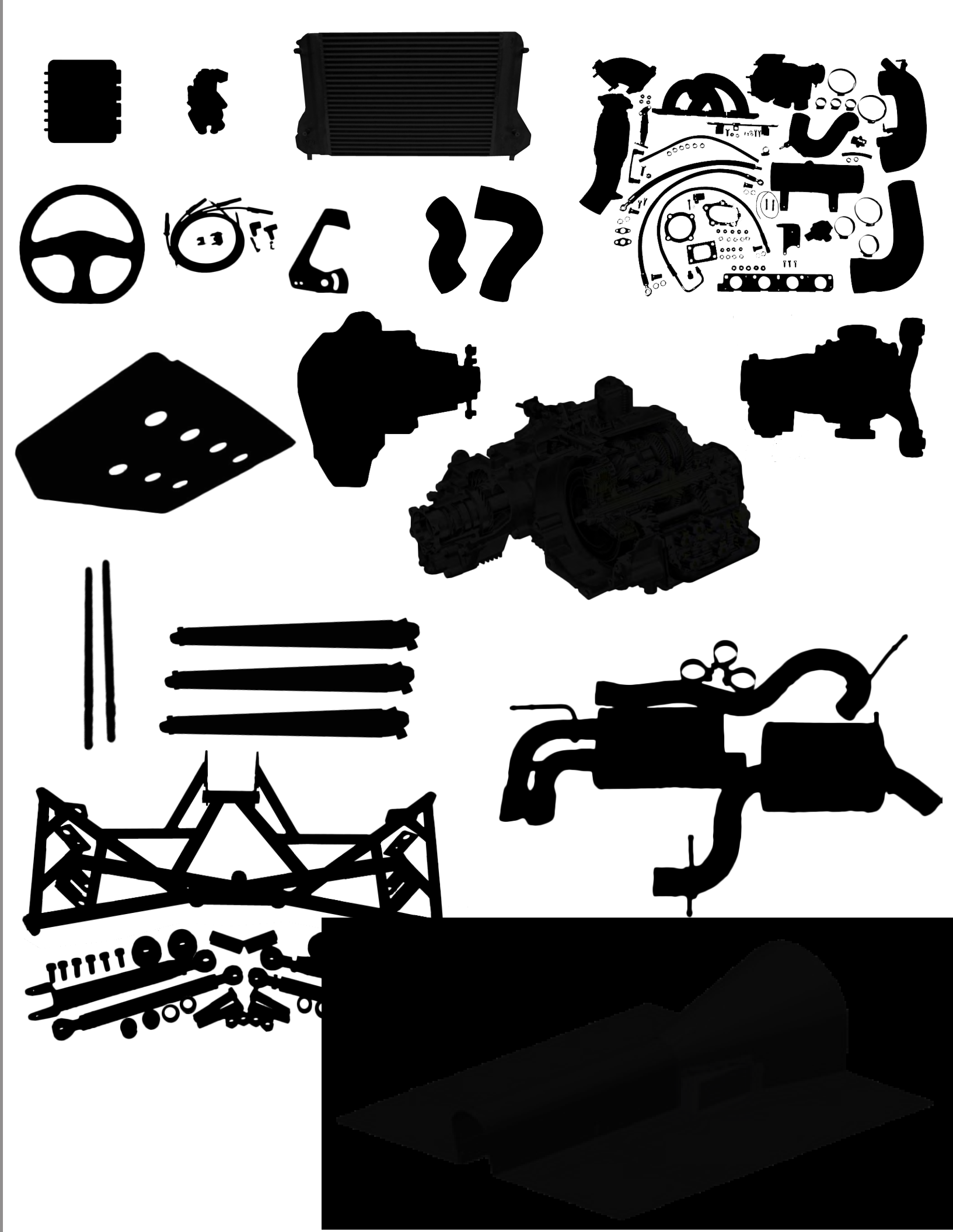
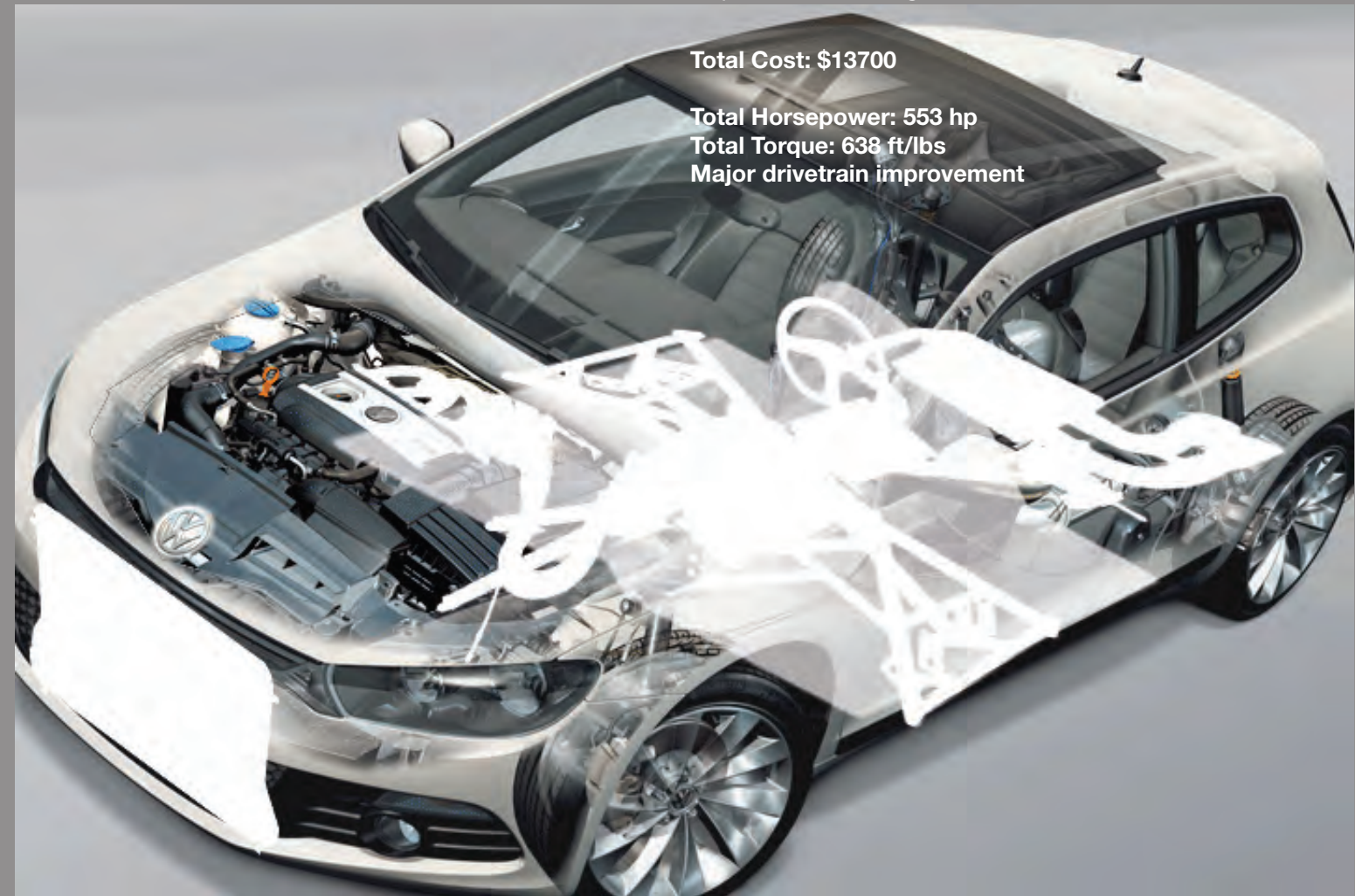
Total Cost: \$13700

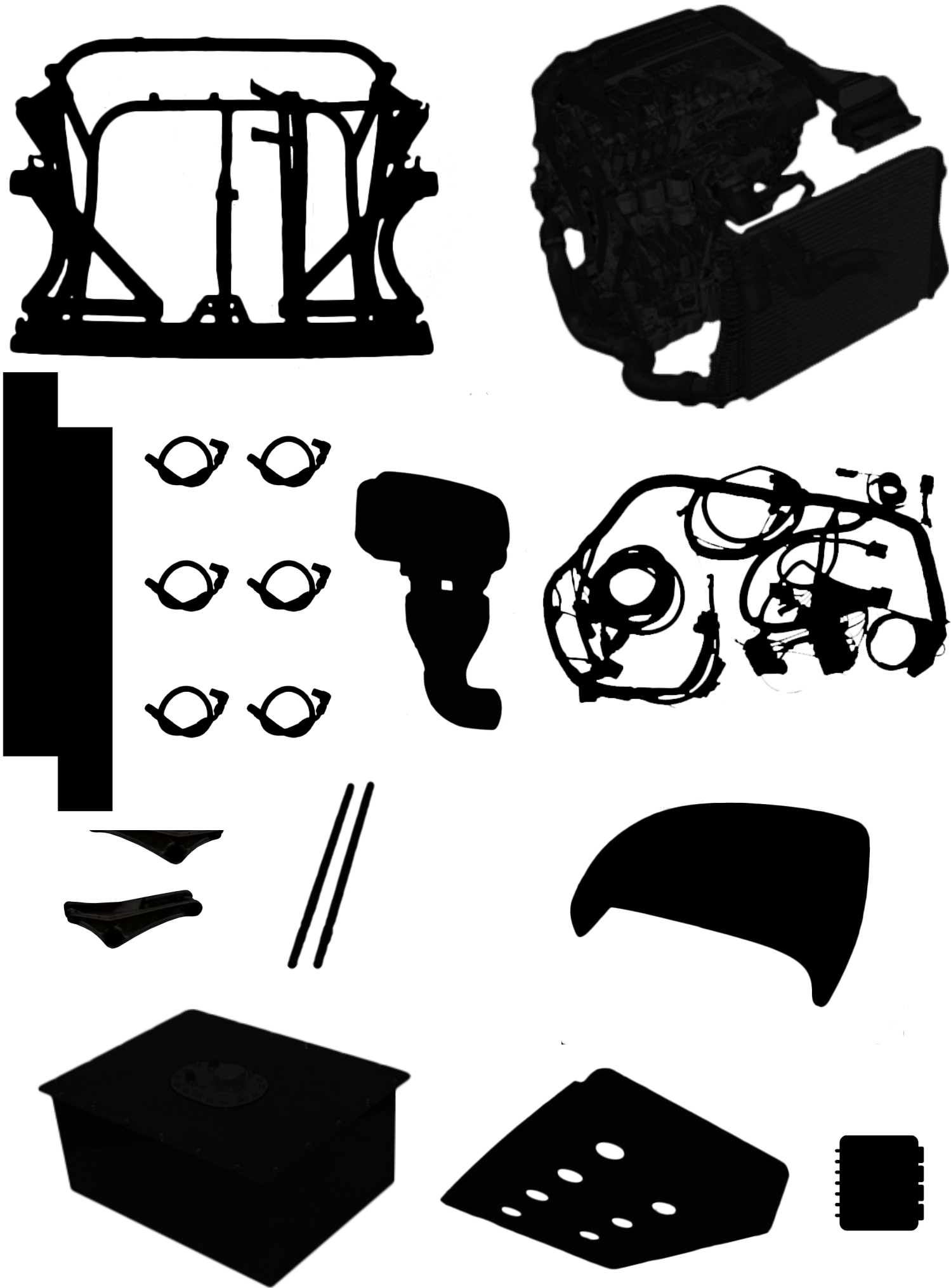
Total Horsepower: 553 hp

Total Torque: 638 ft/lbs

Major drivetrain improvement

*Sourced performance part
Purpose-built equipment





Stage 4*

Dual Engine

Requirements:

Skills:

- Professional mechanical
- Basic bodywork

Tools:

- Professional mechanic's tool set
- Basic bodywork tool set
- Engine hoist

Workers:

- 2-3

Facilities:

- Residential garage

Time:

- 12-16 days

Parts:

- Instruction manual - \$20
- Stage 3 tune Volkswagen 2.0L FSI crate engine - \$12895
 - Chrome moly engine sub-frame - \$200
 - Mounting hardware
- Functional connections
- x2 Billet aluminum rocker - \$50
- x2 Adjustable chrome moly pushrod - \$50
- Steel skid plate - \$50
- Carbon fiber torque tube - \$499.95
- Carbon fiber roof intake cowl - \$589.99
 - Roof cutting template
 - Carbon fiber roof liner intake cowl
 - Mounting hardware
- Jegs 16 gallon fuel cell w/ steel can - \$199.99
 - Mounting hardware
- Edelbrock stainless steel braided fuel lines - \$43.95

Total Cost: \$14680

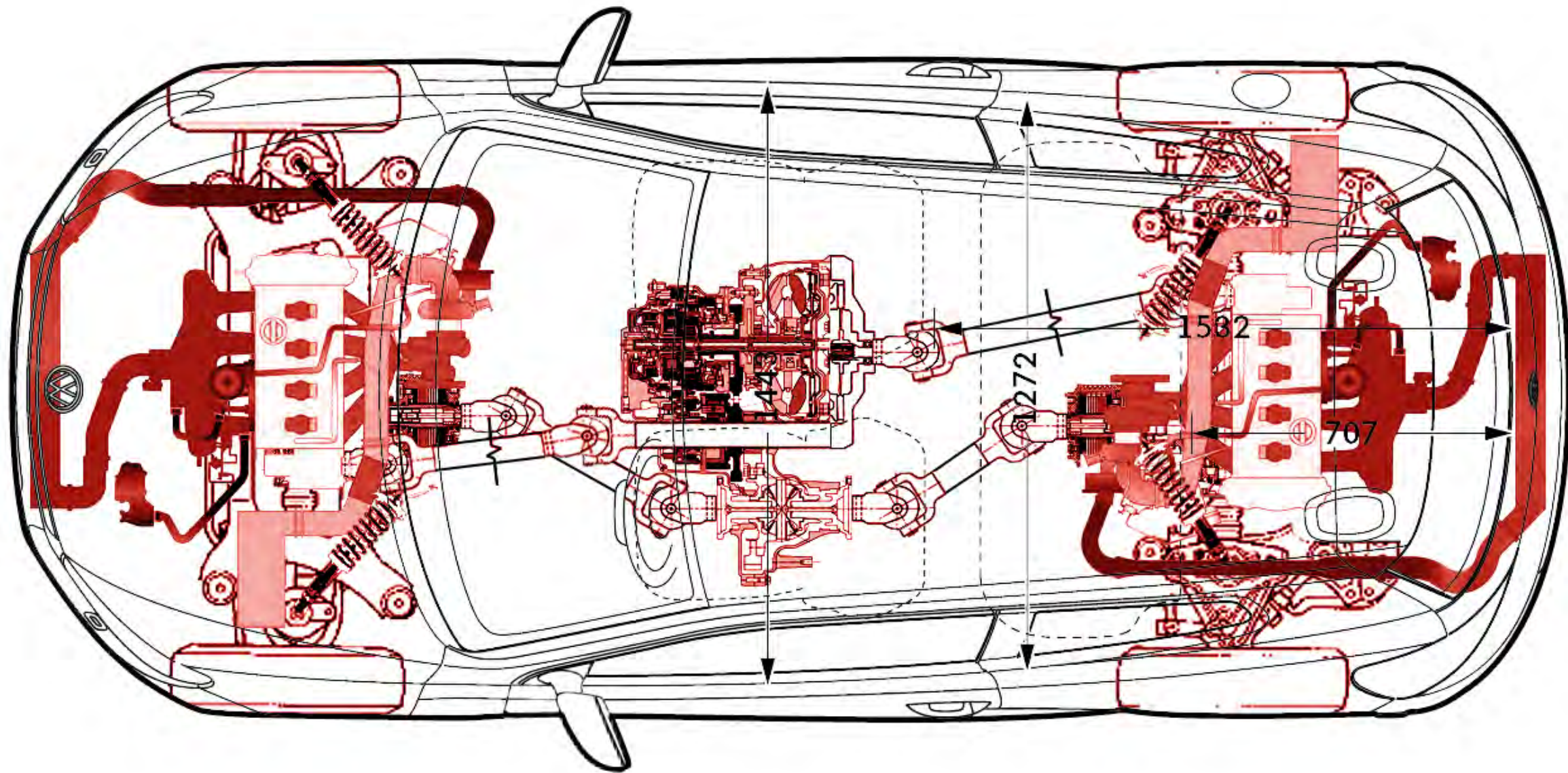
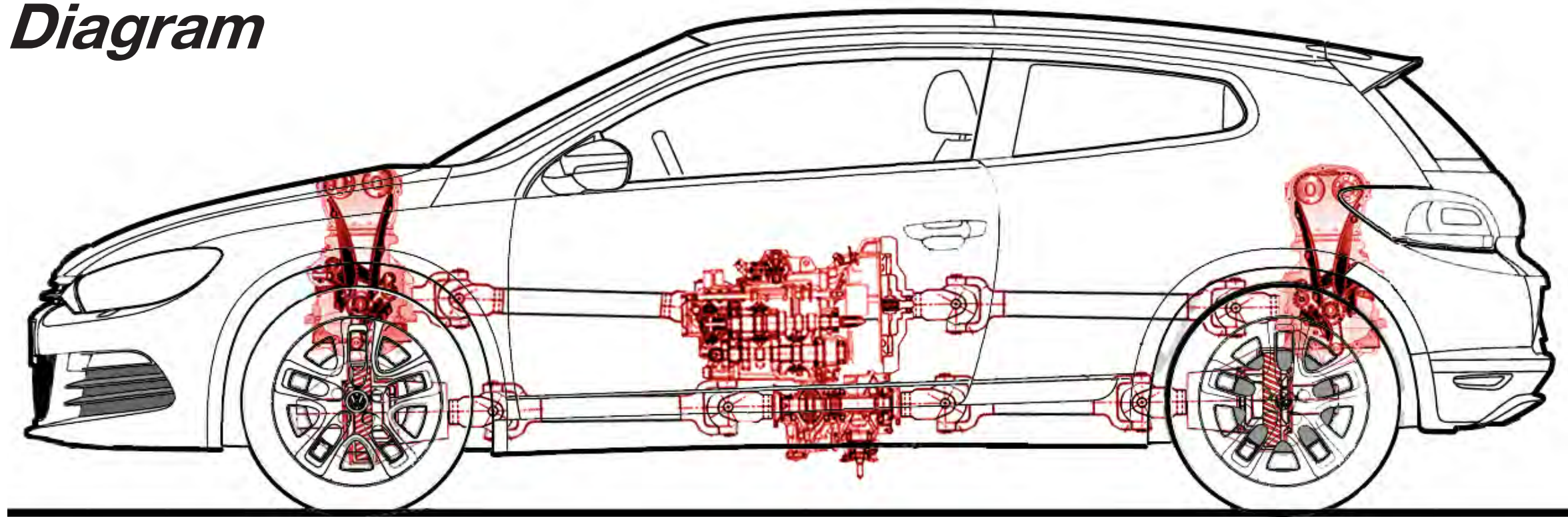
Total Horsepower: 1106 hp

Total Torque: 1276 ft/lbs

*Sourced performance part
Purpose-built equipment



Package Diagram



Description

Additional inline four cylinder engine

- Doubles power output
- Mounted behind rear axle
- Tuned identically to front engine
- Provides 50/50 weight distribution
- Reminiscent of experimental engine swapping/moving of Group B

x2 Turbocharging system

- Upgrade to stock forced induction
- Increases power output and acceleration

x2 Full engine systems upgrade

- Improved exhaust, valvetrain, electronics, internals
- Increases power output

Six-speed manual DSG transaxle

- Mounted midship
- Racing clutch, short throw shifter
- Increases shifting responsiveness
- Maintains 50/50 weight distribution
- Halves weight and complication of two separate transmissions
- Provides center differential for all wheel drive system

Dual input bell housing adapter

- Links both engines to transaxle w/o connecting each other

x2 Carbon fiber torque tube

- Links engine to bell housing adapter w/o increasing weight

x2 Carbon fiber driveshaft

- Links transaxle to differentials w/o increasing weight

4motion all wheel drive differentials

- Completes all wheel drive conversion

Inboard coilover conversion

- Strut tower subframe brace mounts
- Increases rigidity, handling responsiveness
- Protects coilovers from road debris
- Eases ride height adjustment
- Reduces suspension assembly weight
- Reminiscent of Group B experimentation

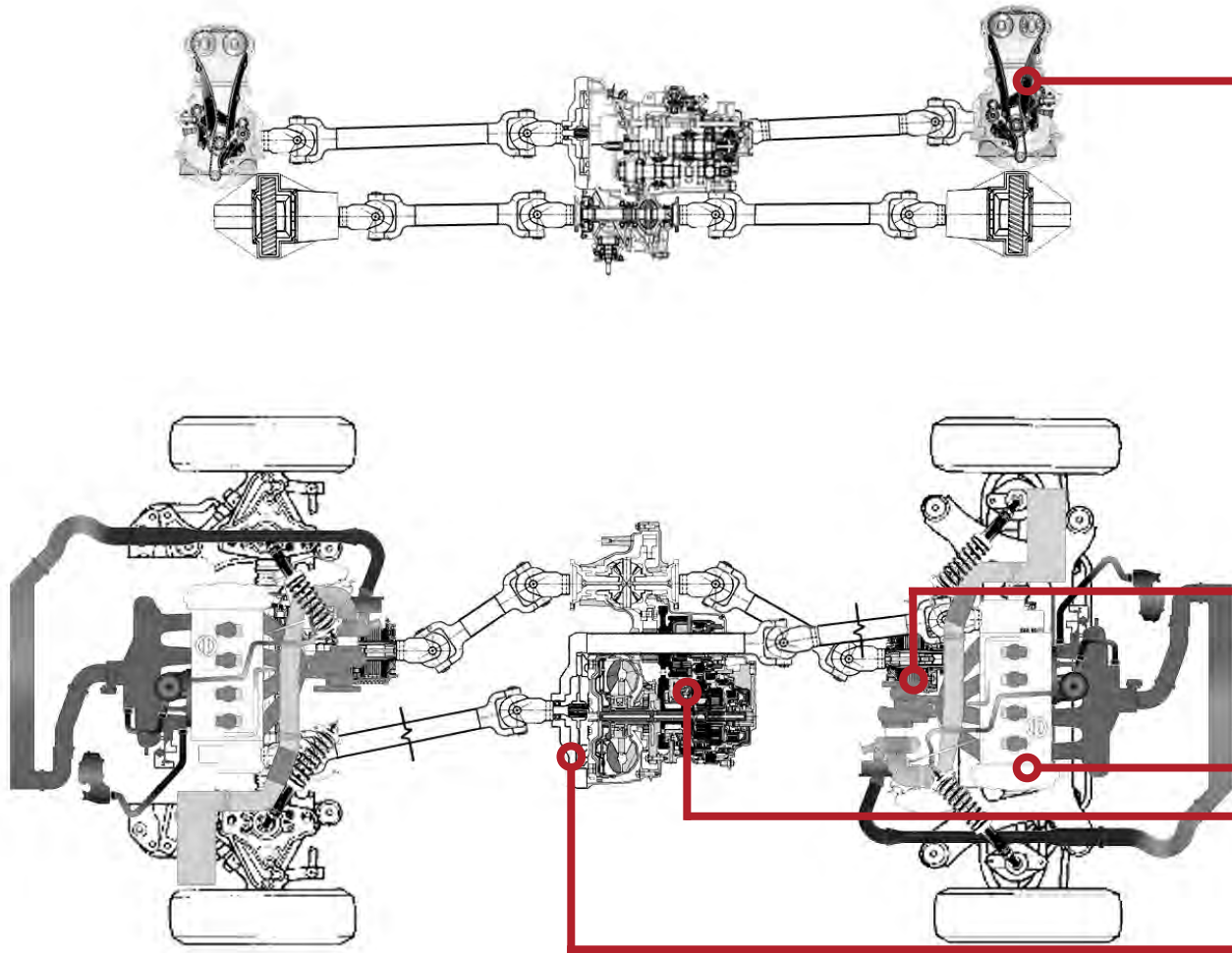
Widebody conversion

- Lowers center of gravity
- Increases contact patch width of tires
- Improves acceleration and handling

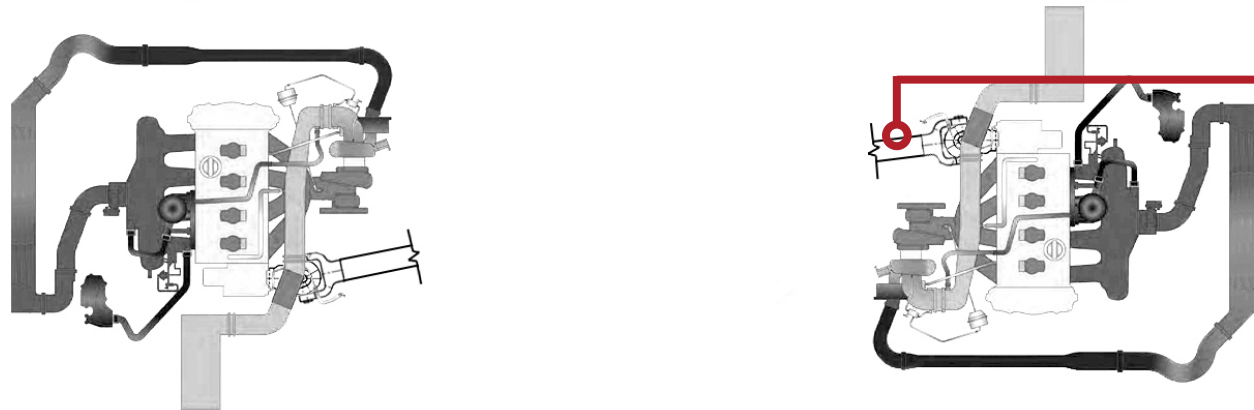
Underpinning system upgrade

- Anti-roll bars, polyurethane bushings, six point roll cage, custom wheels, performance breaks
- Increases rigidity, handling responsiveness

Internals



Powertrain



Drivetrain & Suspension

