

10th DHC meeting

WLTC Validation phase 1

Main results by IFA



Institute for Powertrains
& Automotive Technology

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Institute for Powertrains & Automotive Technology

View point of testing

☐ Drivability

- Influence of the speed-tolerance on the mode traceability (energy rating)
 - The drivers had not the order to follow the target-speed as exactly as possible.
- Smooth throttle operation
- Appropriate shift points
 - Japan proposal
 - Steven proposal

☐ Emission

- Not part of this presentation

Tested Vehicles

Vehicle No.	A	B	C
Vehicle category	Passenger car	Passenger car	Passenger car
Manufacture	VW	VW	VW
Model name	Golf V	Polo GTI	Polo Blue Motion
Fuel type	Gasoline	Gasoline	Diesel
Engine displacement <cm ³ >	1.595	1.390	1.299
Max. rated power <kW/min ⁻¹ >	75/5.600	132/4.400	55/4.200
Vehicle test mass <kg>	1.369	1.369	1.096
Aftertreatment	TWC	TWC	OC, DPF
Emission standard	Euro 4	Euro 5	Euro 5
Transmission	5MT	AT	5MT

Chassis Dynamometer

<input type="checkbox"/> Drive System	4WD, single roller
<input type="checkbox"/> Manufacture	Schenck / Kristl&Seibt
<input type="checkbox"/> Rated power (absorption, drive)	90 kW
<input type="checkbox"/> Temperature	-32°C bis +50°C
<input type="checkbox"/> Cooling power	100 kW
<input type="checkbox"/> Air circulation	80.000 m³/h
<input type="checkbox"/> Max. Speed	160 km/h
<input type="checkbox"/> Inertia range	600-3.500 kg
<input type="checkbox"/> Inertia system	Electric inertia compensation
<input type="checkbox"/> Roller Material & surface	Iron & sprayed surface
<input type="checkbox"/> Roller diameter	1,2 m



Tests

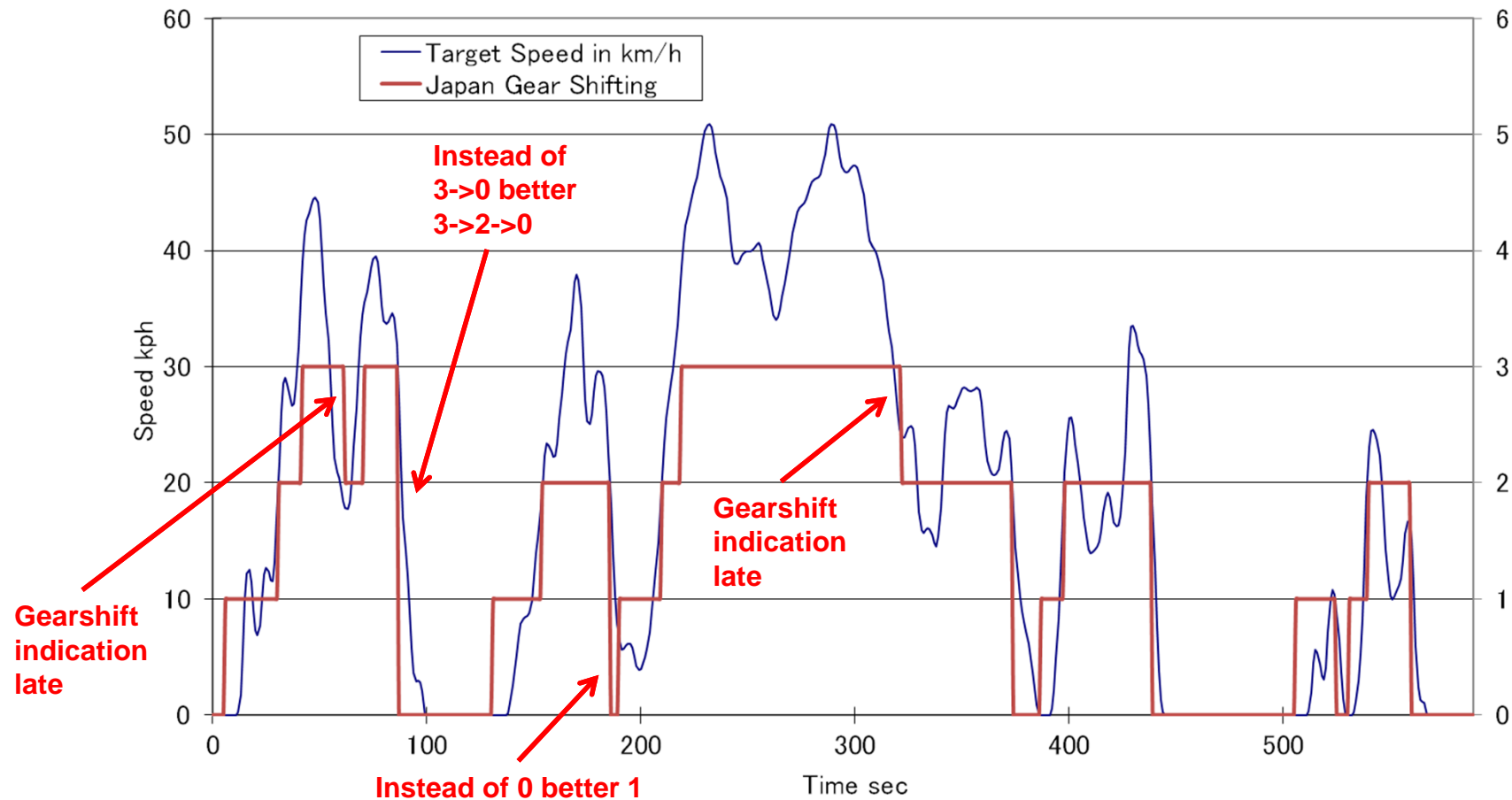
Vehicle	Gear Shift	Driver	Vehicle Conditions	Test series #	
A	Japan	1	Cold	1	
				2	
	3				
	1				
	Steven		Hot	1	
				2	
	3				
	4				
Japan	Hot	1			
		2			
3					
4					
Steven		1			
B	AT	1	Cold	1	
		2		2	
		1		1	
		2		2	
		1	Hot	1	
		2		2	
		1		1	
		2		2	
C	Japan	2	Cold	3	
				1	
	Steven			Hot	1
					2
	Japan		Hot		3
					1
	Steven			Hot	2
					2

Observations, vehicle A, Japan shifting Low-Phase

- ❑ Could follow the target speed
- ❑ Gear shifting remarks see below

Steven shifting:

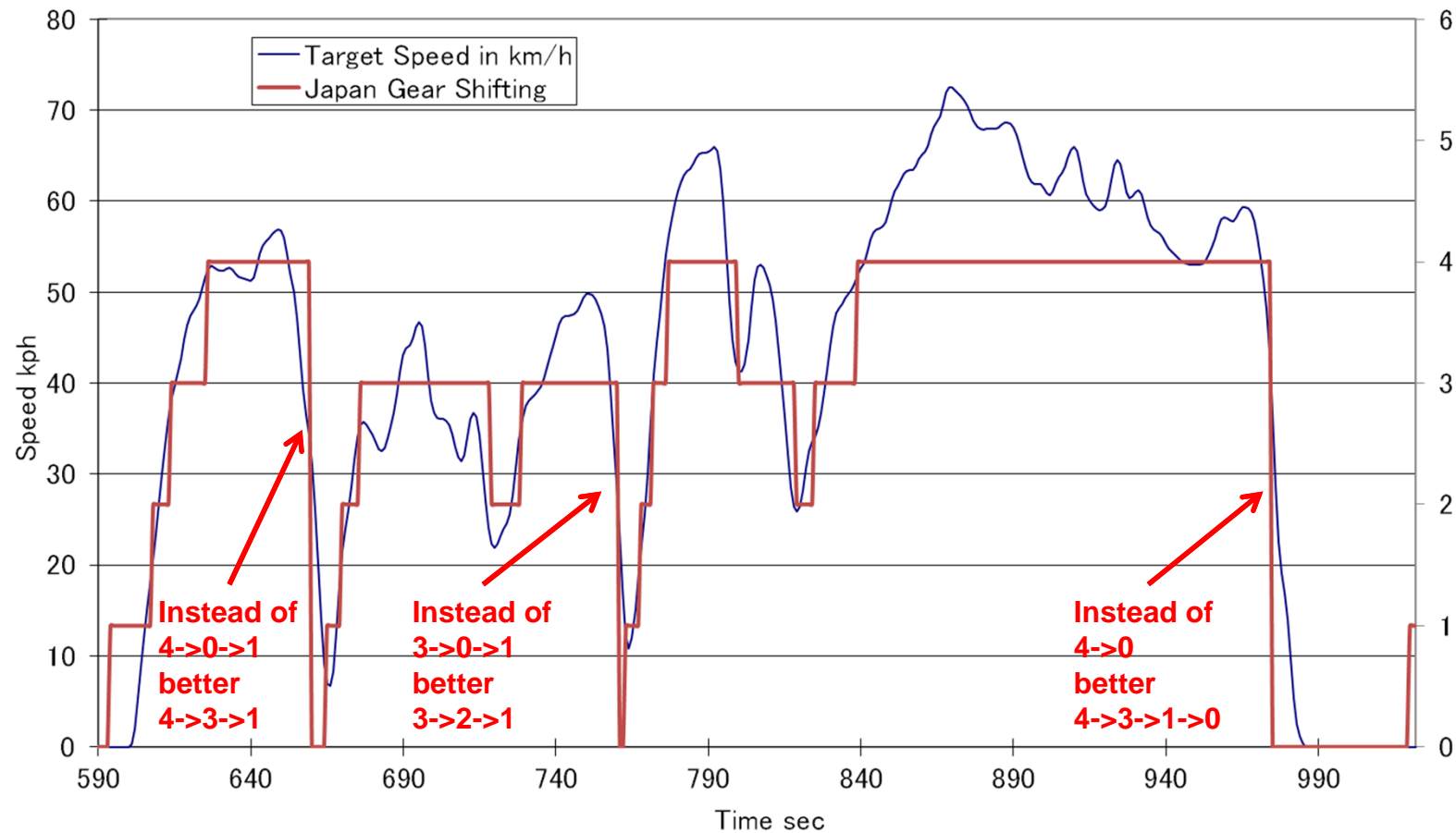
338-342s: 2->1->2 better only 2
422-426s: 2->1->2 better only 2



Observations, vehicle A, Japan shifting Middle-Phase

- ☐ Could follow the target speed
- ☐ Gear shifting remarks see below

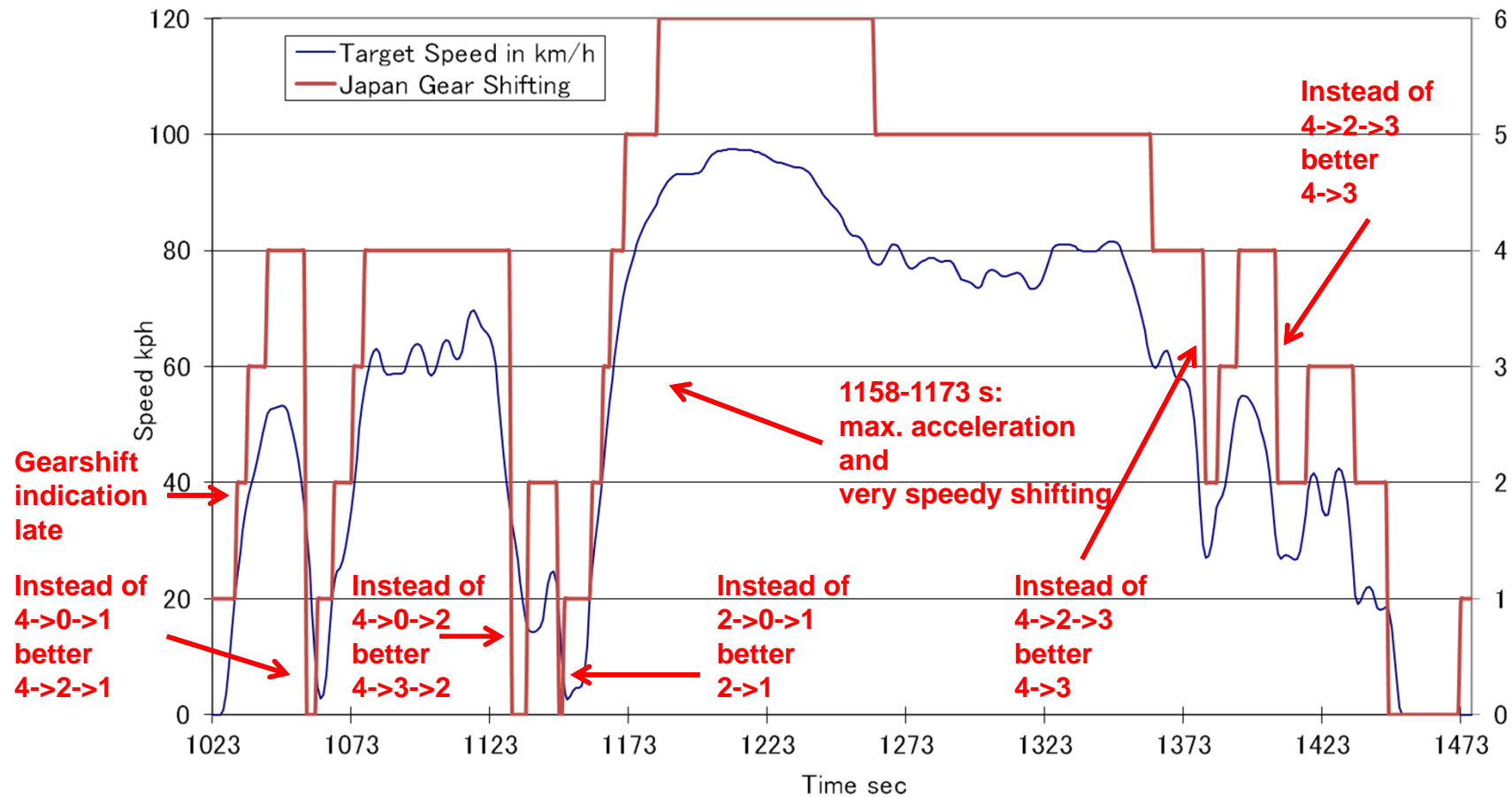
Steven shifting:
No remarks



Observations, vehicle A, Japan shifting High-Phase

- ☐ Could follow the target speed
- ☐ Gear shifting remarks see below

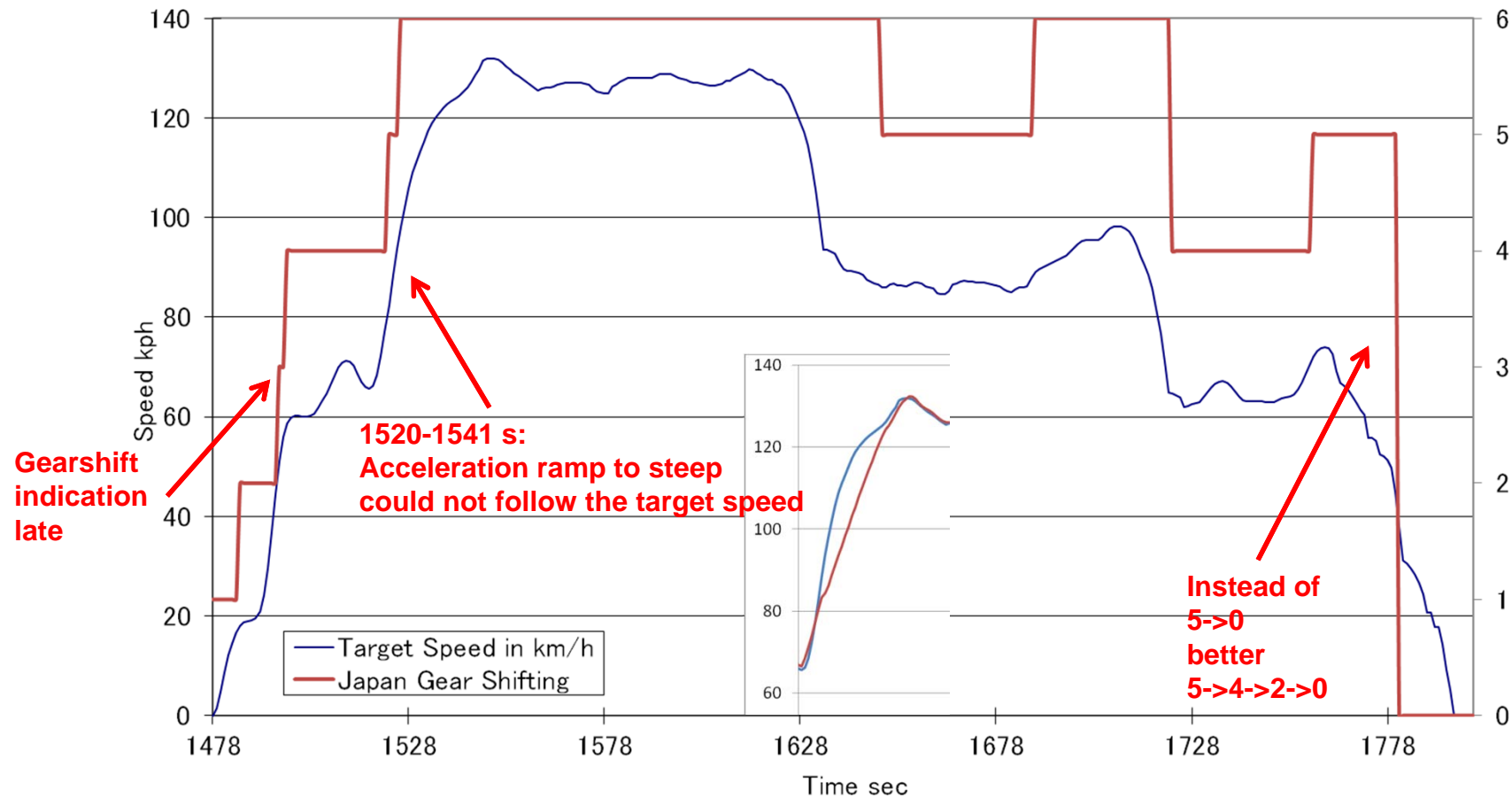
Steven shifting:
No remarks



Observations, vehicle A, Japan shifting Ex-High-Phase

- ☐ Could not follow the target speed
- ☐ Gear shifting remarks see below

Steven shifting:
No remarks



Observations, vehicle A, Japan shifting

Summary

- ☐ Could follow the target speed at high phase with max. acceleration
- ☐ Could not follow the target speed at Ex-high phase
- ☐ 2nd gear is used for very (partly too) low speed (clutch operation)
- ☐ Some remarks for more “realistic” gear shifting

Observations, vehicle B, Japan shifting

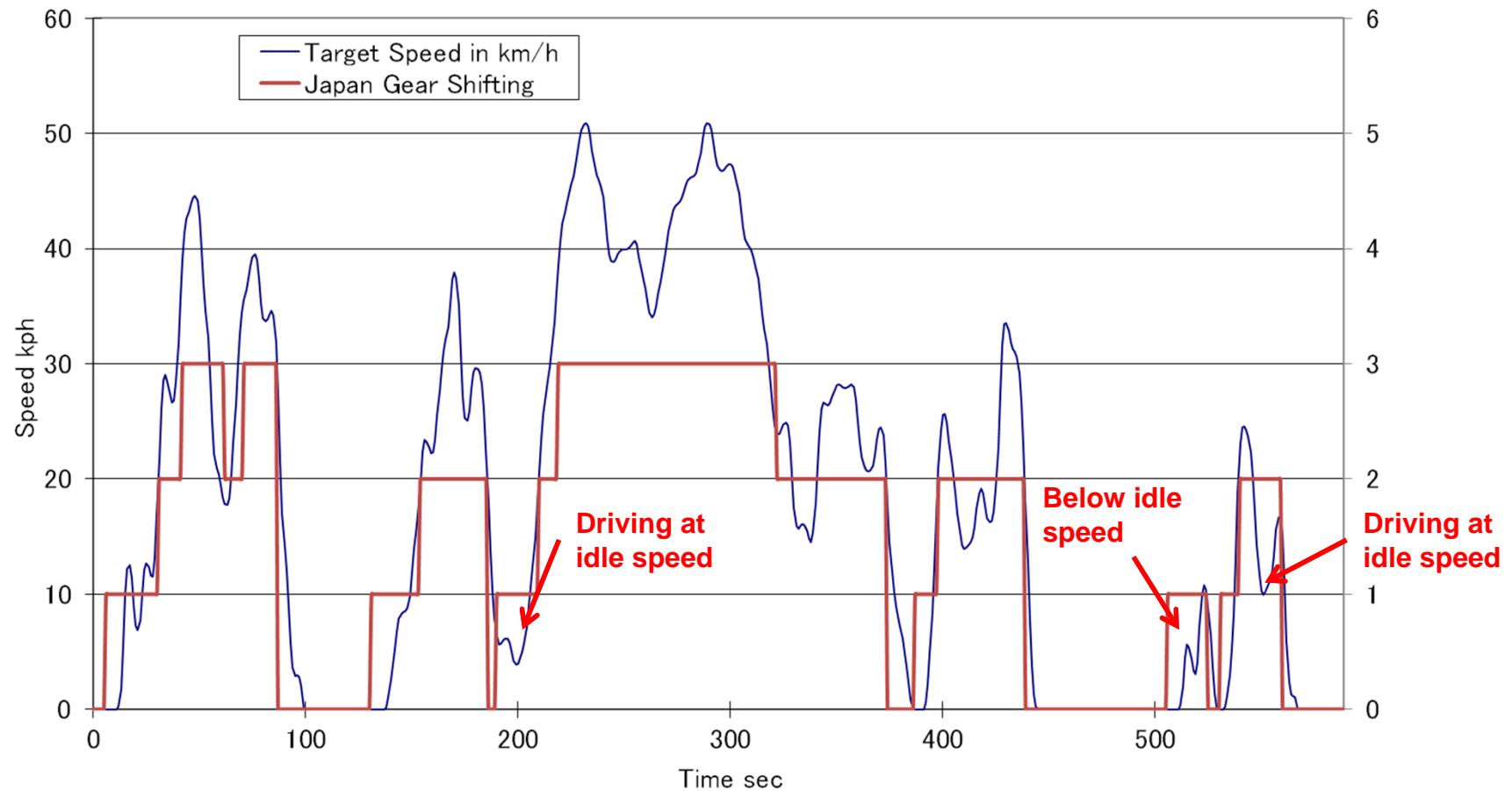
Summary

- ☐ Could follow the target speed at all phases

Observations, vehicle C, Japan shifting Low-Phase

- ☐ Could follow the target speed
- ☐ Gear shifting remarks see below

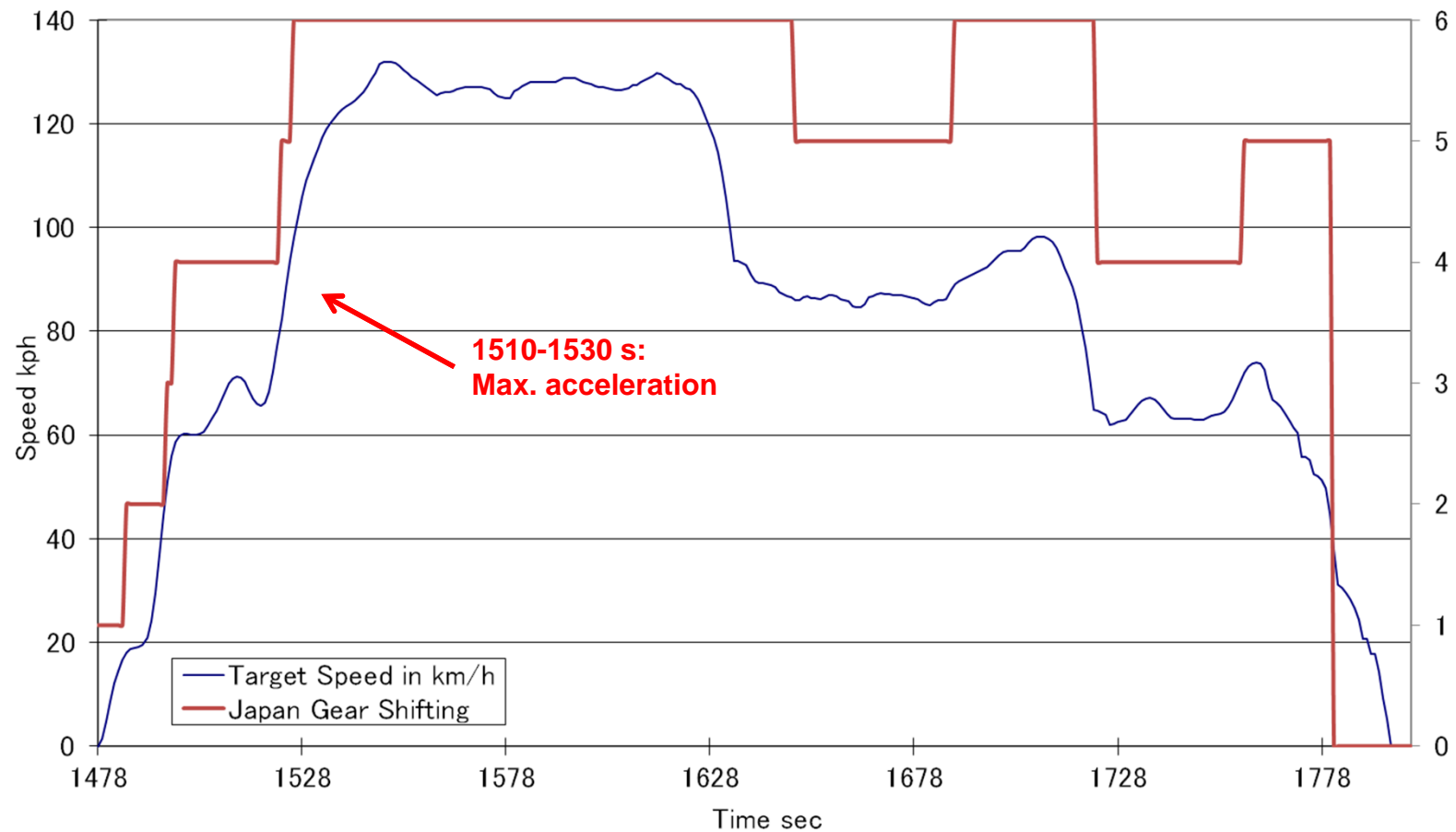
Steven shifting:
No remarks



Observations, vehicle C, Japan shifting Ex-High-Phase

☐ Could follow the target speed

Steven shifting:
No remarks



Observations, vehicle C, Japan shifting

Summary

- ☐ Could follow the target speed at Ex-high phase with max. acceleration
- ☐ 1st and 2nd gear is used for very (partly too) low speed (clutch operation)
- ☐ Some remarks for more “realistic” gear shifting

Summary of the Drivability

- **Influence of the speed-tolerance on the mode traceability (energy rating)**
(The drivers had not the order to follow the target-speed as exactly as possible.)
 - 19% of all driven short trips are within the bandwidth of +/-3%.
 - 78% are below -3%
 - 3% are above +3%
 - The energy rating is a very good value to test, whether the driver follow the target speed exactly.
- **Smooth throttle operation**
 - All tested vehicles could follow the target-speed in Low- and Middle-phase.
 - Low powered vehicles could follow the target-speed in the High-phase by wide open throttle operation.
 - Low powered vehicles could not follow the target-speed in the Ex-High-phase.
- **Appropriate shift points**
 - Japan proposal
 - Some modifications are necessary.
 - Steven proposal
 - It works very well. But there is a risk to make mistakes in the calculation.
 - The gear shift strategy must be calculated and programmed for each vehicle.

Thank you for your attention!



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