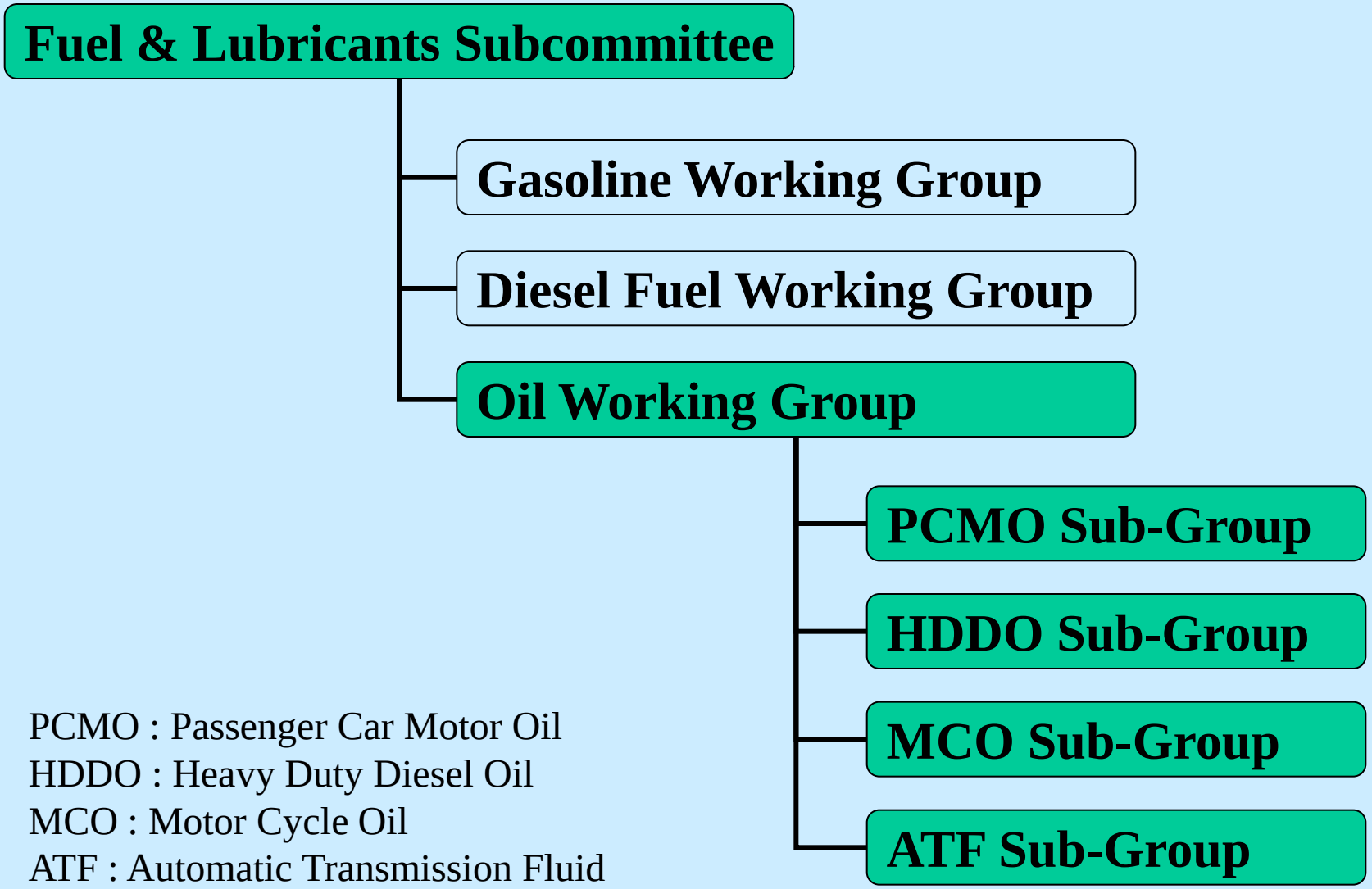
J A M A

Japan
Automotive
Manufactures
Associaton

Members of JAMA

Organizations of JAMA F&L Subcommittee



PCMO : Passenger Car Motor Oil
HDDO : Heavy Duty Diesel Oil
MCO : Motor Cycle Oil
ATF : Automatic Transmission Fluid

Objectives of the JAMA Seminar

PCMO WG

1) Expanding oil spec. of GF-5/SN, SM and SL as the bottom up of lubricant quality in the market

2) Improvement of availability of ILSAC viscosity grade
; 0W-20, 5W-20, 0W-30, 5W-30, 10W-30

MCO WG

1) Enhance the use of engine oils that meet the JASO classification and viscosity grade recommended by manufacturers.

2) Changes in the share of AT models in recent years may increase the demand for JASO MB oils in Asian countries.

ATF WG

1) Necessity of the genuine ATF or equivalent one to each AT of Japanese car.

2) Status of the JASO ATF standards are reviewed to make a better ATF.

History of the JAMA Seminar

Year	2003,2004	2005,2006	2007	2009	2010	2011	2012	2013	2014
Thailand	MCO	HDDO	MCO	HDDO	PCMO	PCMO HDDO MCO,ATF	–	PCMO MCO,ATF	–
Indonesia	MCO	HDDO	–	HDDO	–	PCMO HDDO MCO,ATF	–	PCMO MCO,ATF	–
Malaysia	–	HDDO	–	–	–	–	–	PCMO MCO,ATF	–
China	MCO	HDDO	–	–	–	PCMO HDDO MCO,ATF	–	–	–
Philippines	MCO	–	HDDO	–	–	–	–	–	PCMO HDDO MCO,ATF
Viet Nam	MCO	–	HDDO	HDDO MCO	–	–	PCMO HDDO MCO,ATF	–	–
Taiwan	–	–	HDDO	–	–	–	PCMO HDDO MCO,ATF	–	–
India	MCO	–	–	–	–	–	–	–	PCMO HDDO MCO,ATF
Korea	–	–	–	–	MCO	–	–	–	–

Supported by

for

the JAMA Engine Oil Seminar 2014

JASO Motorcycle Engine Oil Standards Current Status and Future Trends

JAMA
JAPAN AUTOMOBILE MANUFACTURERS ASSOCIATION, INC.

Contents

- **JAMA Motor Cycle Engine oil Seminar 2014(Over view introduction)**
- **Revision work of JASO Standard for Motor cycle**

  1)JASO M345(2T Oil) revise information

  2)JASO T903(4T Oil) revise information

- **Summary**

JAMA

Motorcycle Motor Oil Seminar 2014

Motorcycle Engine Oil
Current Status and Future Trends

JAMA
JAPAN AUTOMOBILE MANUFACTURERS ASSOCIATION, INC.

Speakers of JAMA MCO Seminar

Industry	Name	Company
OEMs	Yasuhiro Kuji	KAWASAKI HEAVY INDUSTRIES,LTD.
Engine Oil & Additive supplier	Naohiro Yamamoto	Idemitsu Kosan Co.,Ltd.

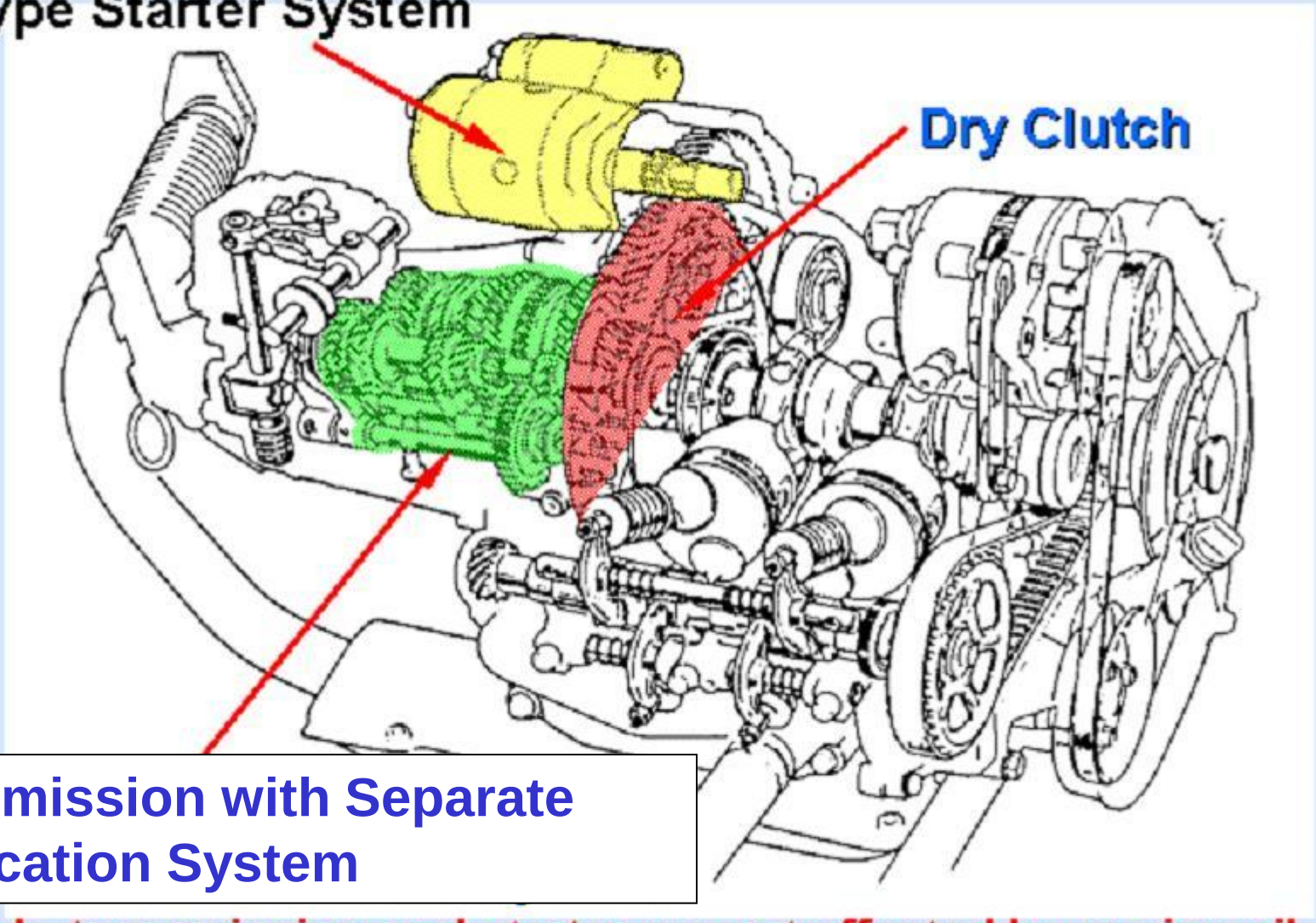
	Name	Company
JAMA MCO Working Group Member	Hideaki Yasukawa Sumitaka Hirose Yoshinobu Yashiro Masaaki Ito Norihiko Kagiwata Kazuya Masuda Tsuyoshi Fukuma Yoshitaka Tamamura Hideyasau Tsuchihashi Hidetaka Hoshino Yasushi Naito	Suzuki Motor corporation Honda R&D Co., Ltd. Motorcycle R&D Center Yamaha Motors Co., Ltd. JX Nippon Oil & Energy Corporation Showa Shell Sekiyu K.K Chevron Japan Ltd. Infineum Japan Ltd. Lubrizol Japan Limited BP Japan K.K Afton Chemical Japan Corporation Evonik Degussa Japan Co.Ltd

Contents

- **Motorcycle engine characteristics and oil requirements**
- Recommend oil viscosity
- Topics in Asian markets
- Status of JASO on-file
- Summary

Typical Structure of Passenger Car Engine

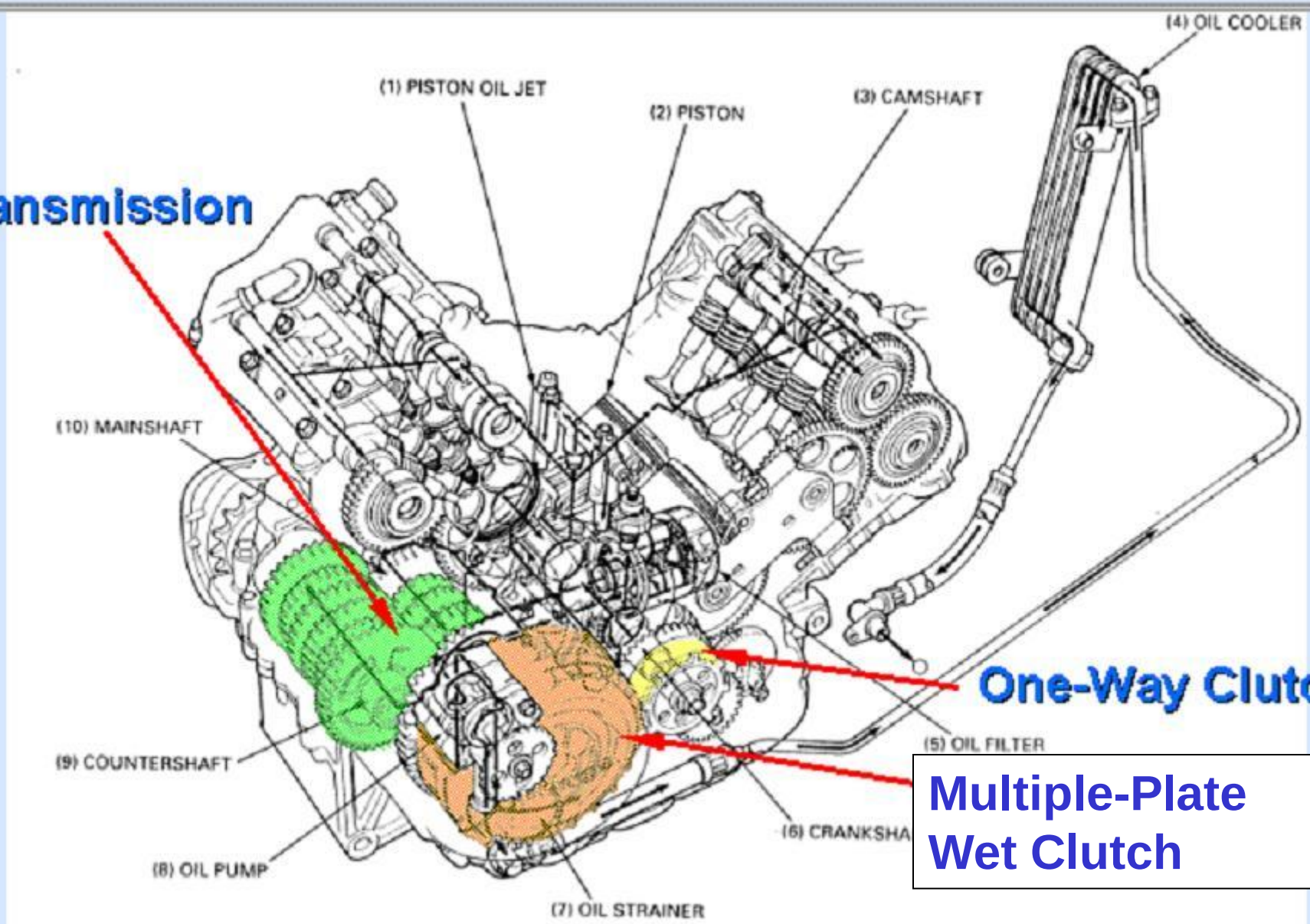
Dry Type Starter System



Transmission with Separate Lubrication System

Clutch, transmission and starter are not affected by engine oil.

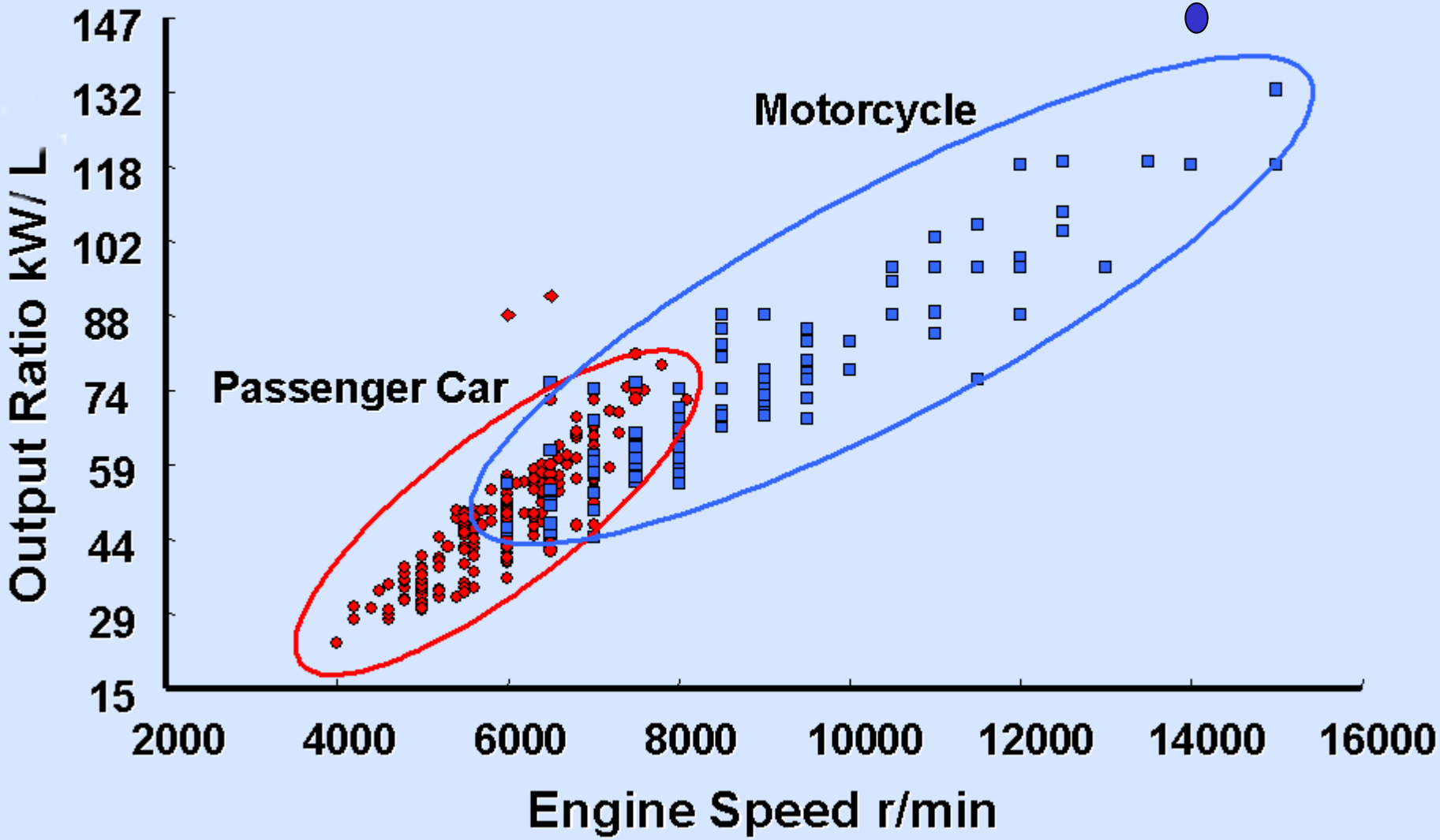
Lubrication System for Motorcycle



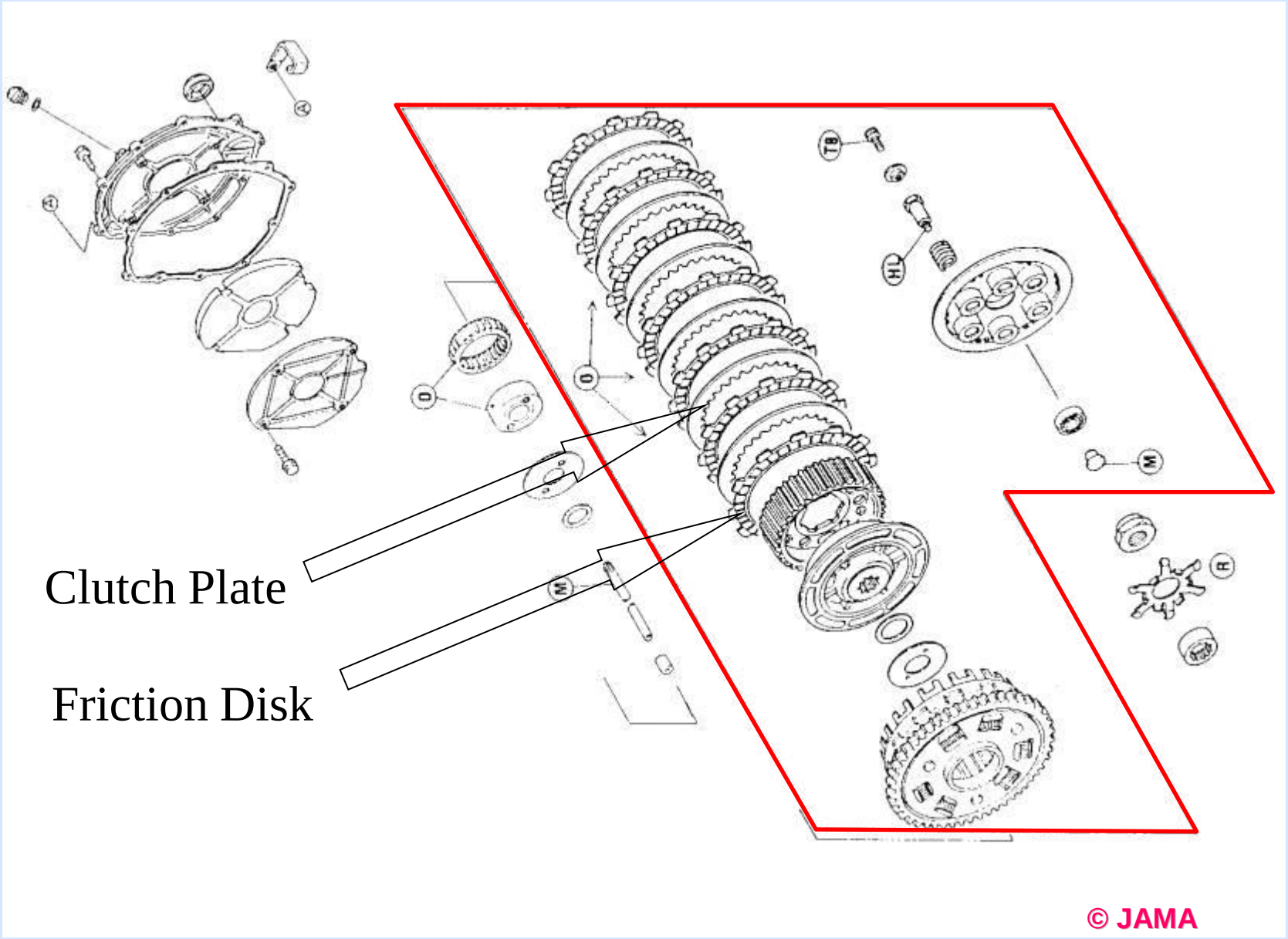
All parts are affected by engine oil.

Comparison of Output between PC and MC

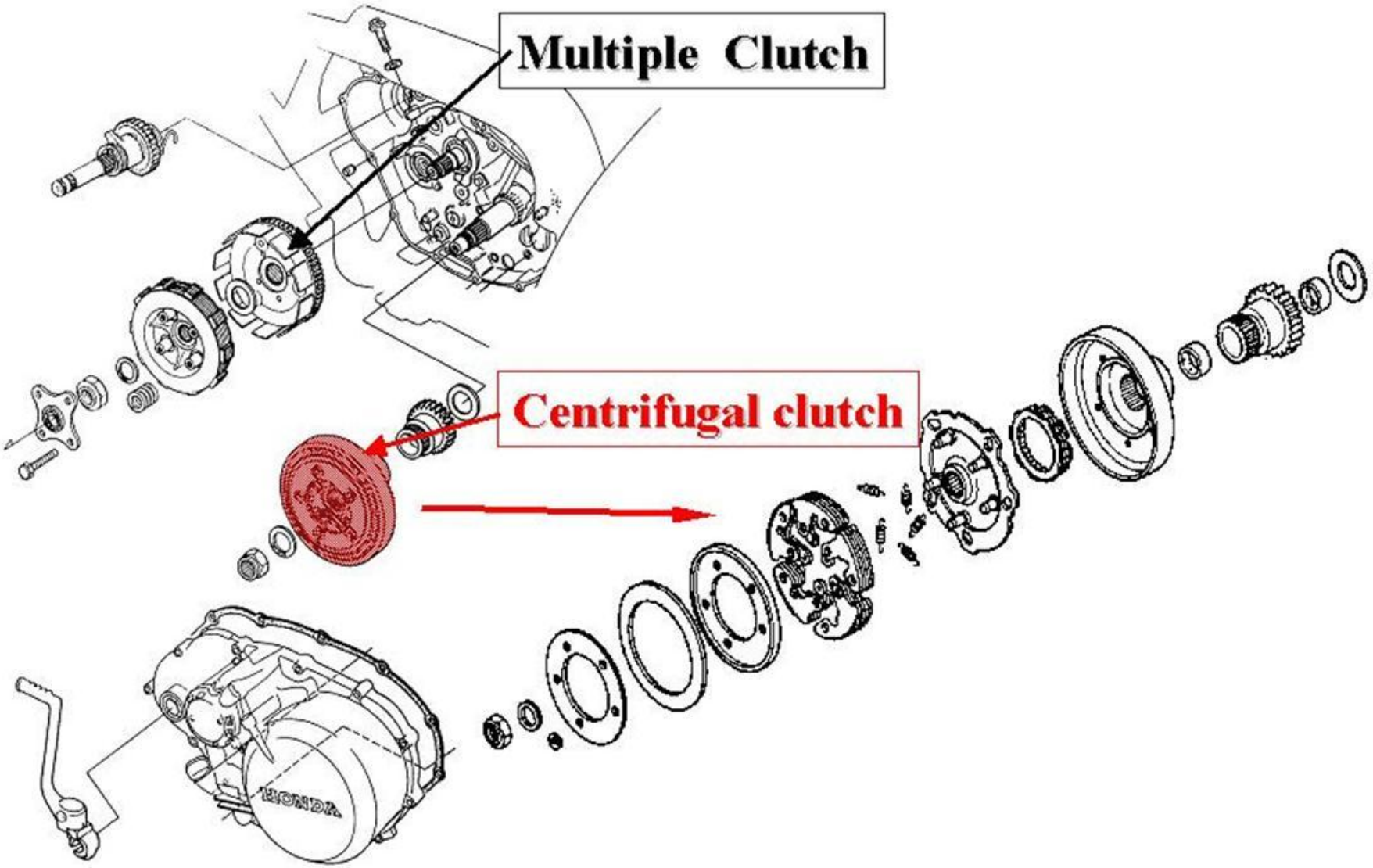
High power passenger cars are used over 10W-30 viscosity oil.



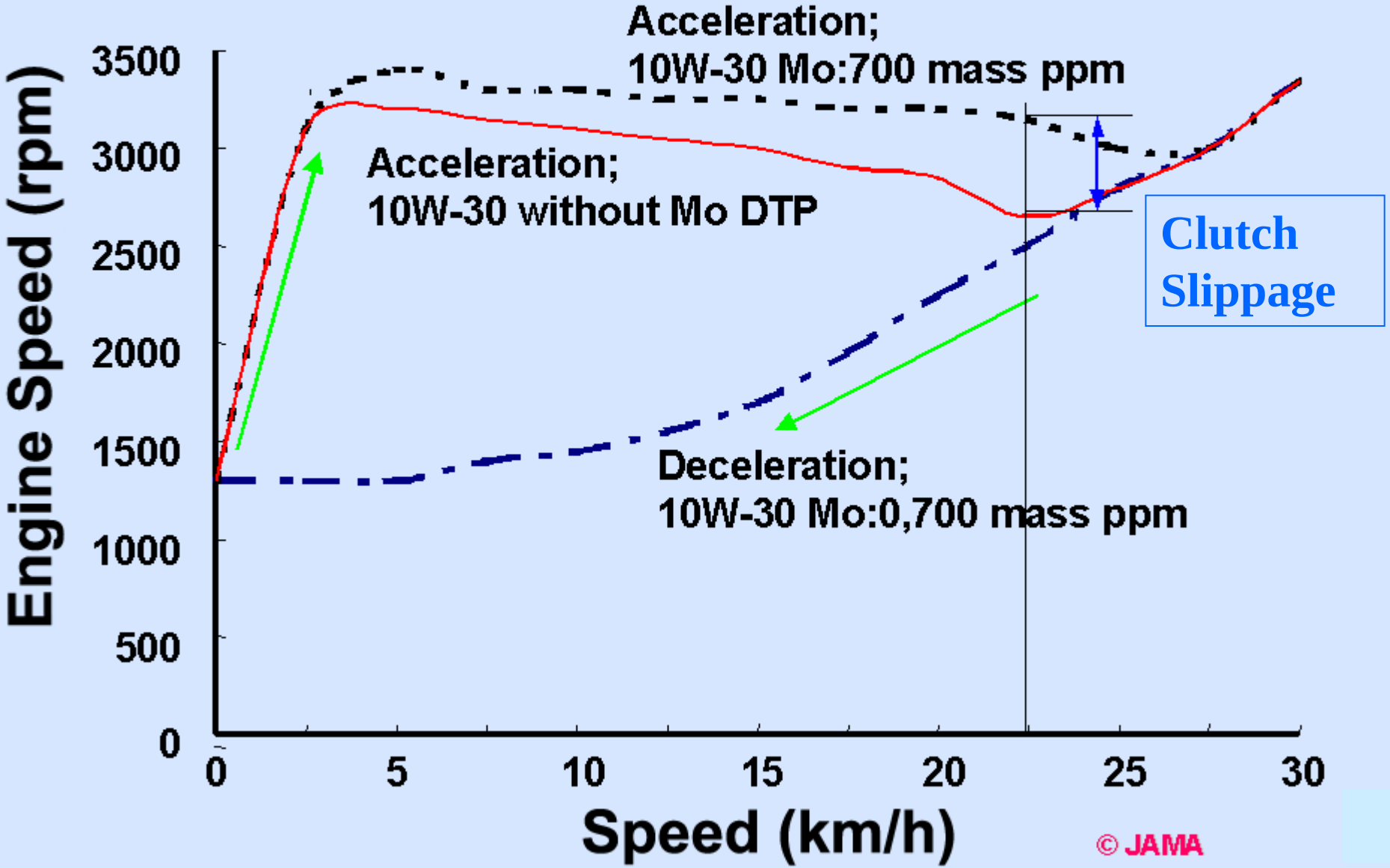
Typical Multiple Wet Clutch



Centrifugal Clutch



Power Transmitting Characteristic of Automatic Centrifugal Clutch



Oil Viscosity and Gear Pitting

HTHS Lower Limit is 2.9 for Gear Pitting

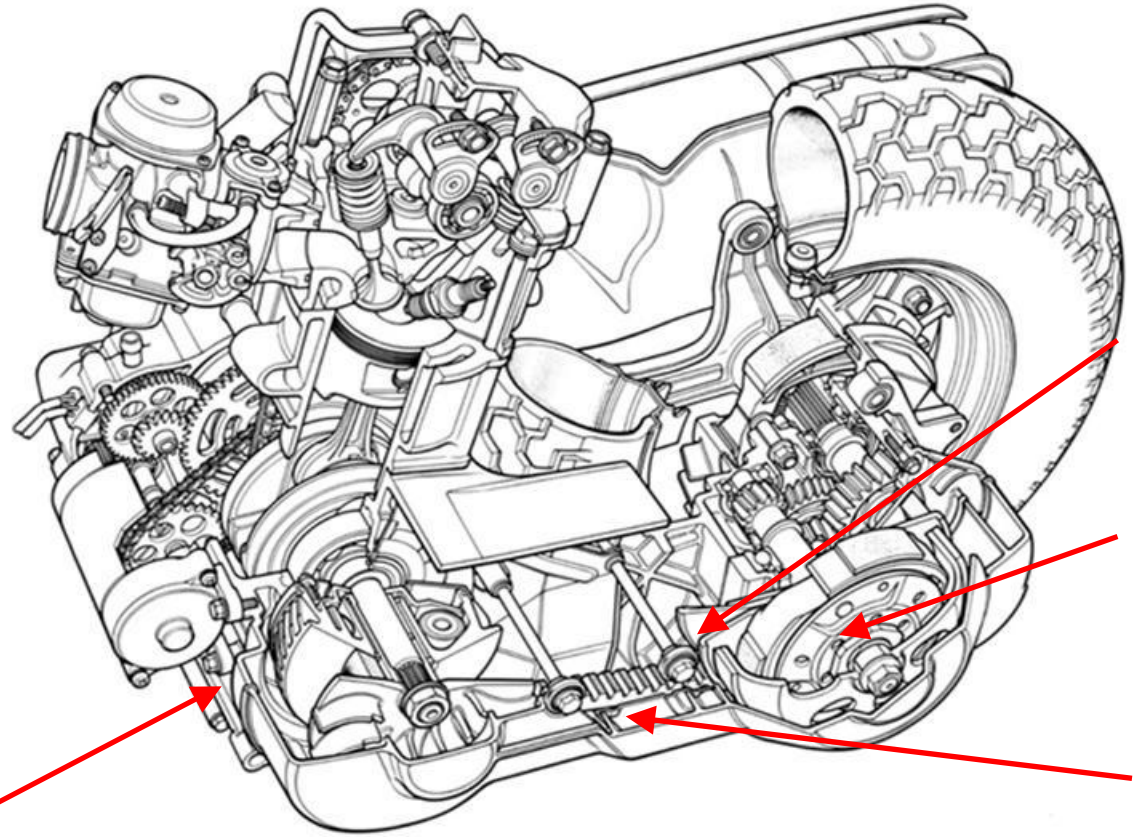
SAE Viscosity Grade \ Motorcycle Maker	A	B	C	D	HTHS Viscosity
5W−30	×	△	△	×	2.7-2.9
10W-30 ～40	○	○	○	○	3.1-3.5
20W-40	○	○	○	○	3.9-4.2

○: No Pitting

△: Occasional Pitting

×: Pitting

Structure of AT Motorcycle (Scooter)



- Belt converter type was adopted to automatic transmission.
- Dry type automatic centrifugal clutch was adopted.
- Engine oil was used for only engine lubrication.
- High friction characteristics is not required on engine oil.

JASO T903-2011

Required Performance	Test Method		Standard Value		
Clutch Friction	SAE No.2		MA		MB
			MA2	MA1	
		DFI	2.50 - 1.85	1.85 - 1.30	1.30 - 0.50
		SFI	2.50 - 1.70	1.70 - 1.25	1.25 - 0.50
		STI	2.50 - 1.85	1.85 - 1.45	1.45 - 0.50
Gear Durability	HTHS Viscosity, mPa.s		2.9 Min.		
Oil Consumption	NOACK, mass%		20 Max.		
Lubricity Stability	Shear Stability, mm^2/s@100C	XW- 30	9.0 Min.		
		XW- 40	12.0 Min.		
		XW- 50	15.0 Min.		
		Other	Stay in Grade (SAE J 300)		
Foaming Tendency	Foaming/ Settling, mL/mL	SQ I	10/ 0 Max.		
		SQ II	50/ 0 Max.		
		SQ III	10/ 0 Max.		
Anti-rust Corrosion	Sulfated Ash, mass%		1.2 Max.		
Catalyst Compatibility	Phosphorous Content, mass%		0.120 Max. 0.080 Min.		
Other Performance	Equivalent Performance of	API	SG, SH, SJ, SL, SM, SN		
		ILSAC	GF- 1, GF- 2, GF- 3		
		ACEA	A1/B1, A3/B3, A3/B4, A5/B5, C2, C3, C4		

Whenever possible, recommend the use of OEM oils with MA values that meet the motorcycle engine requirements

Contents

- Motorcycle engine characteristics and oil requirements
- **Recommend oil viscosity**
- Topics in Asian markets
- Status of JASO on-file
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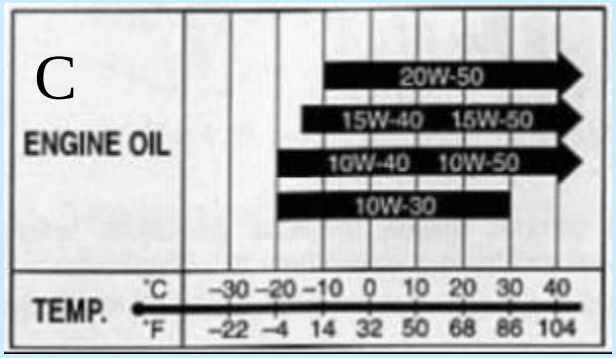
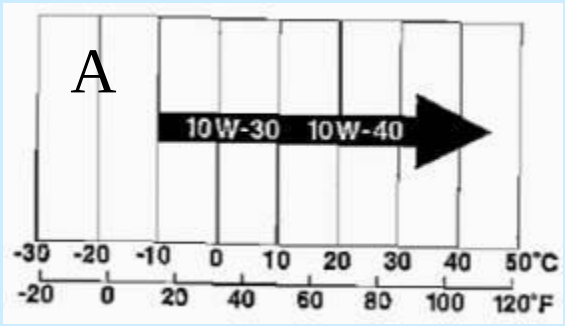
Motor cycle maker Recommend oil viscosity

From Owners Manual

C



A



Recommended Engine Oil

Type:	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity:	SAE 10W-40

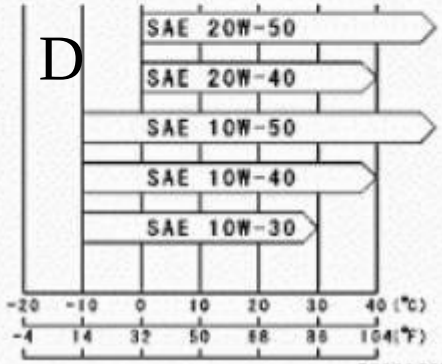
Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.

B

คำแนะนำเกี่ยวกับน้ำมันเครื่อง

การแบ่งประเภทน้ำมันเครื่องตามมาตรฐานเอพีไอ (API)	SG หรือสูงกว่า ยกเว้นน้ำมันที่มีข้อความประหยัดเชื้อเพลิงบนป้ายเครื่องหมายมาตรฐานเอพีไอ (API)
ความหนืด	SAE 10W-30
มาตรฐาน JASO T 903	MB

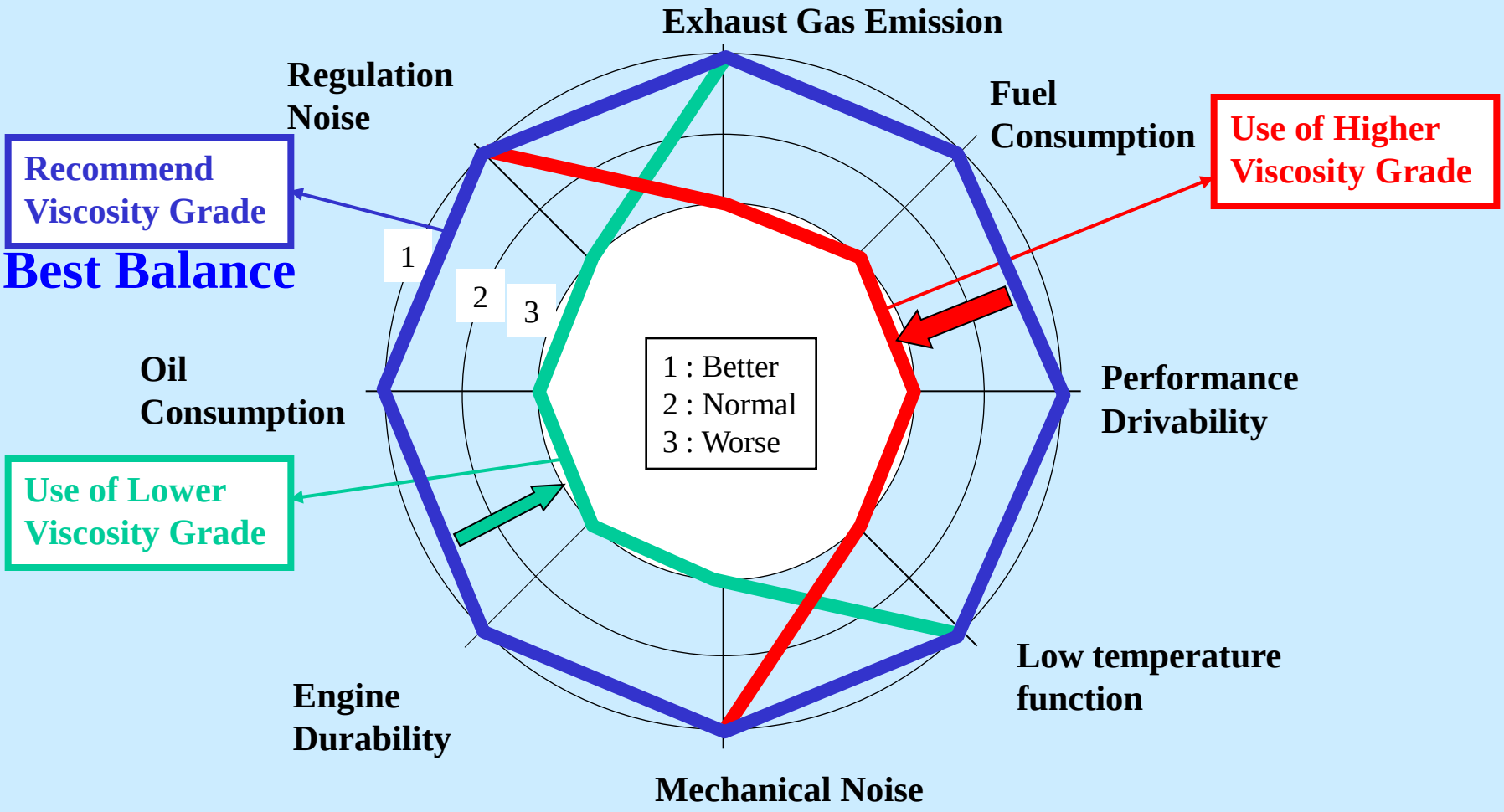
D



---Recommended oil viscosity is different in each manufacturer. ---

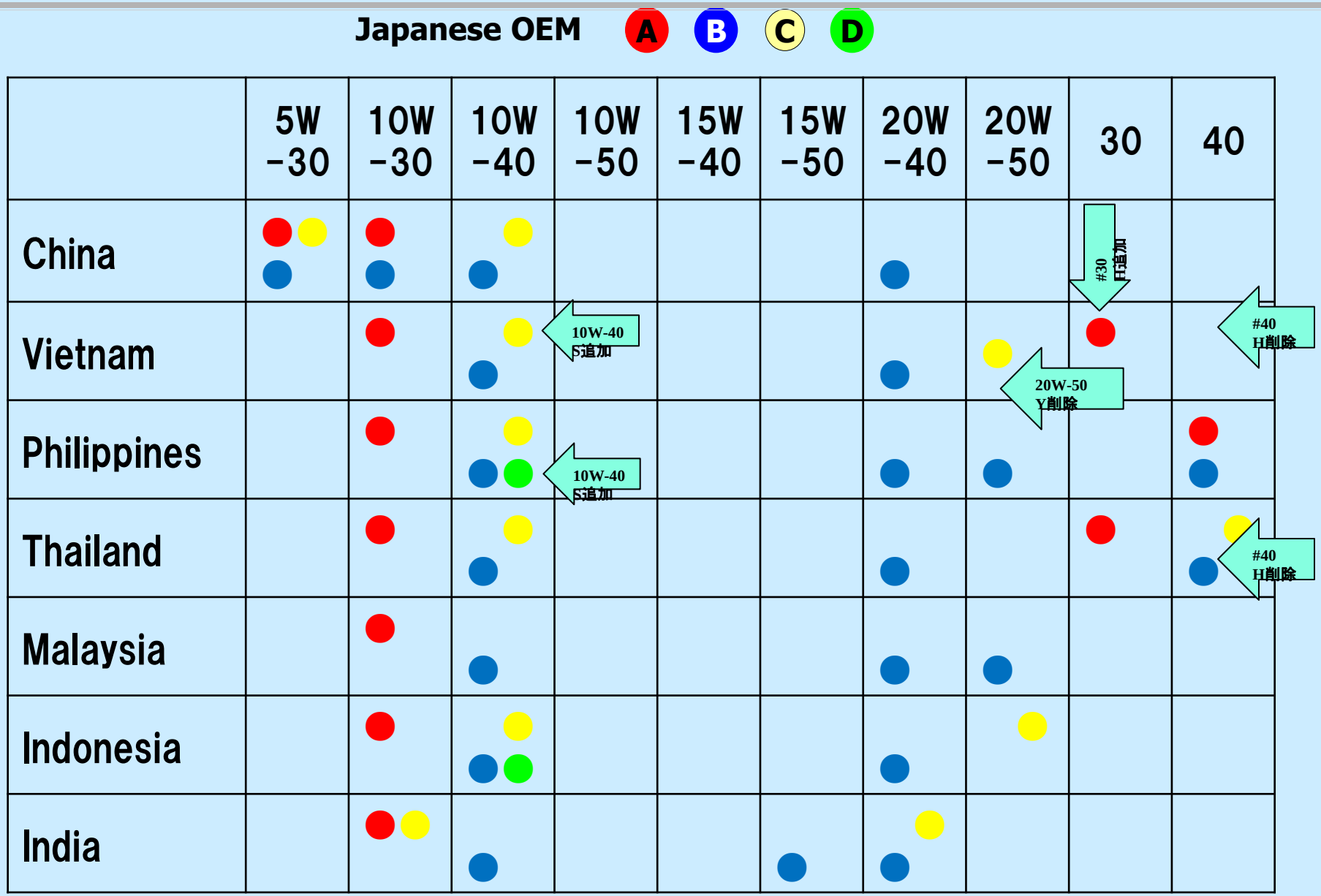
It is the best selection
to use the owners manual description viscosity oil.

Importance of Recommend Oil Viscosity use



Recommend Oil Viscosity is Best Choice for each Model (Including old Model)

Genuine Engine Oil Viscosity at Asian Countries



Asian Market oil for Motorcycle

		Indonesia	Thailand	Vietnam
OEM	A	10W-30 SJ	10W-30 SJ ,#40 SJ,#30 SJ	10W-30 SJ ,#40 SJ
	B	10W-40 SL,20W-40 SJ	10W-40 SL,20W-40 SL, #40 SL	10W-40 SJ,20W-40 SJ 20W-50 SG
	C	10W-40 SL,20W-50 SG	10W-40 SL,#40 SG	20W-50 SG
	E	10W-40 SG		
Oil Maker	a	10W-40 SJ	10W-40 SJ ,15W-40 SG 20W-40 SG,20W-50 SG	10W-40 SJ
	b		10W-40 SG, 15W-40 SJ 20W-50 SG ,#40 SF	10W-40SF ,10W-40 SJ 20W-50 SG
	c	10W-30 MA,20W-40MA		10W-40 SJ ,20W-40 SG 20W-50 SG
	d	10W-30 SG,10W-30 SJ		10W-40 SL, 20W-50 SJ
	e	10W-30SJ		
	f	10W-40 SL		

Domestic Oil Maker

Many High viscosity(20W-50,#40) oil

Some Low quality Oil(SF)-Eliminate After 2011 JASO On-File

Asian Market oil for Motorcycle

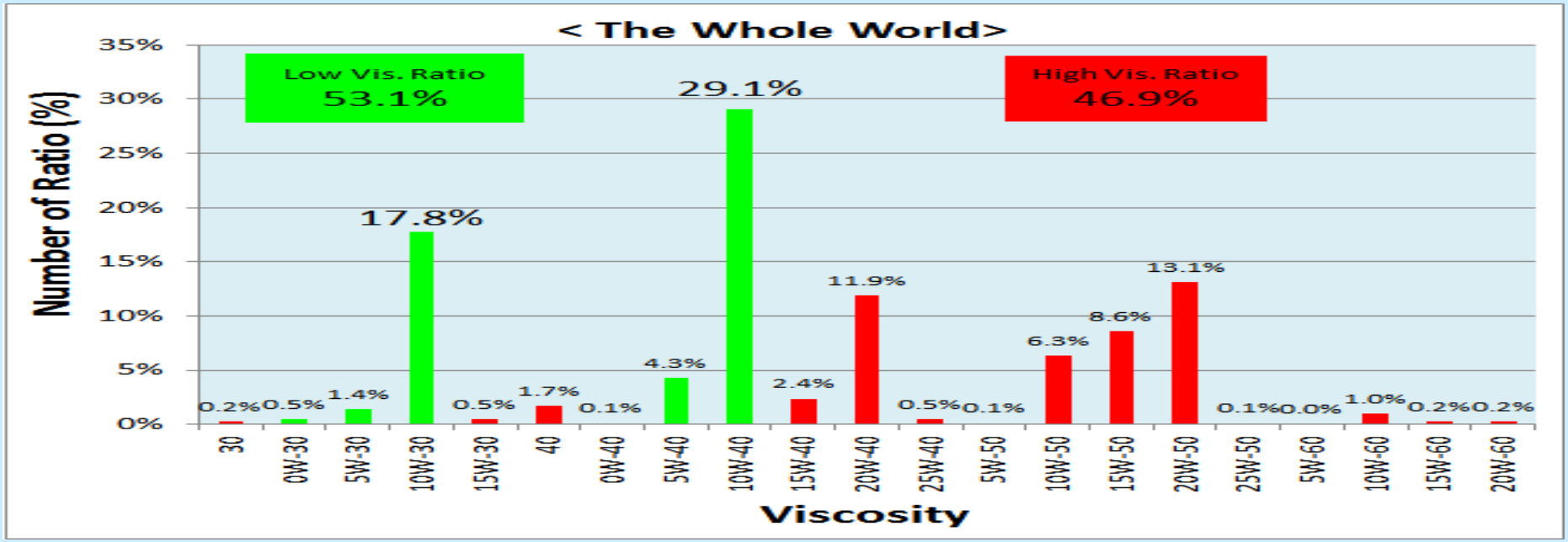
		India	Philippines
OEM	A	10W-30 SJ, SL	10W-30 SJ ,#40 SJ
	B	10W-40 SL,15W-50SL 20W-40 SJ	10W-40 SL,20W-40 SL 20W-50 SJ,#40 SJ
	C	10W-30SJ,SL, 20W-40SG	10W-40 SL
	E		10W-40 SG
Oil Maker	a	10W-40 SJ	10W-40 SJ
	b		10W-40SF ,10W-40 SJ 20W-50 SG
	c	10W-30 SG, SJ, SL, SM 20W-40 SG, SL	
	d	10W-30 ,20W-40	
	e	15W-30	
	f	10W-30 ,20W-40, 20W-50	

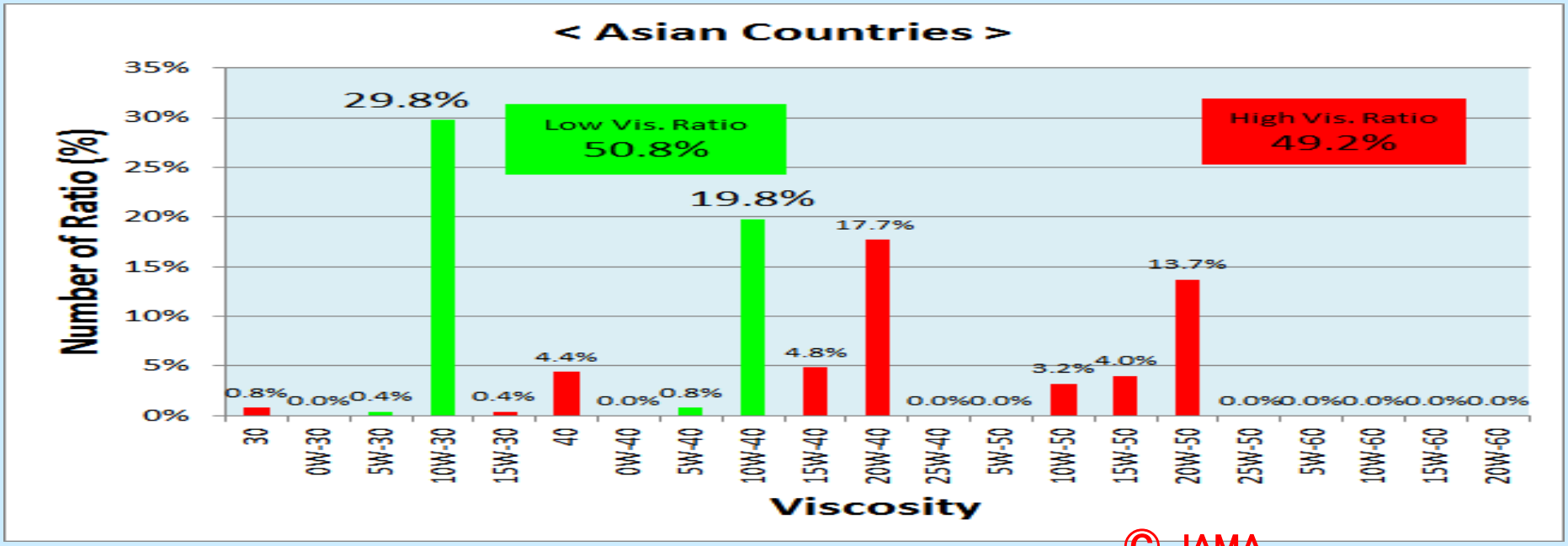
Domestic Oil Maker

Many High viscosity(20W-50,#40) oil

Some Low quality Oil(SF)-Eliminate After 2011 JASO On-File

Market Viscosity Ratio of JASO 4T On-File System





Contents

- Motorcycle engine characteristics and oil requirements
- Recommend oil viscosity
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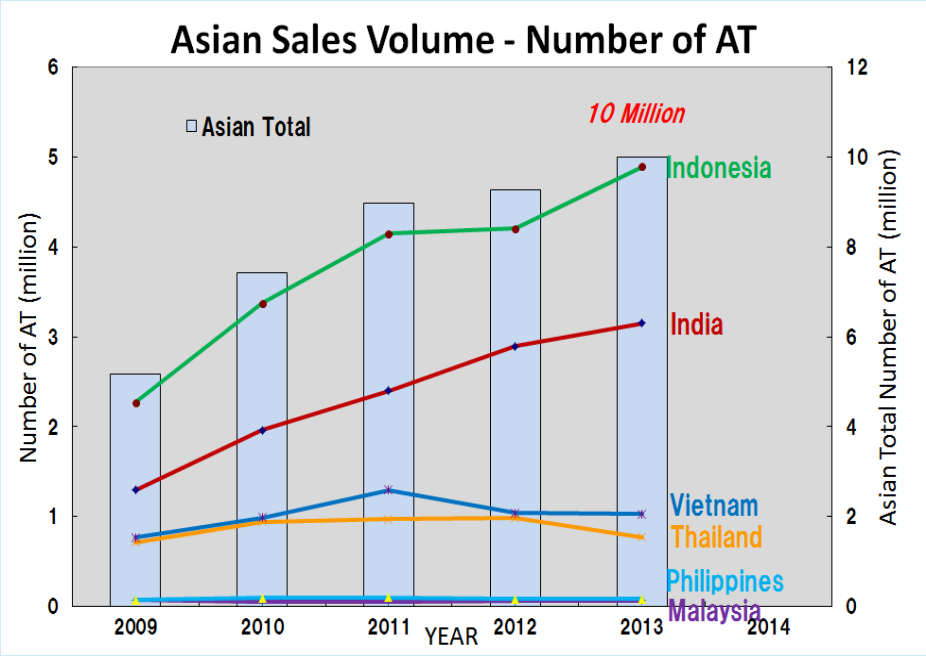
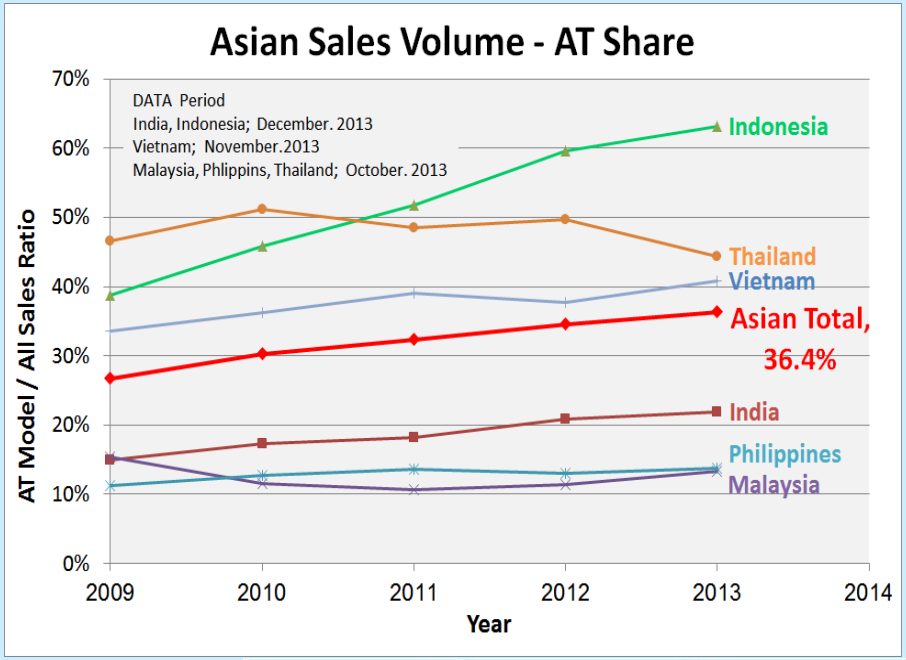
Automatic Transmission (A/T) Engine Oils

Background: Increased number of Dry Clutch type A/T (CVT) models

AT model Sales Volume & Share in Asia





AT Sales Volume & Share is going to increase year by
Basically, A/T models apply JASO-MB for fuel saving

Contents

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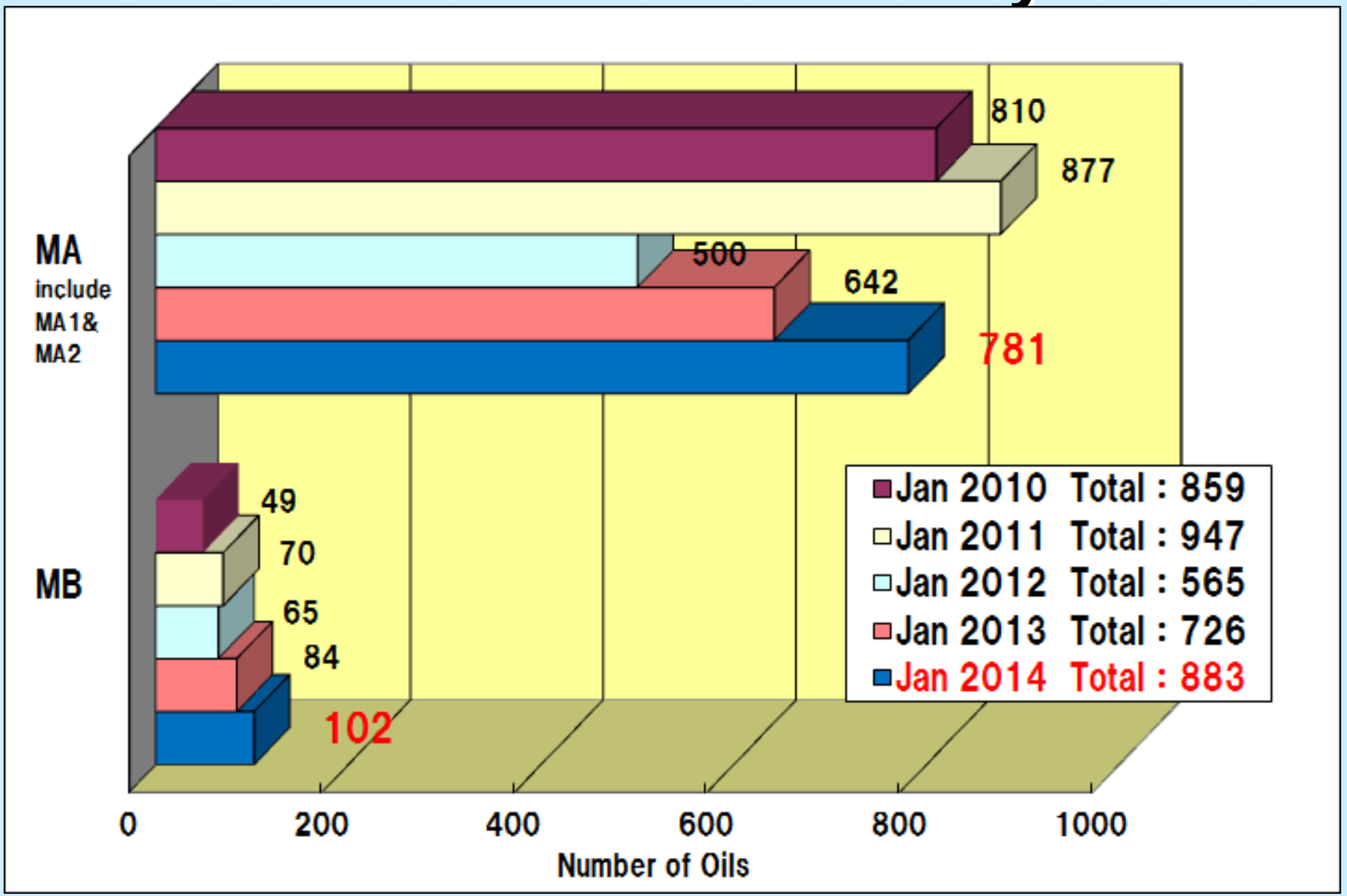
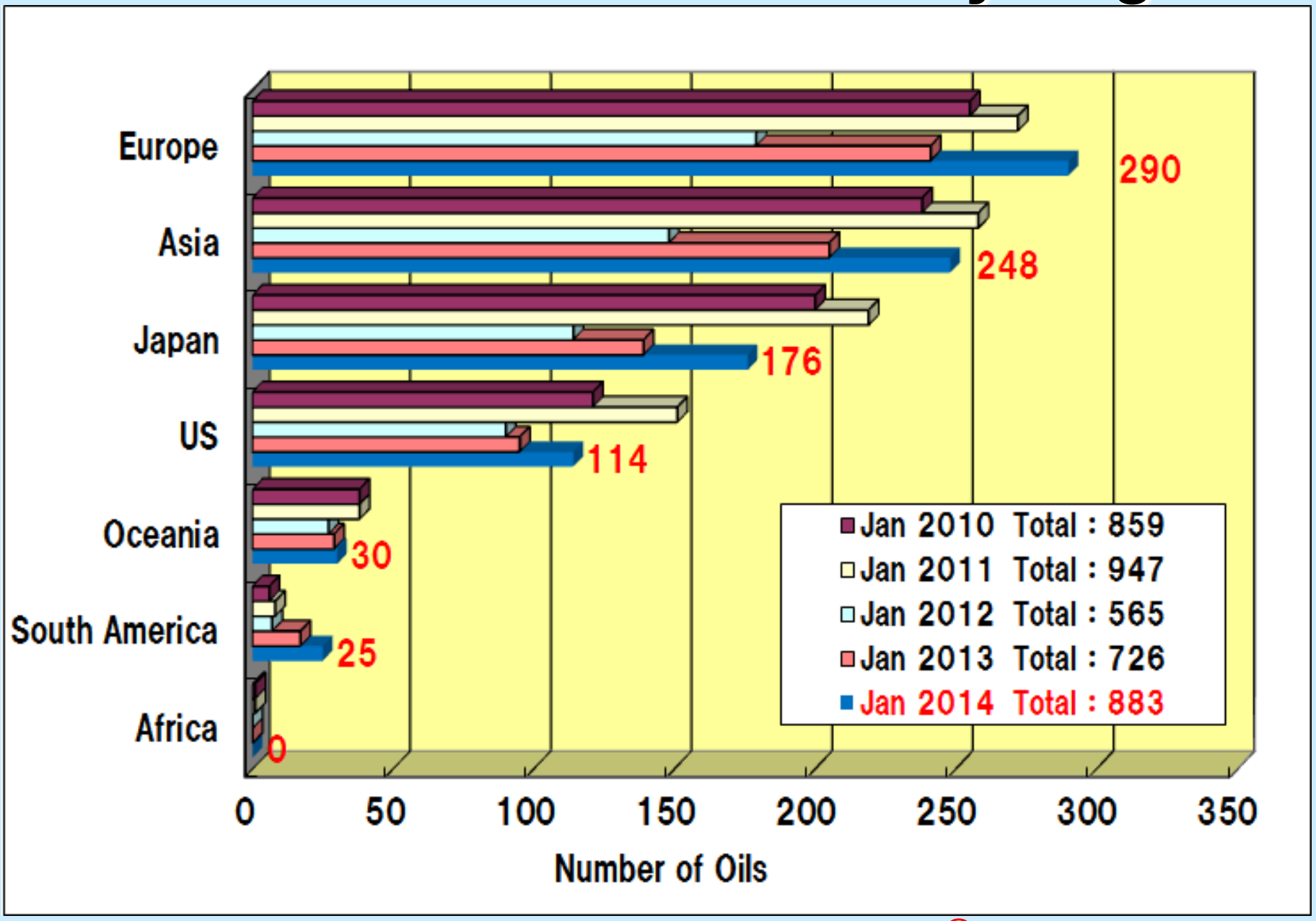
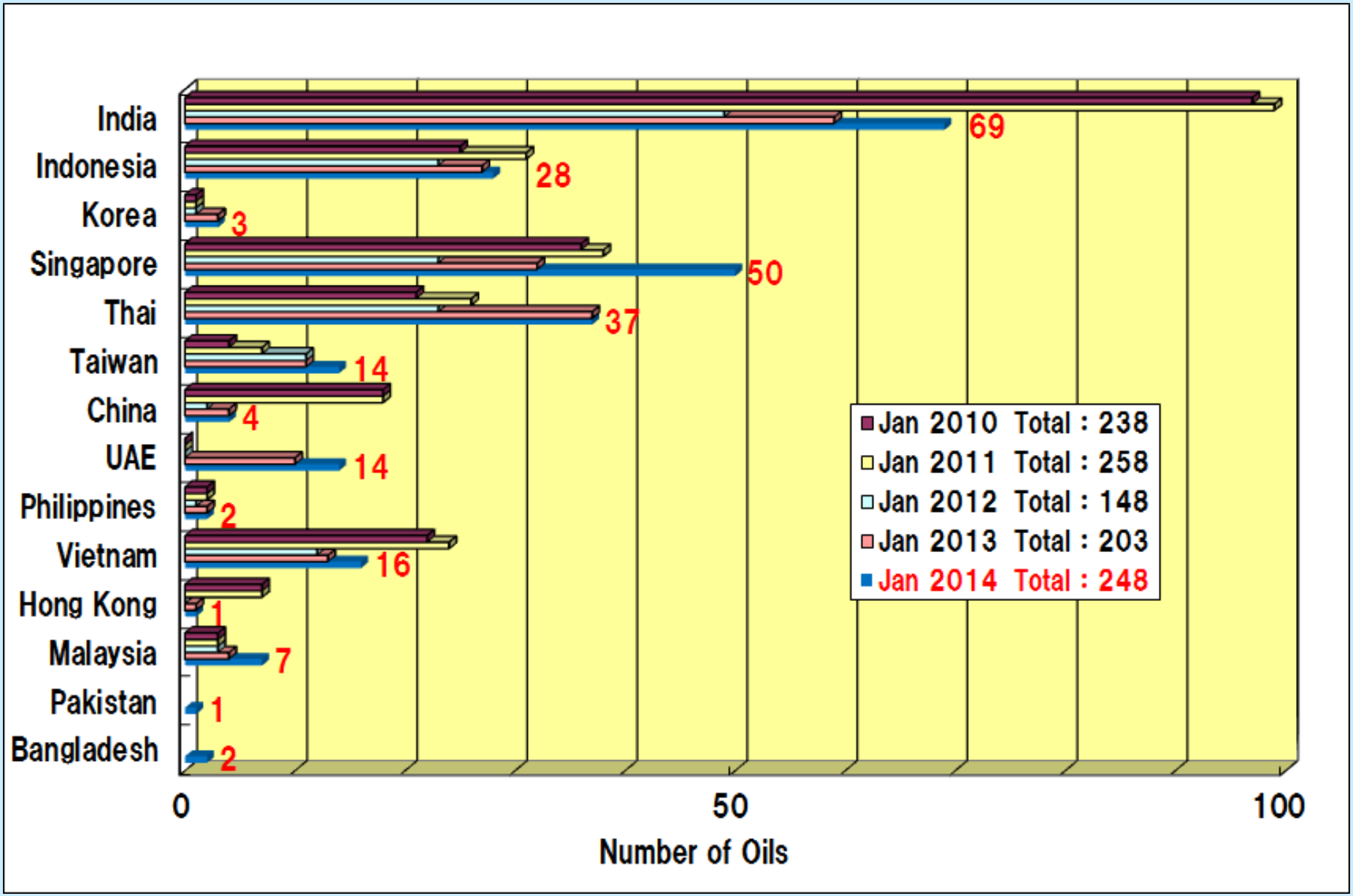
JASO 4T On-File Number by Grade



JASO 4T On-File Number by Region



JASO 4T On-File Number by Asian Countries



On-file numbers in large markets are enough to choose.

Summary

- **From the structure of the engine, Engine Oil for Motorcycle performance needs to meet the JASO standards.**

- **Recommended oil Viscosity is Best Choice for each Model (Include old Model)**

- **In Asian countries, the share of AT models has increased year by year, so the demand for JASO MB will increase.**

Contents

- **JAMA Motor Cycle Engine oil Seminar 2014(Over view introduction)**
- **Revision work of JASO Standard for Motor cycle**

  1)JASO M345(2T Oil) revise information

  2)JASO T903(4T Oil) revise information

- **Summary**

Necessity of M345 standard revise

Standard Test Circumstance

Standard	Use Engine
M340:Lubricity	Honda AF27
M341:Detergency	
M342:Smoke	Suzuki SX800
M343:Clogging	

⇨ Engine:Discontinue
Parts :Unavailability

Difficult to Test

Near future

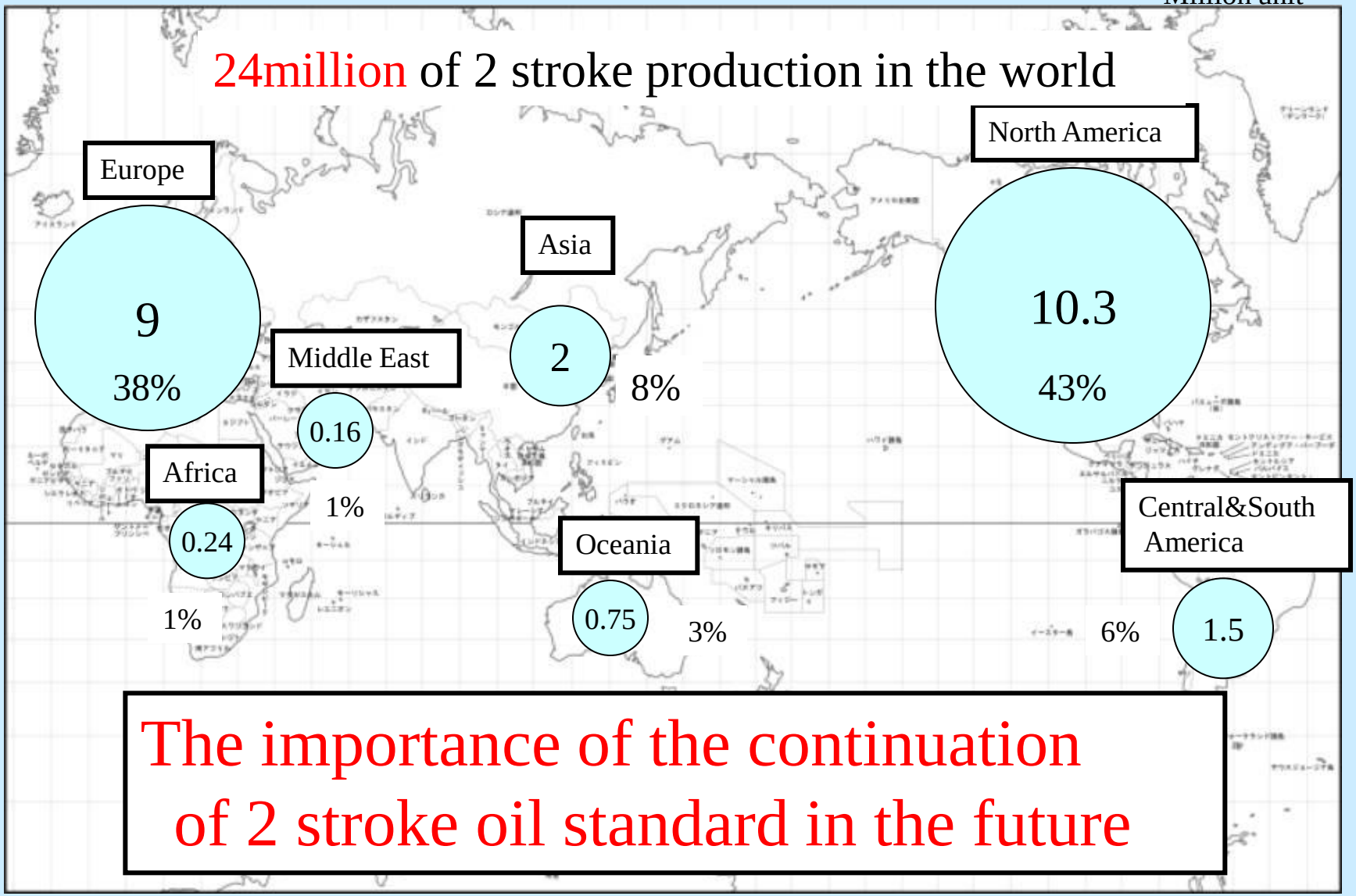
2 stroke Engine product

Motor cycle ⇨ New 2T Products sales continue (Very small amount)

Handheld Product ⇨ Brushcutter /Chainsaw etc
Majority engine is 2 stroke

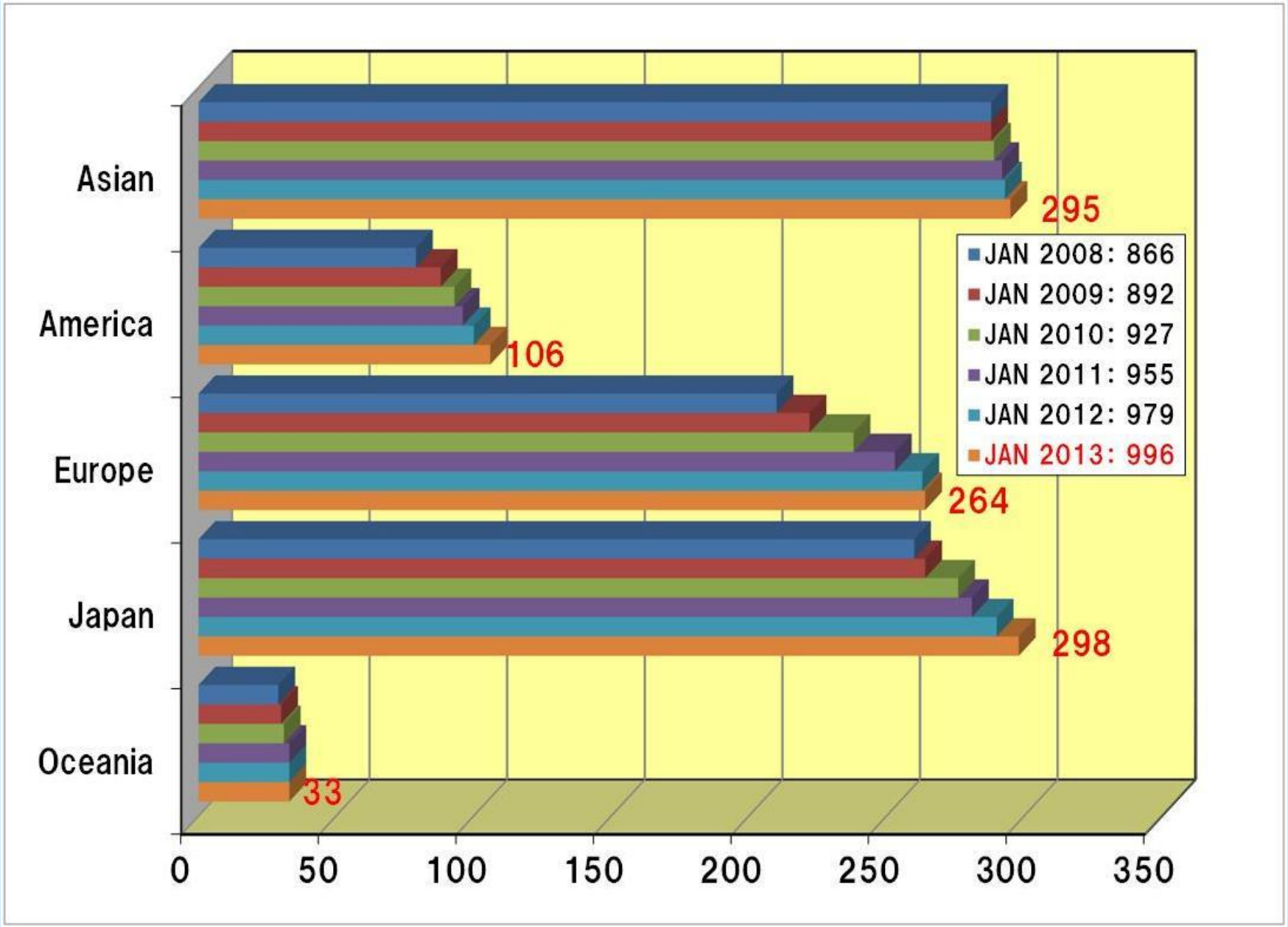
World Production Volume of 2 Stroke General-purpose engine

Million unit



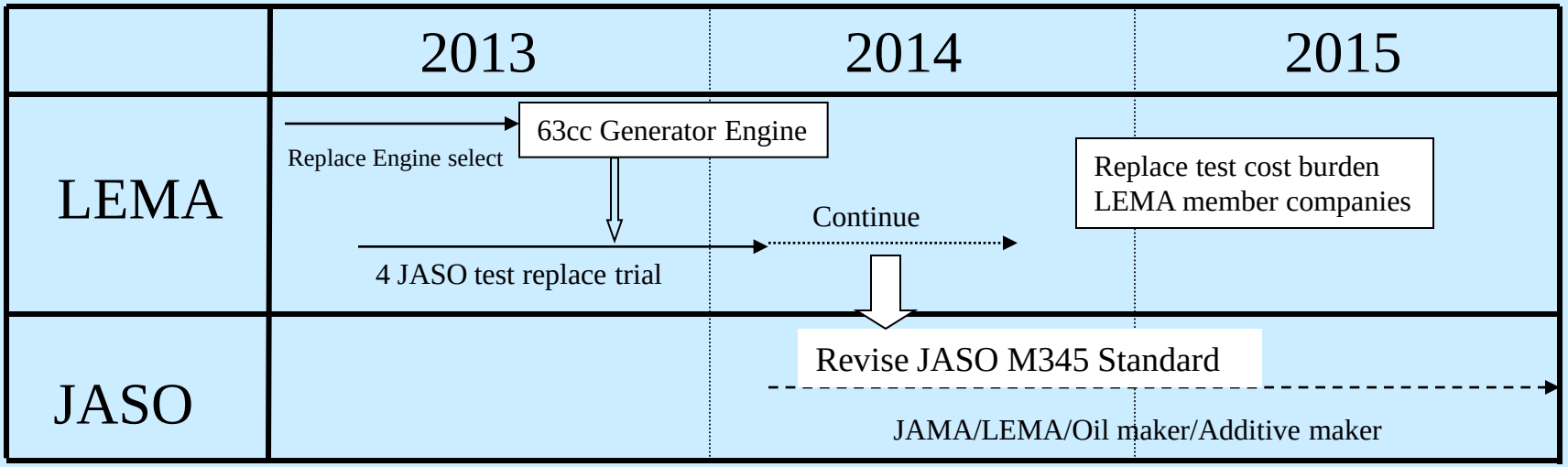
The importance of the continuation of 2 stroke oil standard in the future

JASO 2T On-File Number by Region



Test Engine replacement Stuation

LEMA(Japan Land Engine Manufacturers Association)
JASO(Japan Automotive Standards Organization)
JAMA(Japan Automotive Manufacturers Association)



Candidate engine(63cc Generator)

YAMAHA ET-1

Current situation of JASO 4Test replacement test

	Replacement test problem
Lubricity	Small amount of Power down rate
Detergency	High Merit rating
Smoke	Possible to replace
Exhaust system Blocking	Under replacement test

Piston seizure

Not possible to increase the cylinder temperature.

Necessity of Revise T903-2011

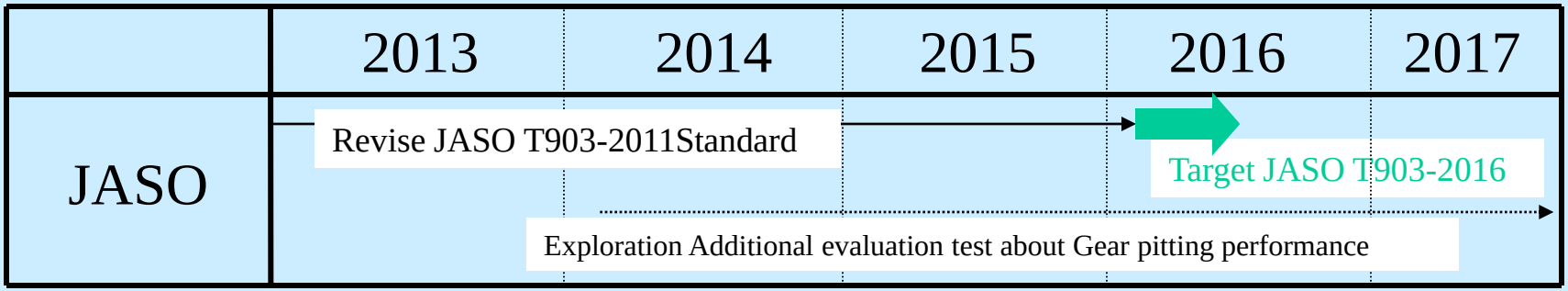
Background

- Some MB(T903-2006) oil meet MA Classification(T903-2011)
- More amount of friction modifier is required when makes same MB oil as T903-2006

Current and Old Reference Oil comparison
Friction index comparison

	Test result (Black :SD1777 Blue :FCC2981)			
	High Friction oil		Low Friction Oil	
	JAFRE-A	JAFRE -A11	JAFRE-B	JAFRE -B11
DFI	2	2.08	1	0.73
	2	1.94	1	0.62
SFI	2	1.82	1	0.89
	2	2.03	1	1.06
STI	2	1.89	1	0.5
	2	1.76	1	0.22

JASO T903(4T Oil) revise information



Theme : “Some MB(T903-2006) oil meet MA classification(T903-2011)”

Target : “Reproduction of T903-1998”

Revise work point

+Rethinking Friction plate material
  For motorcycle ?For Automotive ?
+Rethinking JAFRE oil(Friction property)
  More close to T903-1998 Reference oil(JAFRE A&B)
+Discrimination

Study Item

Necessity of Adding Gear Pitting Test

- To address energy-saving measures in the future (requiring low-viscosity)

- To meet with stringent exhaust gas regulations in the future (required low-phosphorus oil)

Thus, it is essential to add gear pitting test procedure into future JASO standard!

Past Development Status of Gear Pitting Test

1. Pitting verification of gear by FZG test machine

-Lack of Repeatability (Labo to Labo)

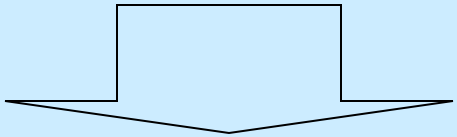
-High test cost ($900/1 gear set)

2. Fatigue verification of thrust needle bearing by UNISTEEL test machine

+Almost Correlated with gear test by FZG test

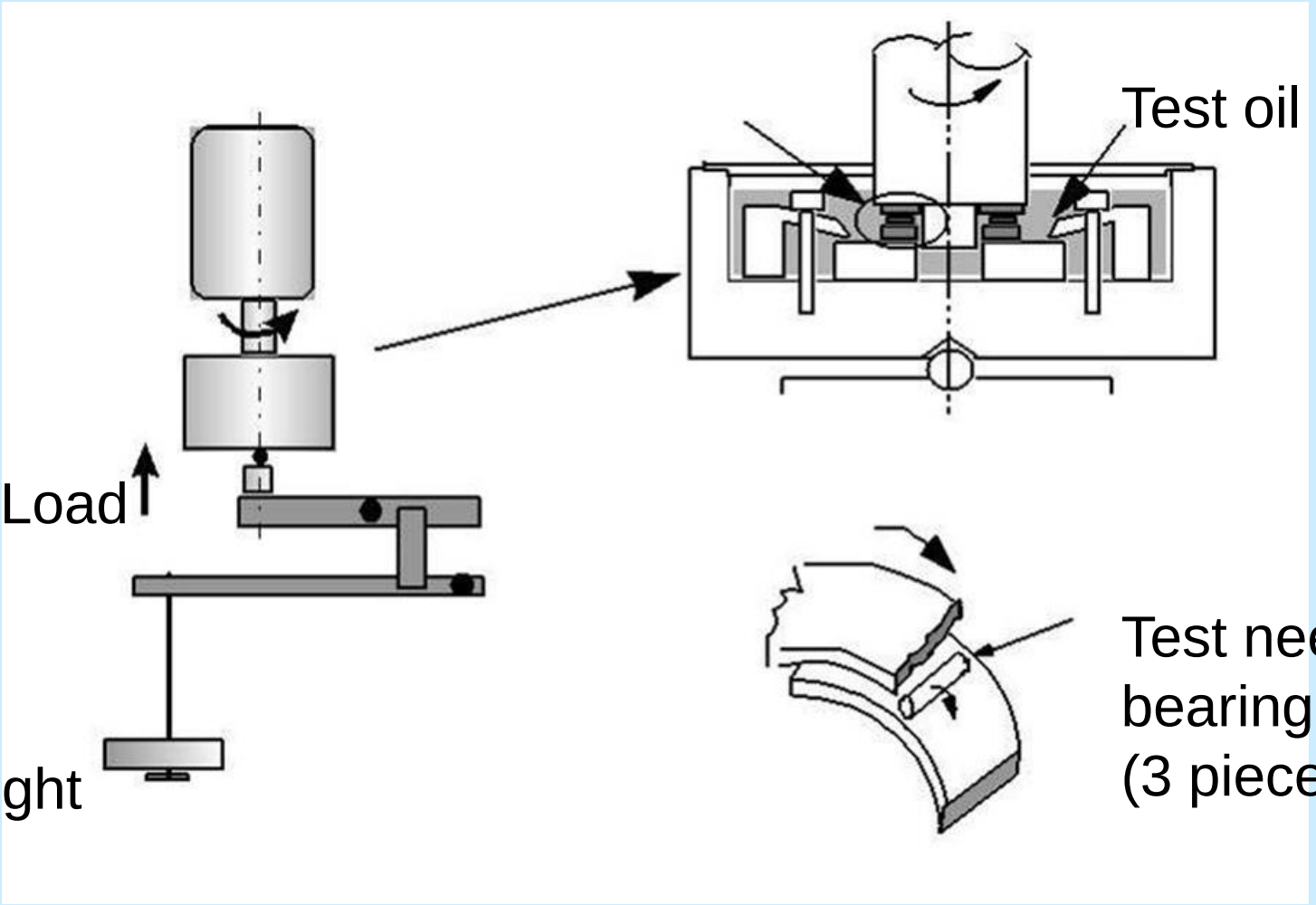
+Cheep test cost(General test rig&Cheep test parts)

-Lack of repeatability (Labo to Labo)



Unify to Unisteel test

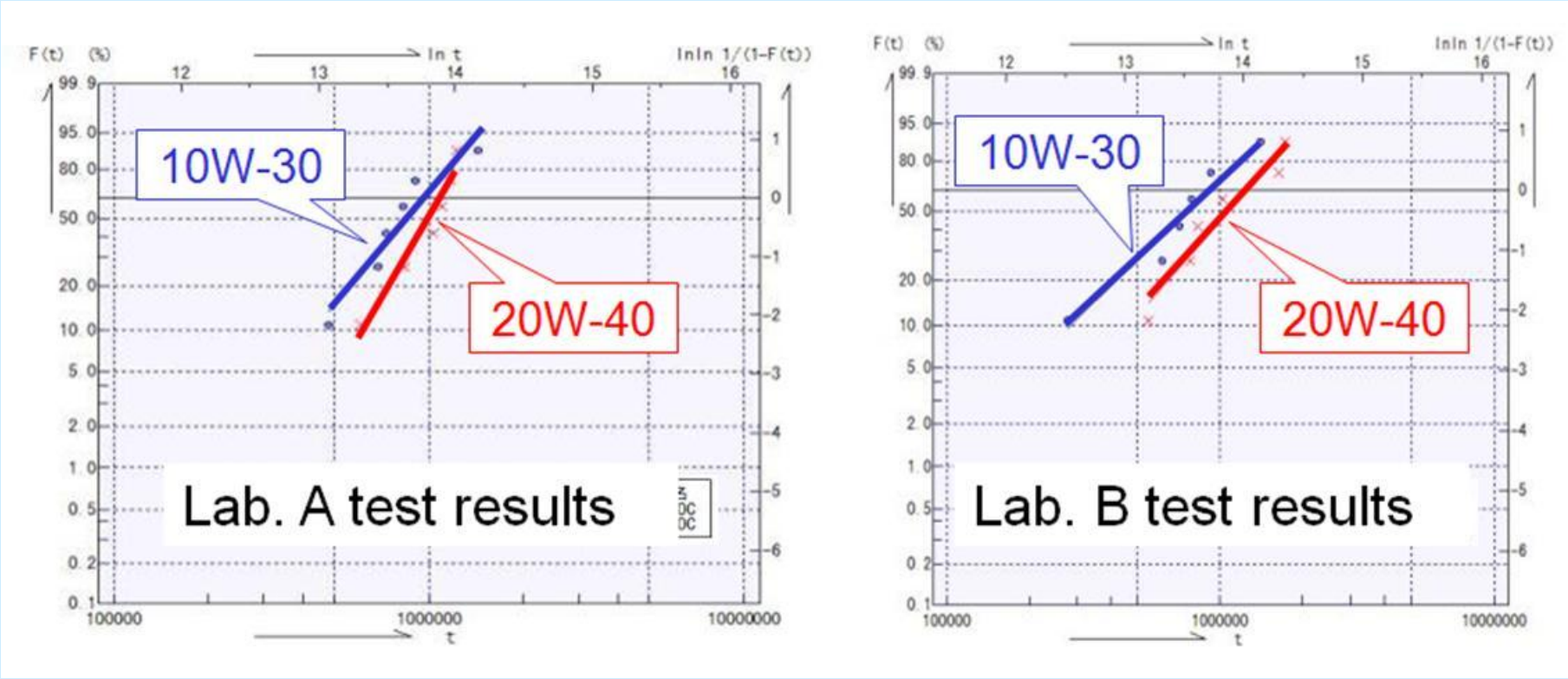
UNISTEEL test equipment



Test by UNISTEEL

Gear Pitting

Test results



Outside

Inside

+Possible classification of oil

-Main cause of the difference between Labo occurs is unknown.

Never give up !

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- **Summary**

Summary

- The Goal of both Standard revision work completed March 2016.
- The revised JASO standard target will 2016.

  ex)M345-2016、T903-2016
- Development of gear pitting test will be continue