



## 2019 Mazda MX-5 Miata Media Introduction



mazda



**DAVE COLEMAN**

Manager, Vehicle Dynamics

Mazda R&D

Mazda North American Operations

**Engineering**

# 29 Years, 1 Goal

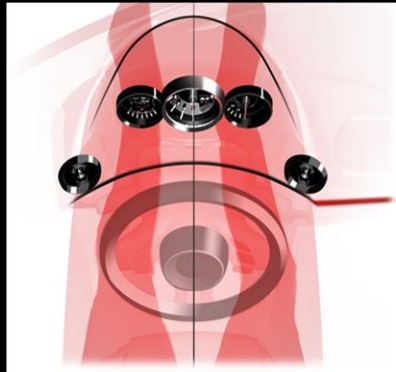
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Fun to drive at all skill levels, from Grandmas to Grand Prix drivers.

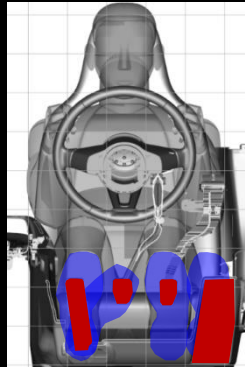
- Front engine, Rear drive
- Light weight, low inertia and modest power
- An easily removable roof
- Compliant suspension and double wishbones

# Driver-centered everything

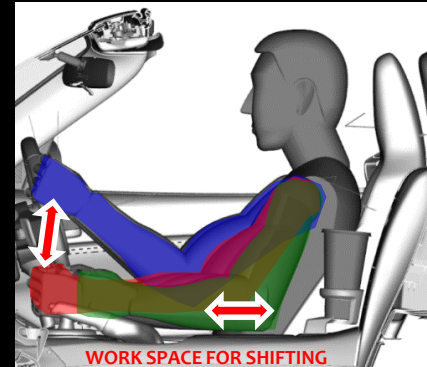
Driving position was #1 priority.  
All other packaging constraints followed.



**SYMMETRICAL LAYOUT**



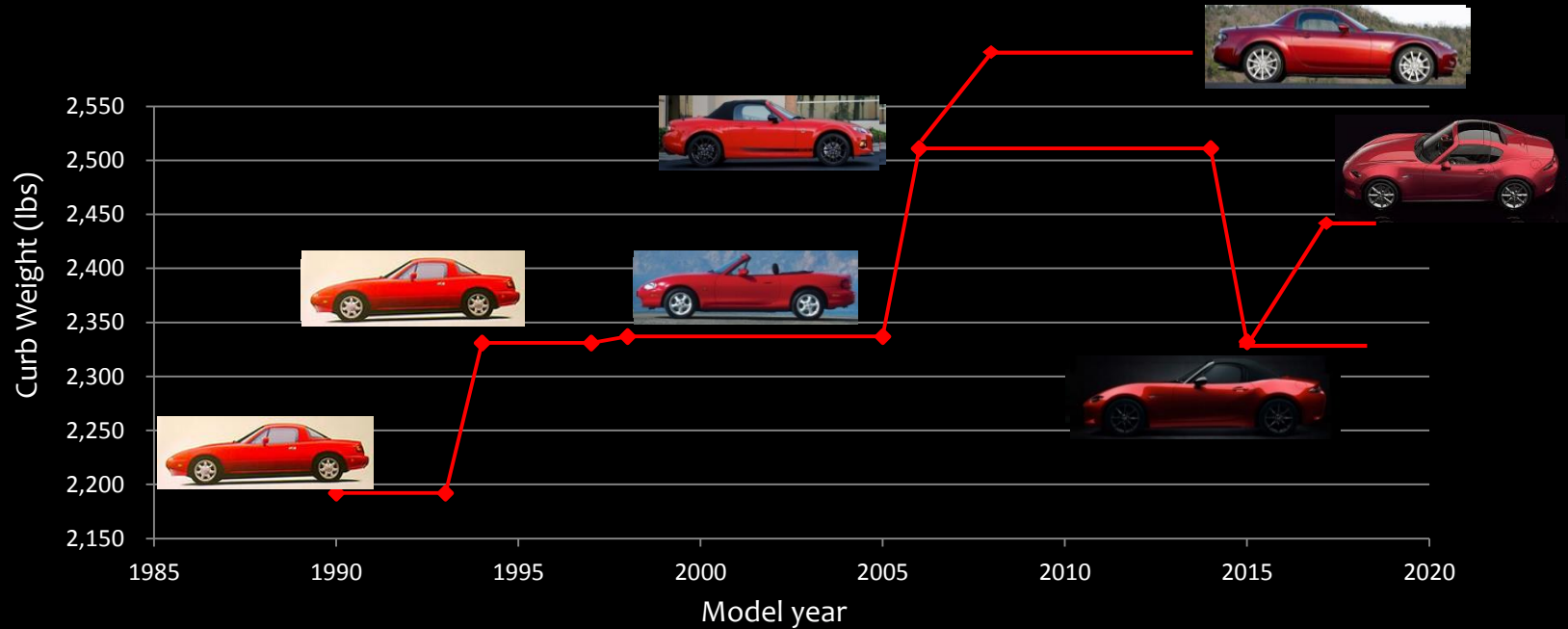
**IDEAL PEDAL POSITION**



**IDEAL LAYOUT OF SHIFTER**

LET'S REMEMBER THE ND MX-5 CONCEPT

# Weight is the enemy





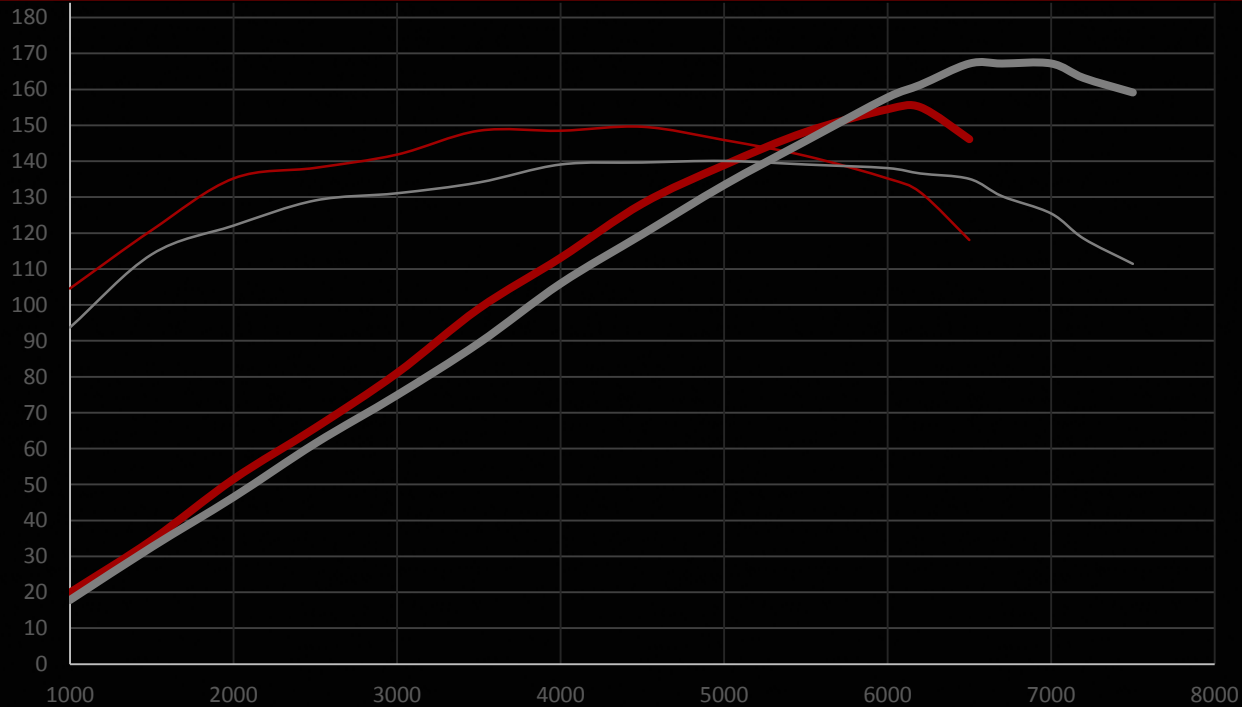
NC: 167HP@7000 RPM

ND1: 155HP@6000 RPM

140LB-FT@5000 RPM

148LB-FT@4600 RPM

# Flexible power delivery



NC: 167HP@7000 RPM

140LB-FT@5000 RPM

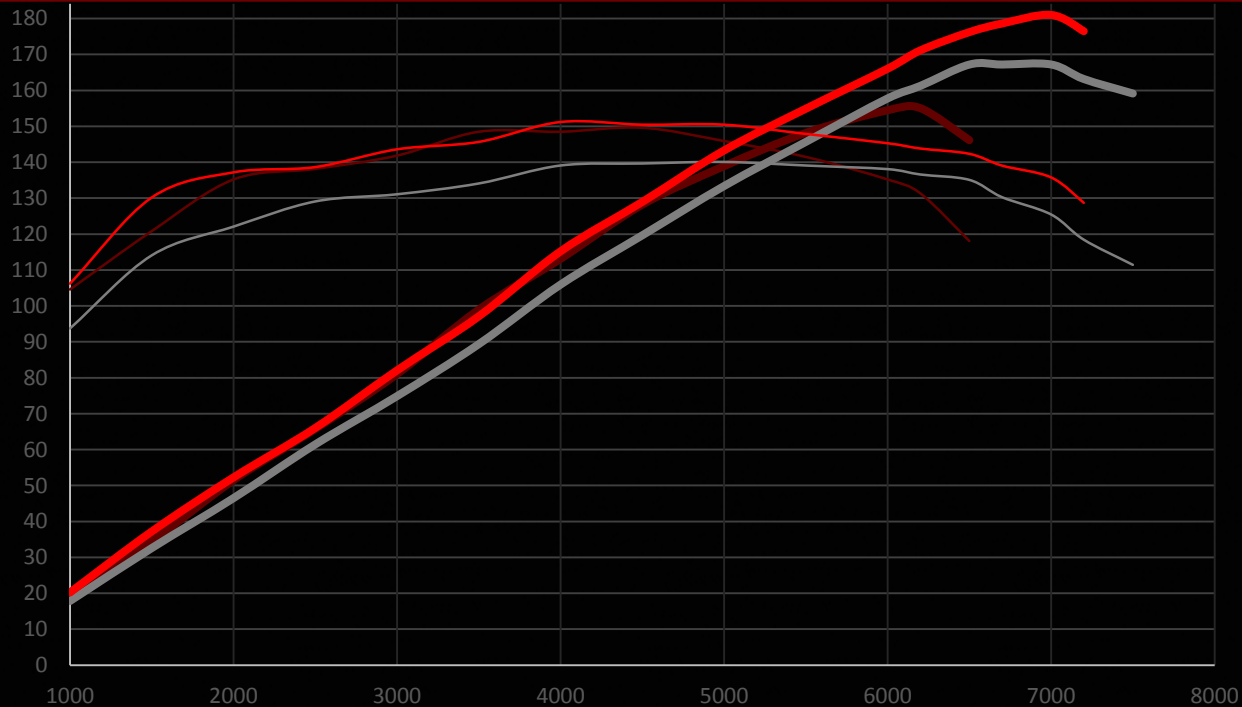
ND1: 155HP@6000 RPM

148LB-FT@4600 RPM

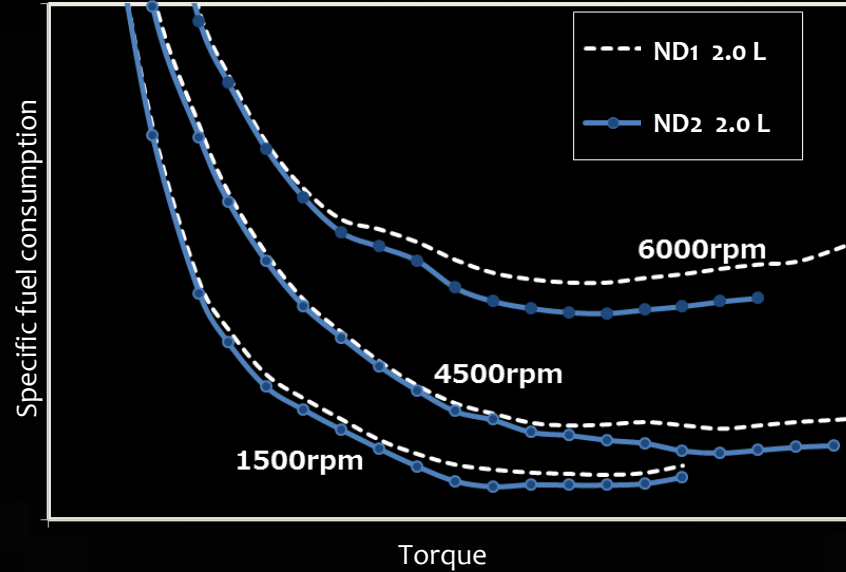
ND2: 181HP@7000 RPM

151LB-FT@4000 RPM

# Flexible power delivery and more revs



# Better fuel economy too





# How? Get more air in.

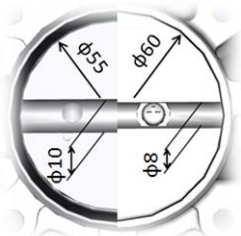
Larger throttle body (28% larger area)

Shorter, multi-path intake manifold

Larger intake ports

Larger intake valves (18% larger area)

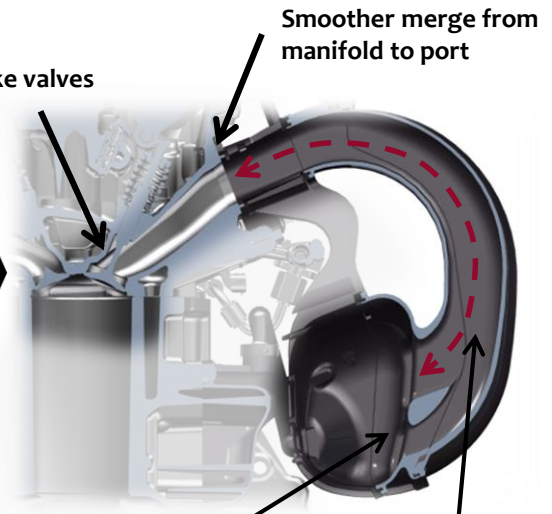
**Throttle plate:**  
5mm larger diameter  
2mm smaller shaft  
28% more flow area



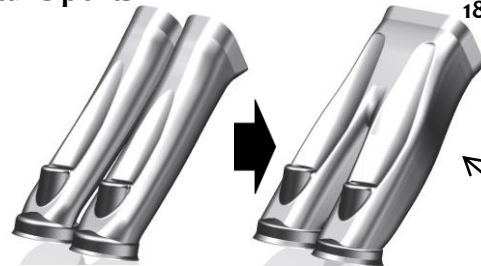
**Intake manifold**



Larger intake valves



**Intake ports:**



Port area:  
18% larger

Less surface area means  
less heat transfer to intake air  
and better knock resistance

independent ports

common ports

# How? Get more air out

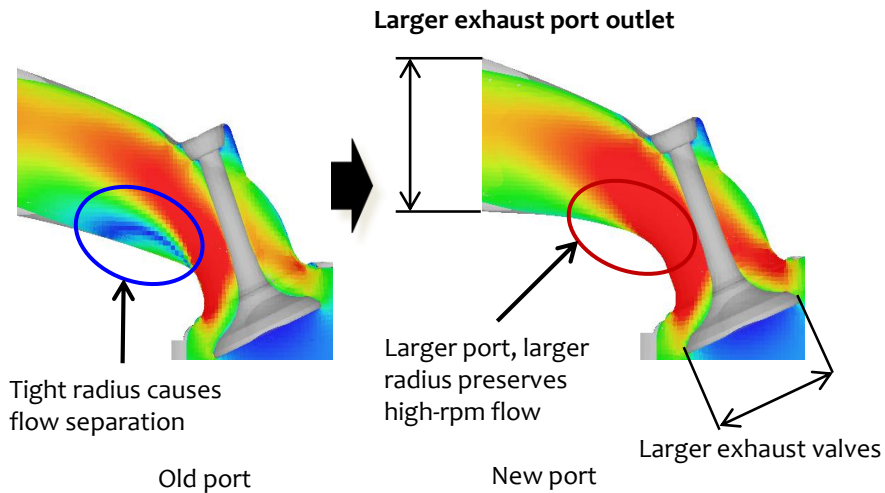
Larger exhaust ports

High-flow exhaust manifold and muffler

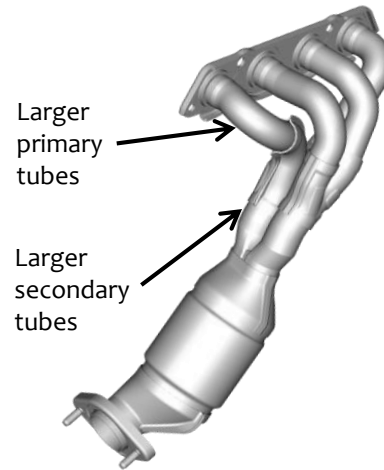
Larger exhaust valves

Higher lift, longer duration exhaust cam

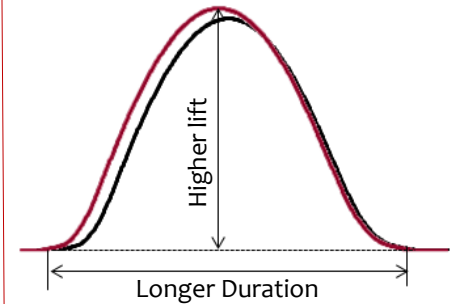
## Exhaust port



## Exhaust manifold



## Exhaust camshaft



# How? Lighter rotating assembly

Lighter pistons

Stiffer, better balanced crankshaft

Lighter connecting rods

## Pistons



Smaller skirts, less surface area, 27g weight reduction



## Crankshaft



Stiffer crank material, better balance through optimized counterweight shape



## Connecting Rod



Stronger bolt material allows smaller, lighter rod bolts.

Total weight reduction: 40g

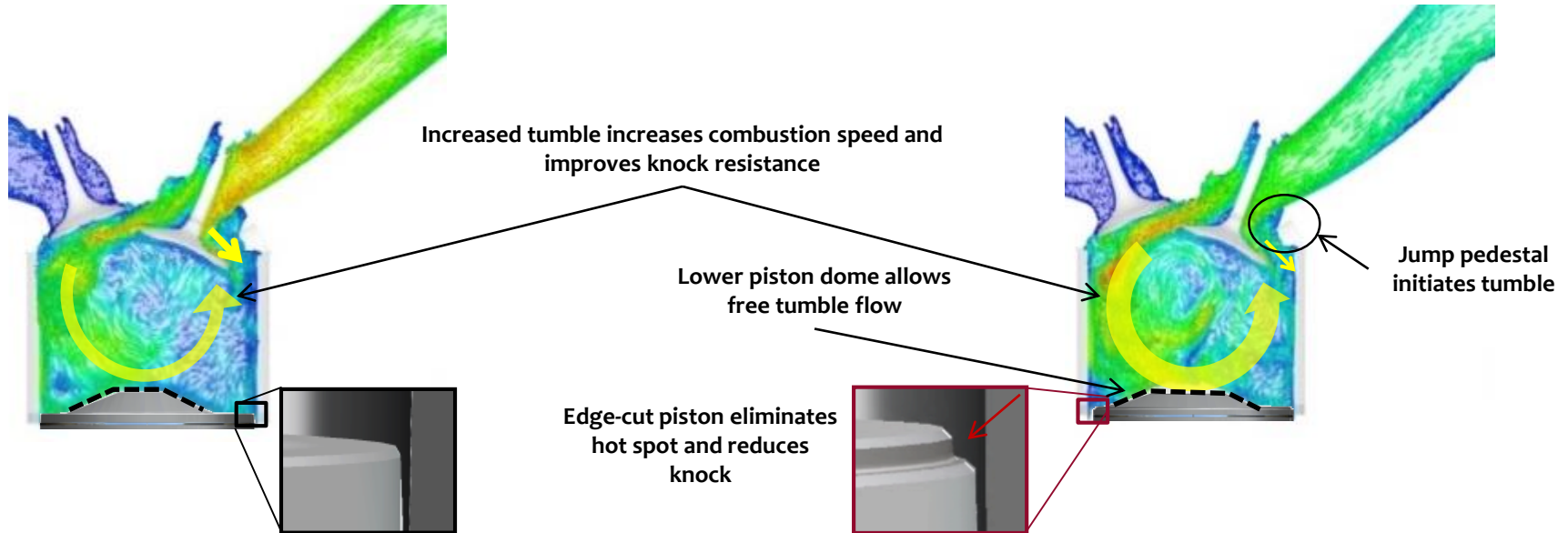


# How? More efficient combustion

Tumble flow increased for faster combustion

Edge-cut pistons improve knock resistance

## Combustion dynamics



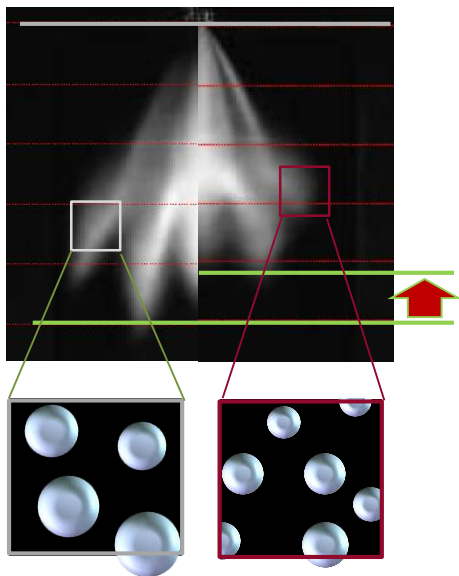
# How? More efficient combustion

Higher-pressure injection with better atomization

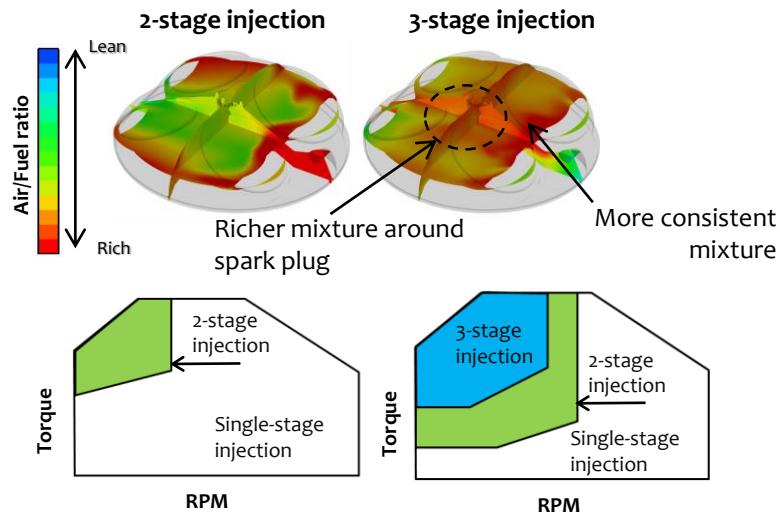
Multi-injection stratified charge strategy

## Fuel delivery

Finer atomization.  
Shorter spray plume,  
less heat loss to surface



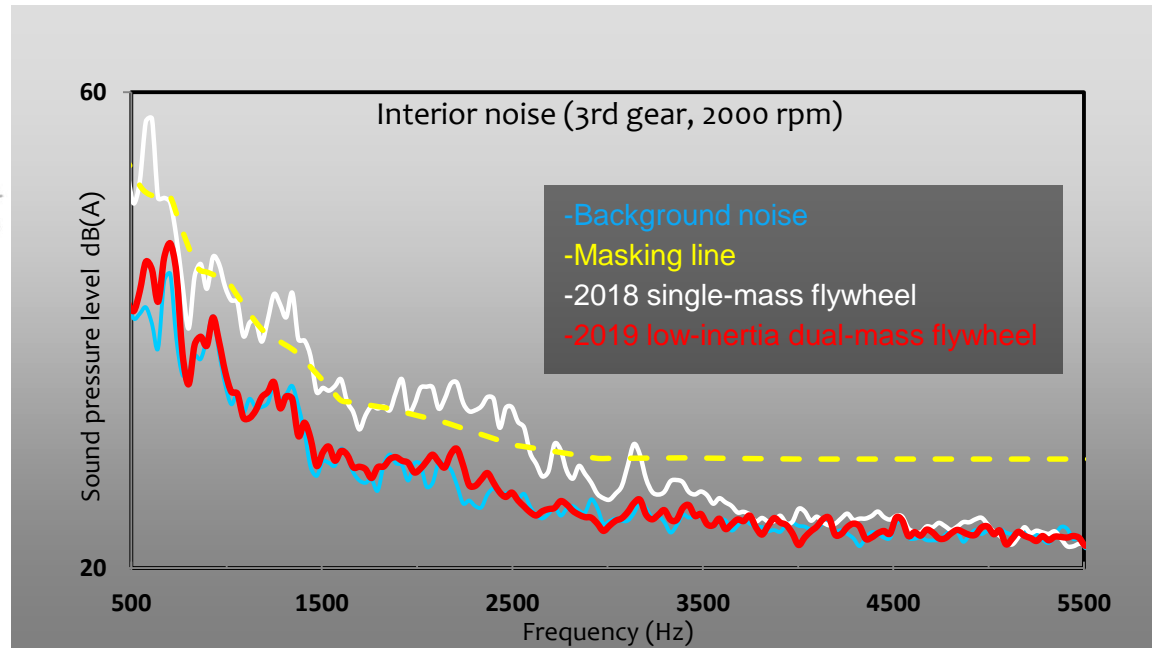
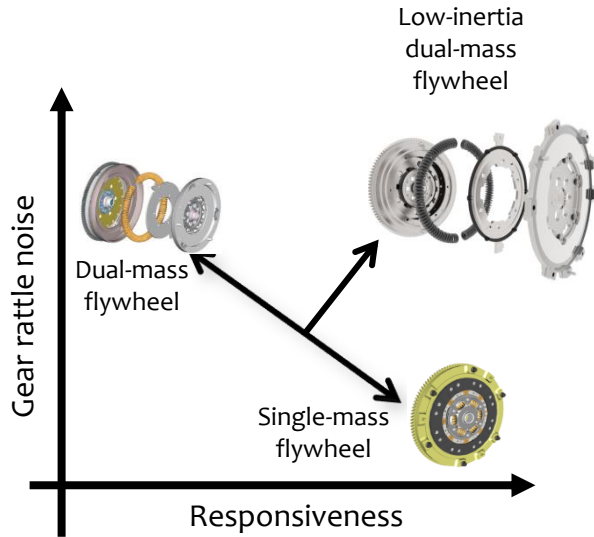
## Injection strategy



# Lightweight dual-mass flywheel

Dual-mass flywheel prevents gear backlash noise

Low-inertia design has same responsiveness as original single-mass flywheel

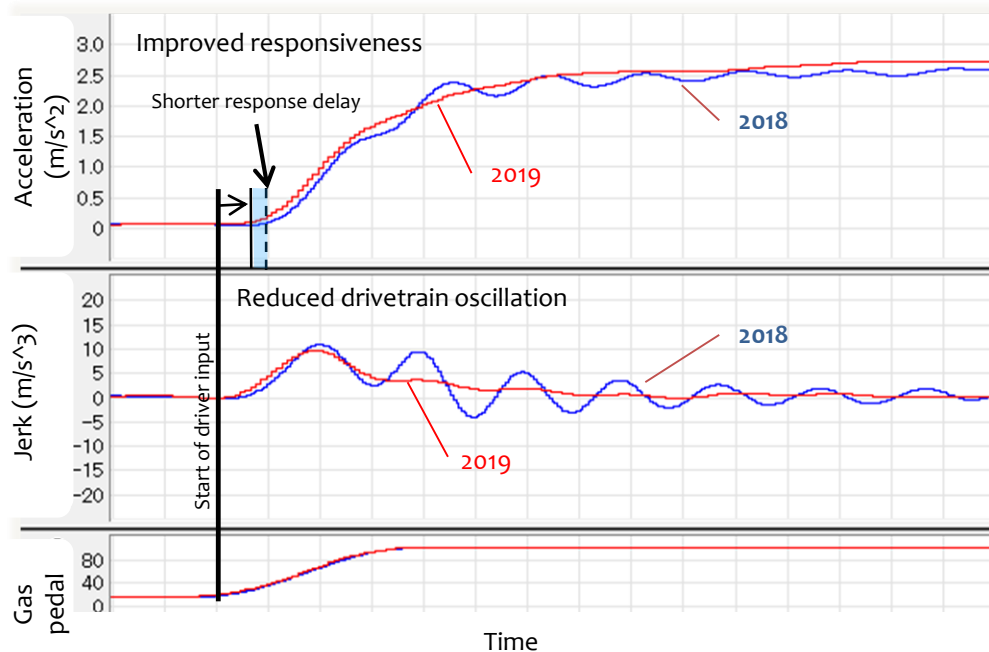


# Quicker, smoother throttle response

New calibration for more linear response.

Active cancellation of drivetrain oscillation.

Shorter initial response delay.

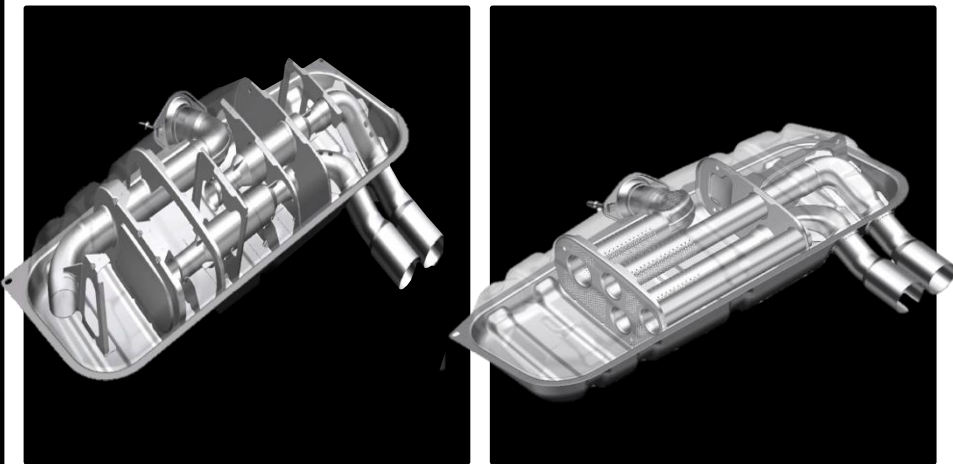




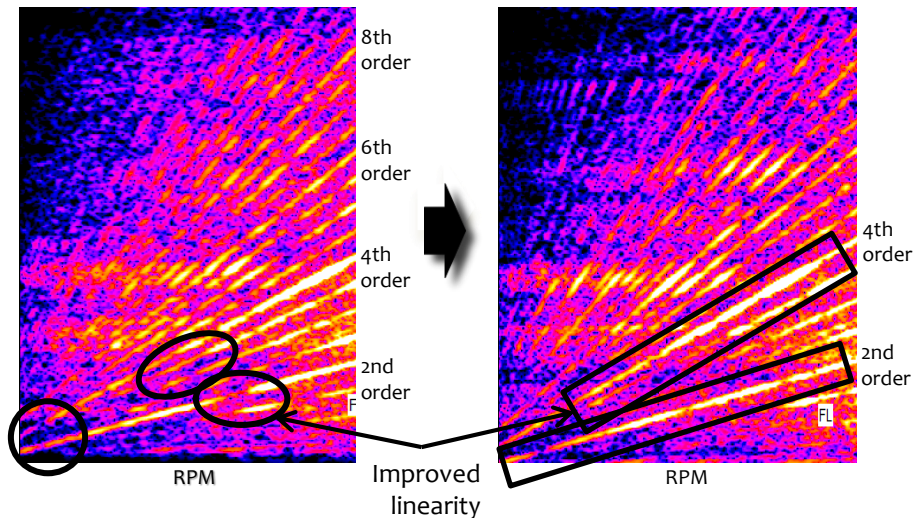
# Smooth, powerful, linear exhaust sound

Internal structure of muffler was changed to give more linear 2<sup>nd</sup> and 4<sup>th</sup> order sound and absorb sound above 800 Hz.

Internal structure of silencer

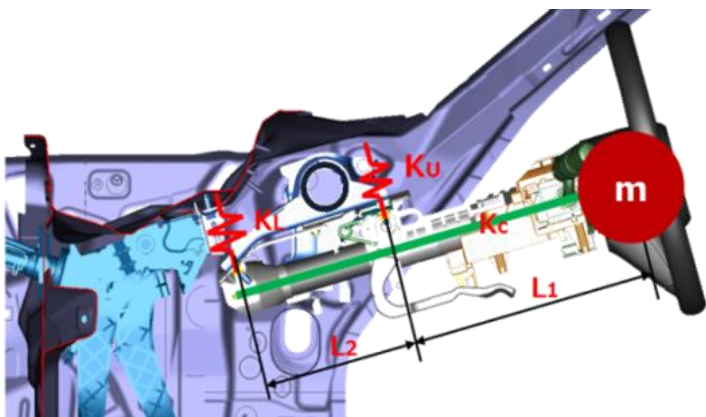


Interior sound at WOT acceleration

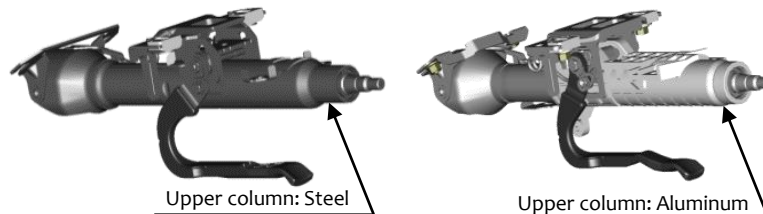


# Telescoping steering wheel

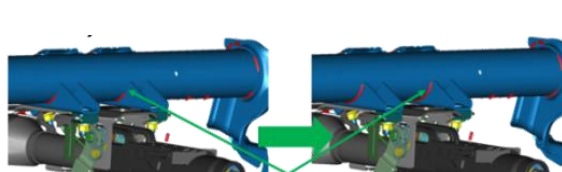
Originally left off to save weight, strong demand for telescoping wheel led to extensive design analysis to add the feature with minimum weight impact. Total weight gain: 203g (0.45lb).



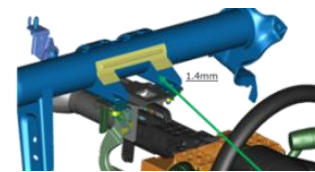
Adding a mid-column joint lowers the natural frequency, requiring stiffening countermeasures to prevent steering column shake.



Thicker aluminum housing +20g



Longer welds on column mount +8g



Reinforcement plate on column mount +55g

Total of 8 countermeasures employed to re-gain column stiffness

# Any way you want it

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2016, when life was simple



**MX-5 Sport**  
Affordable roadster



**MX-5 Club**  
Focused sports car



**MX-5 GT**  
Luxury sports car

# Any way you want it

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2016, when life was simple



**MX-5 Sport**  
Affordable roadster



**MX-5 Club**  
Focused sports car

Oh, optional BBS wheels  
& Brembo brakes...



**MX-5 GT**  
Luxury sports car

# Any way you want it

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2017



**MX-5 Sport**  
Affordable roadster



**MX-5 Club**  
Focused sports car  
And optional BBS wheels  
& Brembo brakes...



**MX-5 RF Club**  
Focused sports car with a cool roof...  
And optional BBS wheels  
& Brembo brakes...



**MX-5 GT**  
Luxury sports car



**MX-5 RF GT**  
Luxury sports car with a cool roof...

# Any way you want it

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2018



## **MX-5 Sport**

Affordable roadster

But you probably want Mazda Connect at least...



## **MX-5 Club**

Optional BBS, Brembo, leather package.

Optional BBS, Brembo, Recaro package



## **MX-5 RF Club**

Optional BBS, Brembo, leather package.



## **MX-5 GT**

Luxury sports car

How about a red top?



## **MX-5 RF GT**

Luxury sports car with a cool roof...

# Any way you want it



**MX-5 Sport**  
Black wheels

2019



**MX-5 Club**  
Optional BBS, Brembo, leather package.  
Optional BBS, Brembo, Recaro package



**MX-5 RF Club**  
Optional BBS, Brembo, leather package.  
Optional BBS, Brembo, Recaro package and a black top.



**MX-5 GT**  
Optional brown top



**MX-5 RF GT**



**MX-5 GT-S**  
GT trimmings with the Club's LSD and Bilstein suspension  
Optional brown top



**MX-5 RF GT-S**  
GT trimmings with the Club's LSD and Bilstein suspension and a black top



# What changed

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## All:

- New high-rev engine
- Telescoping steering wheel
- Rearview camera

## AT models:

- Final drive shortened from 3.454 to 3.583

## GT:

- New GT-S package with LSD
- New Traffic Sign Recognition (TSR)
- New brown cloth top available
- Smart City Brake Support (SCBS) standard

## Club:

- Wheel color changed to Black Metallic
- Available SCBS, Lane Departure Warning System (LDWS)

## Sport:

- Wheel color changed to Black Metallic
- Available SCBS, LDWS, Blind Spot Monitoring w/Rear Cross-Traffic Alert



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Thank You