



MUNRO



**TESLA
MODEL S PLAID
ELECTRICAL DRIVE MODULE
COST ASSESSMENT**



TESLA MODEL S PLAID ELECTRIC DRIVE MODULE

Purchasers of this **\$35,000 240+ page report** will receive a cost assessment of the Electric Drive Module (EDM). The analysis includes the Front Motor, Rear Motor, Inverter, Front Gear Box and Rear Gear Box.

Report Includes:

- 1) Executive Summary with EDM Side-by-Side Comparison
- 2) Eye-Catching Features
- 3) Quick Cost Estimate Report
- 4) Cooling Diagrams

TESLA MODEL S PLAID EDM DESCRIPTION

- 1,020-horsepower powertrain using three 250kW motors; a single front motor with a differential and dual rear motors with torque vectoring, powered by a 100kWh battery pack with a 396-mile range at 119/112 MPGe city/highway
- The Tesla Model S Plaid front and rear gearboxes have a gear reduction ratio of 7.54:1 from the motor to the driveshaft, decreasing from the 9.00:1 gear ratio seen in the Model Y
- This new motor assembly is capable of 20,000 rpm and provides up to 1,050 lb-ft of torque
- The front motor and both rear motors use identical rotors and stators



1. EXECUTIVE SUMMARY & SIDE-BY-SIDE COMPARISON

- The Executive Summary highlights the purpose and key points of each report including Munro’s observations and cost summaries.
- Side by Side comparisons highlight prominent EVs and their associated specifications, features, integration strategies and other relevant data.

EDM Side-by-Side Comparison

Battery Electric Vehicles (BEV)- Permanent Magnet (PM) Motors

Parameters	MOTOR SPECIFICATIONS						
	Tesla Model 3 (rear)	BMW i3	Chevrolet Bolt	Jaguar I-PACE	Nissan Leaf	Tesla Model Y Rear	Tesla Model S Plaid
Motor Type	PM	PM	PM	PM	PM	PM	PM
Total Motor Weight (kg)	41.45	36.47	33.75	38.83	34.75	45.89	45.1
Total Weight (kg)							
Stack Configuration							
Laminator ODD/In							
Laminator Thickness							
Lamination Count							
Winding Configuration							
Winding Material							
Insulation Config							
Total Weight (kg)							
Stack Configuration							
Laminator ODD/In							
Laminator Thickness							
Lamination Count							
Number of Poles							
Magnet Configuration							
Magnet Material							
Total Magnets							
Total Magnet Weight							

EDM Integration Strategies

Integration Level: 5: Tesla Model S Plaid
 Integration Level: 4: Ford Mustang Mach-E
 Integration Level: 3: Nissan Leaf

Executive Summary

This project report provides a detailed analysis for costing parts and labor associated with the manufacturing and production practices of the Tesla Model S Plaid electric drive motors (EDMs). The purpose of this report is to analyze the design and processes that are required to manufacture the parts and components that make up the EDMs as well as the strategies in place to control and monitor them.

The cost model baseline is established by disassembling the EDMs. The parts are then documented in detail, capturing the assembly operations and weight of components.

A baseline process map is modeled in the Design Profit® software and is used to determine the cost associated with materials and manufacturing processes.

Design strategies, exploded views, fluid circuit diagrams, and dimensional data (mm) of the EDMs are captured and documented.



2. EYE-CATCHING FEATURES

- Munro identifies specific observations of interest called "Eye-Catching Features." These observations can represent advantages or disadvantages in cost, weight, feature content, or performance as related to design, material choice, assembly, or manufacturing process selection.

Eye-Catching Features

Carbon Fiber Rotor Wrap

Eye-Catching Features

Inverter Phase Lead Squib

Eye-Catching Features

Capacitor Bank Potting

Eye-Catching Features

Rear Motor Housing Bearing Surface Finish

Description:

- Carbon fiber rotor magnets
- This design is

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Description:

- All three inverters are located between the two motor housings in the Model Y

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Description:

- Capacitor bank (TIM) in Model Y

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Description:

- Bearing surface on motor housing casting has been machined to achieve a high surface finish

Advantages:

- Improved surface finish of bearing mating surface helps to optimize bearing performance, extending lifespan

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3. QUICK COST ESTIMATES

- The EDM is broken down into systems and components for Quick Cost Estimating (QCE). QCE is Munro's proprietary methodology developed in response to the need for speed-driven results and is quickly gaining popularity. Quick Cost Estimates provide approximate costs in a timely fashion. While less accurate than detailed costing (also available from Munro), QCE allows OEMs and suppliers the ability to make sound comparisons and directional decisions expeditiously.

Douglas Richman - EPA Peer Reviewer from Kaiser Aluminum

"Munro is recognized as being technically competent, highly experienced, knowledgeable and creative in benchmarking and lean engineering of automotive and non-automotive systems. Costing models are thorough covering all elements of total production cost."

LH Differential Housing



System	Zone 4: Powertrain & Battery Pack
Parent	Gear Box - Front
Part	LH Differential Housing
Material	Aluminum Alloy
Parts	1
Fasteners	0
Total Weight (kg)	7.33
Material Cost**	
Process Cost	
OEM Asm Cost	
Supplier Asm Cost	
SG&A and Profit	
Total Cost*	
Total Quantity	
Product Total Cost*	

* Excluding tooling, SFA&G, and logistics
** Includes material cost and purchased parts cost

Rotor Asm



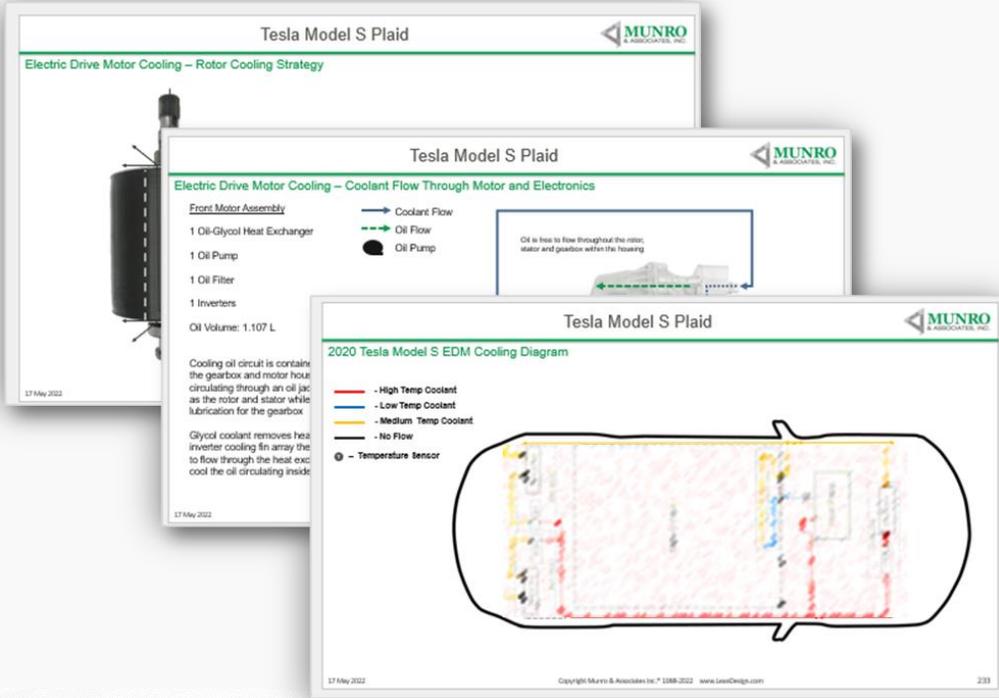
System	Zone 4: Powertrain & Battery Pack
Parent	RH Motor Stator Housing Asm
Part	Rotor Asm
Material	Multiple
Parts	
Fasteners	
Total Weight (kg)	
Material Cost**	
Process Cost	
OEM Asm Cost	
Supplier Asm Cost	
SG&A and Profit	
Total Cost*	
Total Quantity	
Product Total Cost*	

* Excluding tooling, SFA&G, and logistics
** Includes material cost and purchased parts cost



4. COOLING DIAGRAMS

- This report outlines the cooling lines and connections for coolant and refrigeration fluids. Both the heating and cooling circuits are illustrated





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- The large reports feature a linked table of contents, allowing users to easily navigate the report contents and quickly locate specific data.



FREQUENTLY ASKED QUESTIONS

- **Were any OEMs involved in the study?**

No. Neither Tesla nor any supplier's quoted costs were used in this study.

- **Is there any Tesla proprietary information in this report?**

No. All data was developed through Munro's proven methodologies, obtained by analyzing Munro's purchased production-version Model S Plaid..

- **Are the components costed using country specific costing centers?**

Yes. Munro uses country-specific labor rates and working patterns, factory floor costs, utility rates, and loan interest rates.

- **Is this a Costing or Pricing report?**

This is a Costing Report. Pricing has too many variables.

- **How can I receive more details on the contents of the reports?**

Questions regarding report contents should be sent to sales@leandesign.com. Munro will respond with clarification, and if necessary, meet virtually to discuss and review. Complex and/or detailed requests may require additional consulting fees.

- **Are Sample reports available?**

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Note: Some data may be redacted.