

Certification System of Agri. Machinery in Korea

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Foundation of Agri. Tech. Commercialization & Transfer

4th Training of Trainers of the Asian and Pacific Network for Testing of
Agricultural Machinery

October 22-27, 2018 Beijing and Wuhan, China

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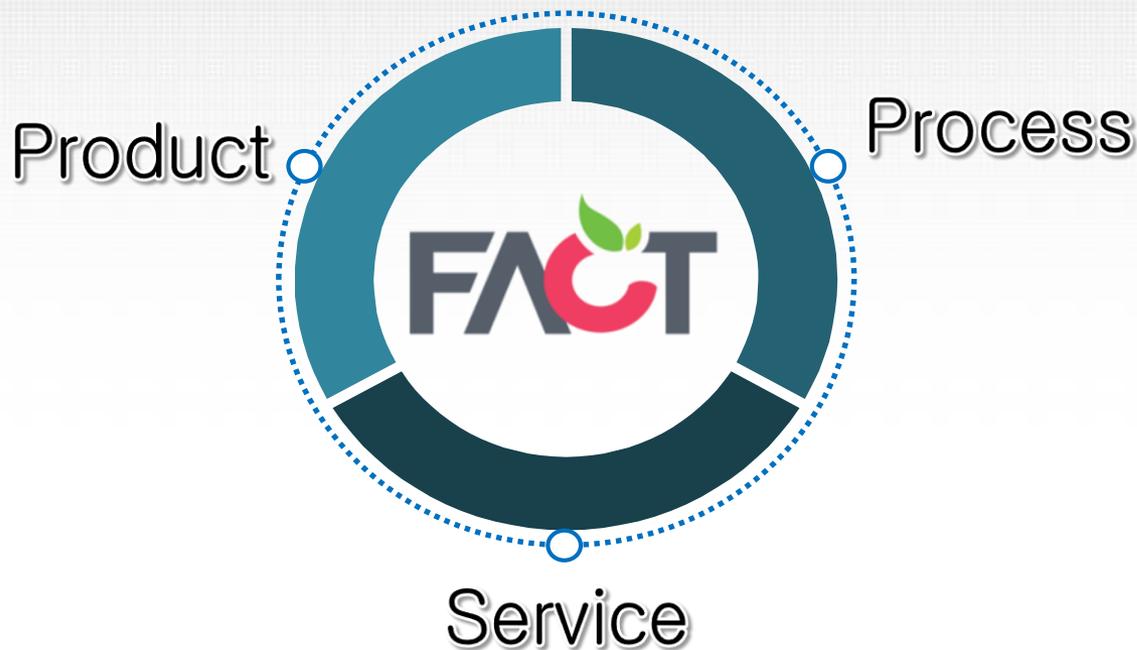


General Certification and Accreditation



○ Certification ?

Procedure which a third party assures documentarily that a **product, process or **service** meets the prescribed requirements.**



Types of Certification

Subject

Product, Management system

Forcibleness

Compulsory, Optional

Regional

National, Foreign, International

Body

Third party, Self certification

Law Base

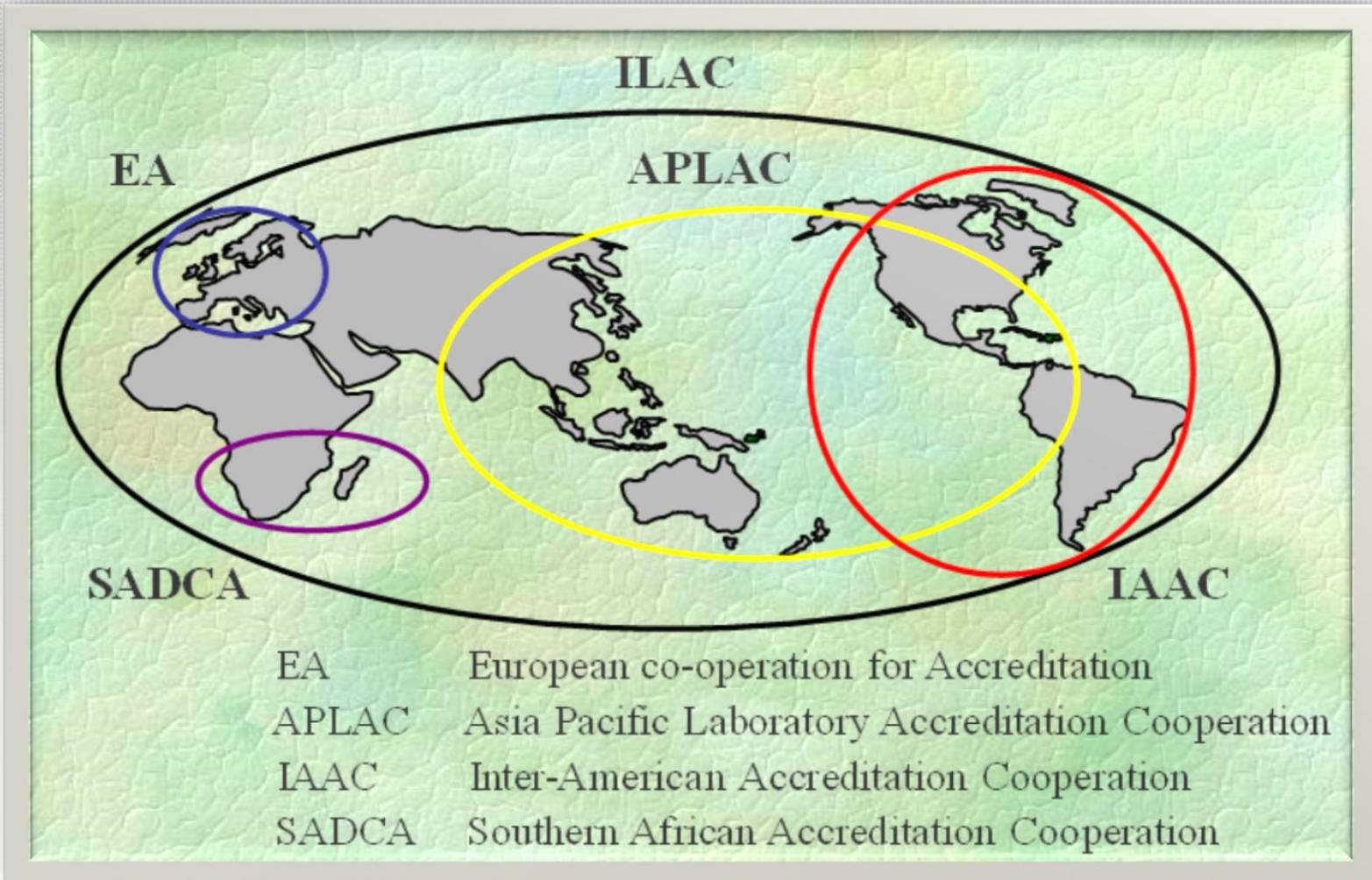
Legal, Private Certification

Accreditation ?

The process in which certification of **competency, authority, or credibility** is presented



International picture for accreditation



What is KOLAS ?



Korea Laboratory Accreditation Scheme

- A governmental accreditation body
 - Corporation with the Asia-Pacific Laboratory Cooperation (APLAC) and the International Laboratory Accreditation Cooperation (ILAC)
- Mission
- Provide accreditation for competent laboratories and inspection bodies
 - Promote mutual recognition with other accreditation bodies
 - Promote international acceptance of test results and inspection reports produced by accredited organizations in order to facilitate trade
 - Cooperate and collaborate with other accreditation bodies

Accreditation Scheme for Testing

○ Accreditation Criteria

Laboratories are accredited by KOLAS in accordance with the National Standards Act, ISO/IEC 17025-General requirements for the competence of testing and calibration laboratories and ILAC

○ Accreditation Fields

• Testing Fields

- ✓ Mechanical, Chemical, Electrical,
- ✓ Heat and Temperature measurement etc.

• Calibration Fields

- ✓ Length and related quantities, Time & frequency,
- ✓ Mass and related quantities, Temperature & humidity etc.

Equipment for testing



Accreditation in FACT

○ Accreditation Fields

- **Mechanical testing**
 - ✓ **Tractor test**
 - ✓ **ROPS test**
 - ✓ **Non-destructive test**
 - **Sugar content, Acidity**
- **Chemical testing**
 - ✓ **Petroleum product test**
 - **Calorific value**

○ Members for KOLAS

- **Quality manager : 2**
- **Technical manager : 1 for each test**
(total 4)





Traceability and Management of equipment

Measurement Traceability

- **Unbroken chain of comparisons relating an instrument's measurements to a known standard**
- Traceability preserving system



★ Measuring instrument must be calibrated by a upper level standard device

Calibration system

○ To assure accuracy and precision of a measuring instrument by traceability to maintain the error and the uncertainty within the permissible tolerance

○ Management of measuring instrument

- Annual calibration by accredited lab(external)

- ✓ All instruments that are critical to the test

- Intermediate inspection by accredited lab(external)

- ✓ Some instruments that are critical to the test

- Pre-check before the test(internal)

교정 성적서
CALIBRATION CERTIFICATE

교정도 시행사 (고객명) : (주)표준기술원 (표준원)
Tel: 021-456-3405, Fax: 021-451-0521

성적서 번호 : SC1801-01884-1
 (Certificate No.)

제1회 (Client)
 고객명 (Name) : 농약개발용화재단
 주소 (Address) : 경기도 수원시 권선구 수인로 135번길 22 (서문동)

제2회 (Calibration Subject)
 기기명 (Description) : 전자식 저서 저울
 제작회사 및 형식 (Manufacturer & Type) : PINE; 3 000 kg
 기기번호 (Serial Number) : NO.00000000000000000000

제3회 (Date of Calibration)
 교정일 (Date) : 2018. 01. 31.

제4회 (Environment)
 온도 (Temperature) : (10.4 ± 0.2) °C
 습도 (Humidity) : (34 ± 2) % RH
 교정장소 (Location) : 고정표준실 (Permanent Cal. Lab.) 이동교정 (Mobile Lab.) 현장교정 (On Site Cal.)

제5회 (Traceability)
 교정방법 및 소급성 시험 (Calibration method and/or brief description) :
 상기 기기는 전자식 저서저울 표준교정장치(SC71-201-01)에 따라 국가측량표준기관으로부터 측정의 소급성이 확보된 표준장비를 이용하여 교정되었습니다.
 The above instrument was calibrated by calibration procedure of Electric Balances (SC71-201-01) using standard equipment which was maintained traceability from National standard.

교정용 사용용 표준장비 명세 (List of used standards/specifications)

Description	제조사 및 형식 (Manufacturer & Model)	기기번호 (Serial Number)	국가교정기관명 (The name of national Cal.)	교정기관 Calibration Lab.
표준 무게	HANSLUNG (SF1) / 1 mg ~ 10 kg	090004	2018. 12. 07	SC71
표준 무게	표준저기 (SF1) / 20 kg	01-10-00	2018. 02. 28	SC71
표준 무게	표준저기 (M2) / 500 kg	SC-1	2019. 08. 14	HANSLUNG
표준 무게	표준저기 (M2) / 500 kg	01-10	2019. 08. 14	HANSLUNG

제6회 (Calibration result) : 교정결과 참조 (Refer attached file)
 제7회 (Measurement uncertainty) : 교정결과 참조 (Refer attached file)

측정 (Measurement performed by) : 김민지 (Kim Minji)
 연락처 (Contact) : 070-4489-4025
 담당자 (Responsible) : 김민지

승인 (Approved by) : 김민지 (Kim Minji)
 직명 (Title) : 기술책임자 (장) (Technical Director (Chief))
 직명 (Name) : 표준원

본 성적서는 국제시험기관인증협력제 (International Laboratory Accreditation Cooperation) 상호인증협정 (Mutual Recognition Arrangement)에 시행용 참여기관 (KOLAS)로부터 확인 받은 것임에 따라 효력을 인정받는다. (This above calibration certificate is the accredited calibration item by Korea Laboratory Accreditation Scheme, which signed the KALC-MRA.)

2018. 02. 05

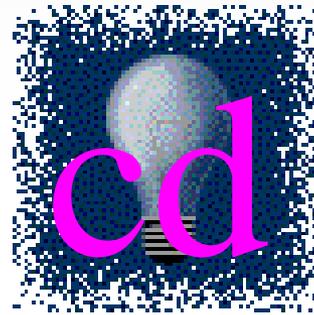
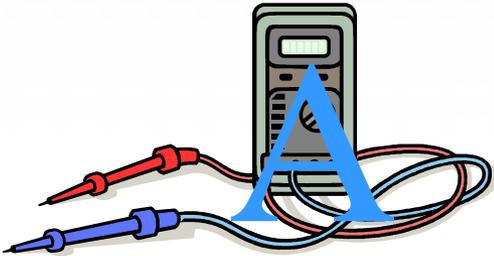
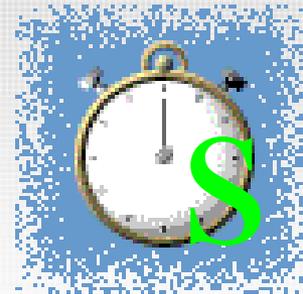
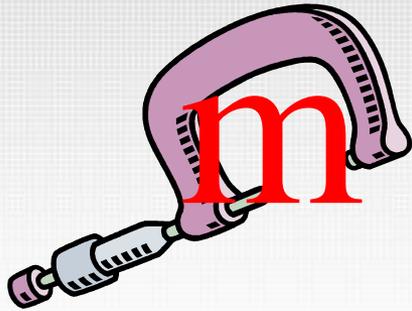
표준기술원 대표인
 Accredited by KOLAS, Republic of Korea

(주) 표준교정기술원 대표이사
 Standard Calibration Technology Institute Co., Ltd.

본 성적서의 유효기간은 측정대상품의 특성을 고려한 교정(교정주, 온도, 습도, 충격) 등의 교정조건을 변경하지 않는 한 유효하며, 교정조건을 변경하는 경우 유효기간이 연장될 수 있습니다. (NOTES) If any significant instability or other adverse factor(s) (drift, temperature, humidity and/or mechanical shock) occur, the validity of the calibration is likely to affect the validity of the calibration.

International system of unit (SI)

- Establish a correct unit system for all fields to secure reliability and avoid misunderstanding in testing





Certification System of Agri. Machinery in Korea



Agri. Machinery Certification Systems in Korea

1. Improvement progress of agri. mech. in Korea



1970's
(Crawling)

1980's
(Walking)

1990's
(Riding)

2000's

2010's

Rice

Protected Agri.

Smart Farming

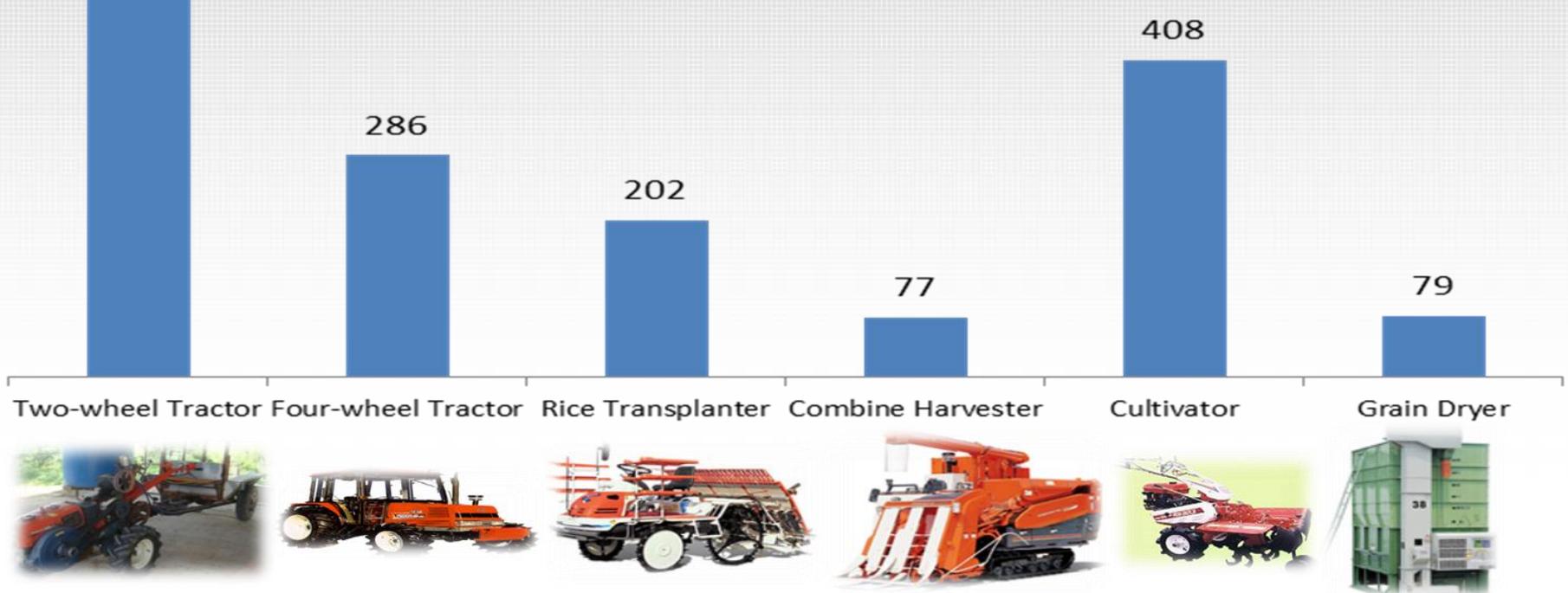
Source: CSAM – Regional Workshop on the Role of Mechanization in Strengthening Smallholders' Resilience through Conservation Agriculture in Asia and the Pacific (RDA, Byounggap Kim)

2. Number of agri. machineries in Korea(2016)

Agri. Mechanical rate for rice : **98 %**

Agri. Mechanical rate for field crop : **58 %**

Unit: Thousand



3. History of Agricultural Machinery Testing Station

Agricultural Machinery Test Building



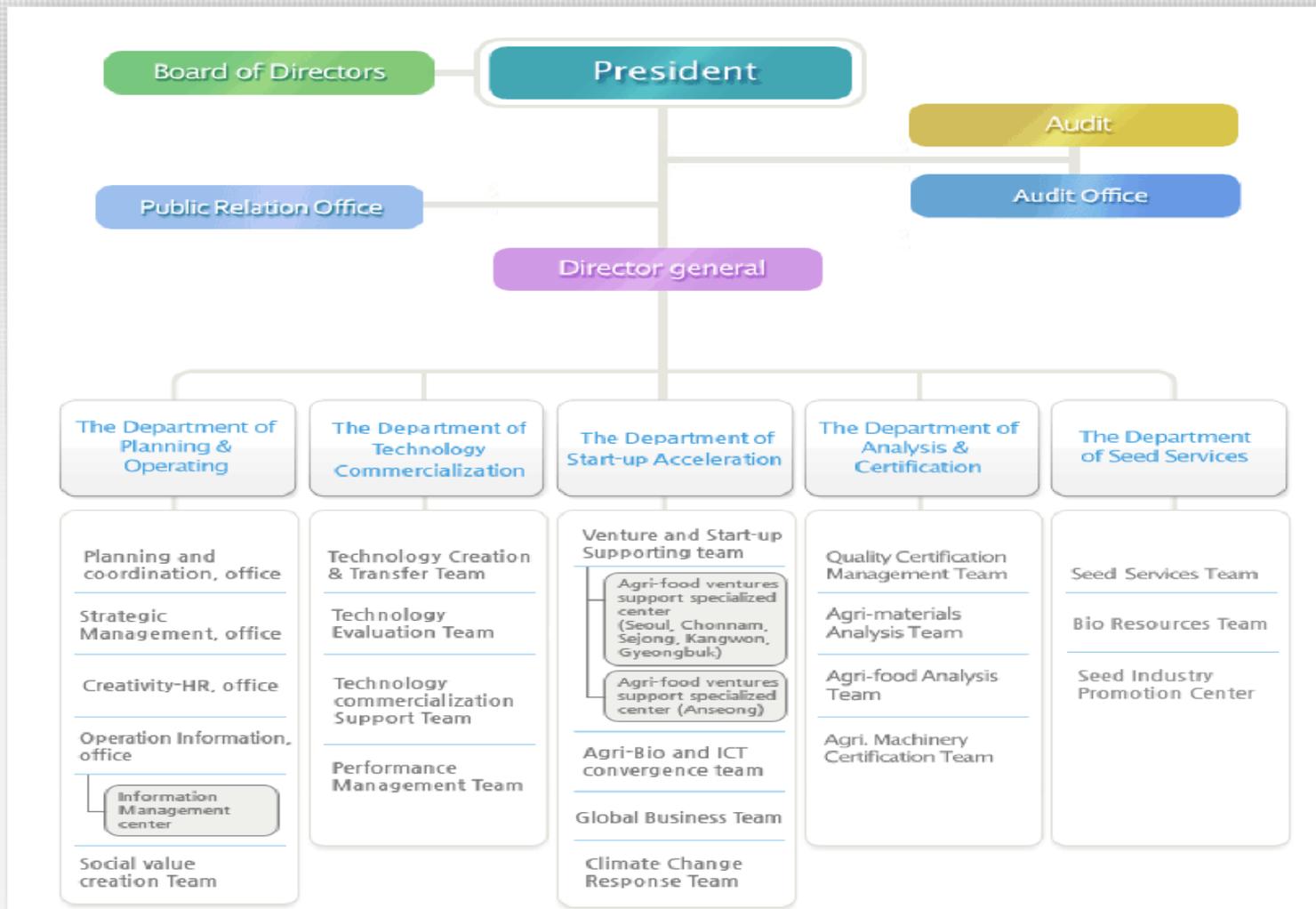
Agricultural Machinery Field Test Track



- 1966. 3. : National Agricultural Materials Inspection Office, Ministry for Agriculture, Forestry and Fisheries
- 1994. 12. : Agricultural Mechanization Research Institute, Rural Development Administration
- 1995. 12. : OECD Agri. tractor standard code designation testing station
- 2008. 12. : KOLAS International official testing station
- 2009. 9. : Foundation of Agri. Tech. Commercialization and Transfer
- 2018. 8. : Relocation to another city (build up new facilities)

4. Organization of FACT

○ Agri. Machinery Certification Team employees: 20



5. Legal base related to the Certification

- Agri. Mechanization Promotion Law
- Agri. Machinery Testing & Safety Management Regulation

6. Objects of Certification for Agri. Machinery

- Restriction of market entrance of defective agricultural machines
- Providing information necessary to select the agri. machines
- Support of Research & Development in agricultural machinery industry
- Support of domestic and foreign business activities
- Safety assurance of agricultural machines' users
- Contribution in environmental preservation and energy saving

7. Certification standards

- National Codes
 - ✓ Agri. machines general testing methods and criteria
 - ✓ Agri. machines safety criteria
- International standards
 - ✓ OECD Codes, ISO Standards, ASABE Standards, EC Directives etc.

8. Types of certification

- National test : Testing the structure, performance, safety and level of difficulty in operating
- Safety test : Checking the safety devices
- Specific performance test : Test for the development of agri. Machines
- International standard test : Test according to OECD, ISO, ASABE etc.
- Modification verifying check : Evaluating the suitability of the modified parts after certification
- Post test : To manage and supervise the machine after tests

9. Test machines(compulsory)

Test types

Machines

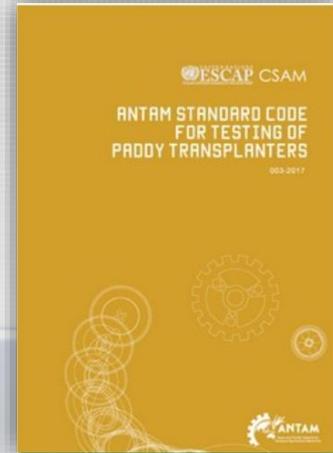
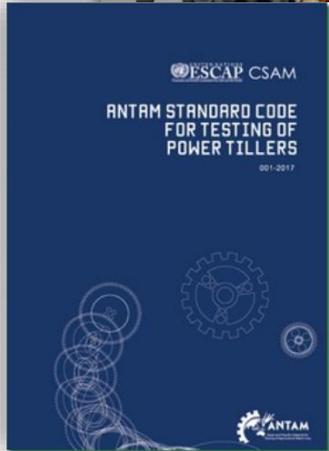
**National
test
15 items**

agricultural tractor, ROPS, combine harvester, riding type rice-transplanter, transplanter, agricultural heater, farm product dryer, low temperature storage, rice milling machine, riding type haulage vehicle, loader, excavator, riding type cultivator, riding type fertilizer sprayer, riding type baler

**Safety
test
29 items**

walking type rice-transplanter, walking type haulage vehicle, grain dryer, high place operation vehicle, rice planter, long distance pest applicator, travelling type sprayer, crusher, wood chipper, fertilizer sprayer, farm-product washer, oil use dryer, weeder, mower, lift, trailer, baler, cutter, coating machine, harvester, power tiller, walking type cultivator, speed-sprayer, feed mixer, sowing machine, feeder, skinning machine, threshing machine

10. Preparing for testing power tillers, powered knapsack sprayers cum dusters and rice transplanters





Testing of Agricultural Tractor in KOREA



Testing of Agricultural Tractor

1. Definition of Agri. Tractor

Agricultural tractor



• Self-propelled vehicles, at least two axles, designed to carry out the following operations for agri. purposes

- to pull trailers

- to carry, pull or propel agri. tools or machinery and where necessary, supply power to operate them with the tractor in motion or stationary

Testing of Agricultural Tractor

2. Testing items

Structures

Dimensions, Mass, Wheelbase, Ground clearance, Transmission, PTO, Linkage, Steering, Axles, Engine

Performance

PTO test, Drawbar test, lifting force test, Braking test, Noise test, Center of gravity, Water-proofing test

Safety

15 items including protection of PTO shaft, Instrument systems, Lighting systems etc.

Level of operating

Operating devices

Testing of Agricultural Tractor

3. PTO performance test



Test items

- Max. power test
- Full load test
- Part load test

Test requirements

- Ambient temp. : 23 ± 7 °C
- Power transfer loss of the torque and power value is not modified.
- The U-joint between PTO shaft and Dynamo. should not have any appreciable angularity.
- The exhaust gas discharge device must not affect the engine power.
- All tests should be carried out continuously.

Testing of Agricultural Tractor

4. Hydraulic power & Lifting force test



Test items

- Hydraulic power
- Lifting force

Test requirements

- Hydraulic fluid : recommended by the manufacturer and identified by type and viscosity in accordance with ISO 3448:1992.
- Temp. of tractor hydraulic fluid : $65 \pm 5^{\circ}\text{C}$
- Adjusting the linkage according to ISO 730:2009
- Angle of mast more than 10 degrees (if possible)
- Checking the oil pressure during the test

5. Drawbar test



Test items

- Max. draw power
- Max. draw pull
- Fuel consumption

Measuring & checking items

- Draw power
- Draw pull
- Velocity
- Wheel slip
- Fuel consumption
- Engine speed
- Temperatures(Fuel, Coolant, Engine oil, Air)
- Relative humidity
- Atmospheric pressure

Testing of Agricultural Tractor

6. Braking test



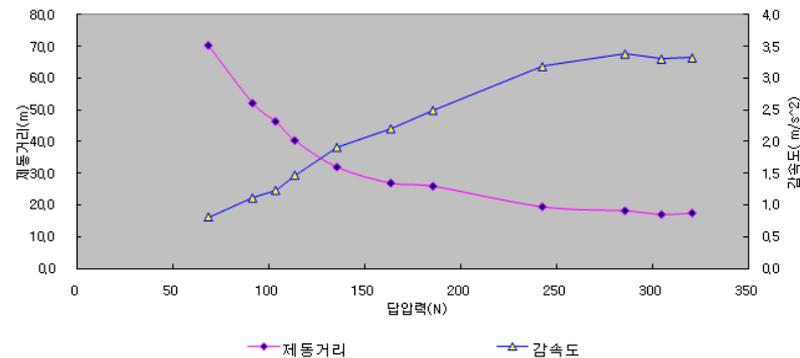
Service braking test



Parking braking test

Measuring & checking items

- Pedal operating force
- Braking distance
- Velocity
- Deceleration , $f = V^2 / 2S$
(f : Mean deceleration(m/s^2), V : Initial speed(m/s),
 S : Braking distance(m))



Testing of Agricultural Tractor

7. Center of gravity test



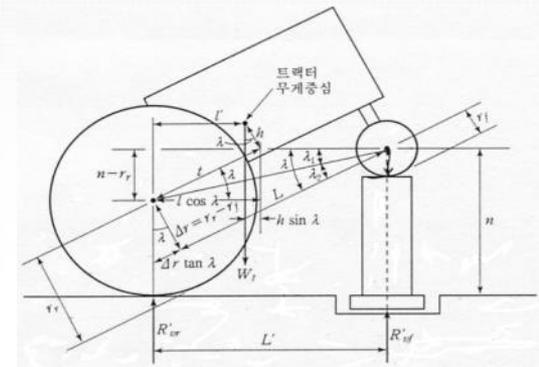
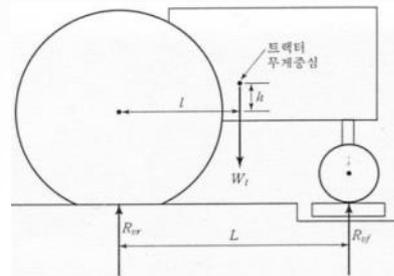
Position of Center of gravity



Overturning angle

Measuring & checking items

- Height above ground
- Distance from the vertical plane
- Distance from the median longitudinal plane
- Static overturning angle



Testing of Agricultural Tractor

8. Turning area and Turning circle



Measuring & checking items

- Radius of turning area
- Radius of turning circle
- Driving speed

9. Waterproofing test



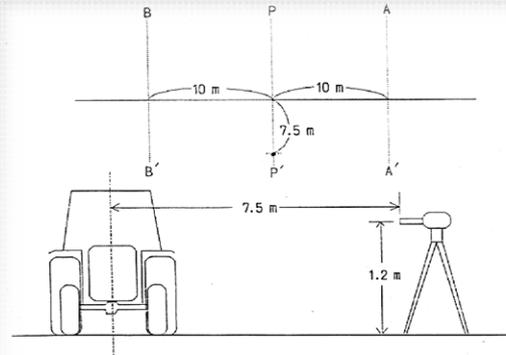
Checking items

- Axis housing
- Clutch housing
- Gear box

Testing of Agricultural Tractor

10. External noise test

- Max. noise
- Max. speed



11. Steering force test

- Steering force
- Operating time



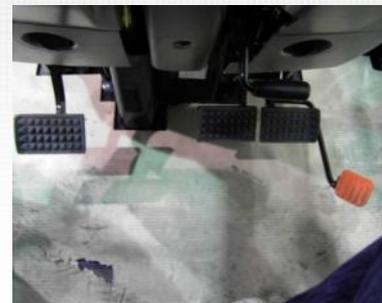
Testing of Agricultural Tractor

12. Safety test

Protection from the moving parts and safety devices



Operating systems and Driving position



Lighting, High temp. guards and Labels etc.





Test Equipment in FACT

○ Engine Dynamometer

- Type : AC (Alternating Current)
- Measuring the engine performances such as power, torque, speed, fuel consumption, temperatures(fuel, water, air, oil etc)



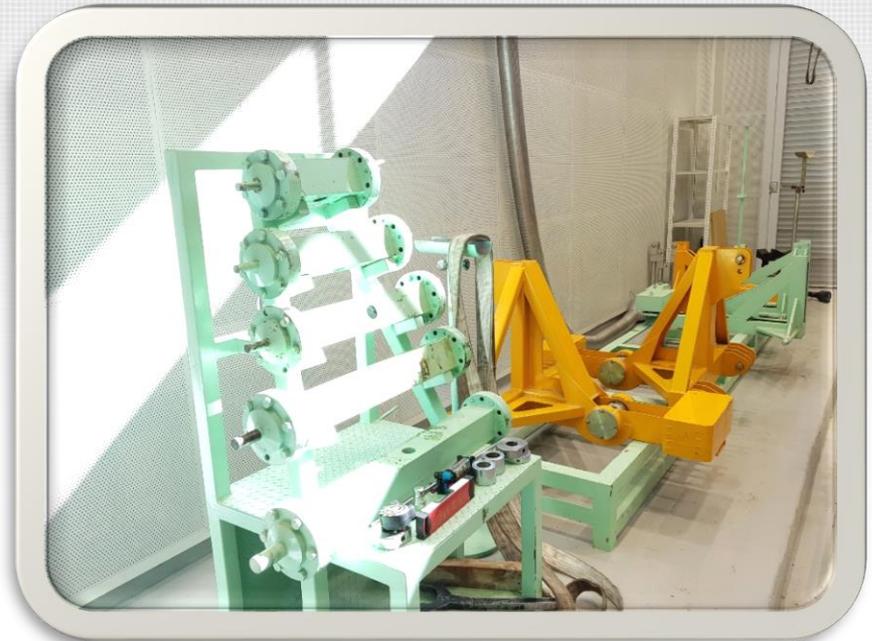
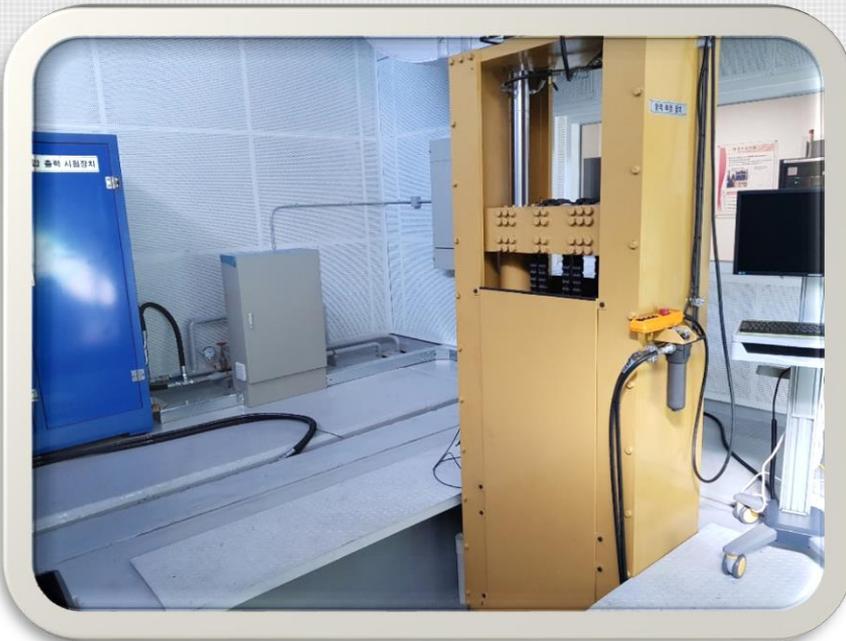
Tractor PTO Dynamometer

- Type : EC (Eddy Current)
- Measuring the tractor PTO performances such as power, torque, speed, fuel consumption, temperatures(fuel, water, air, oil etc)



Hydraulic Power & Lifting Force measuring system

- **Specification :** Max. Lifting Force 200,000 N
Max. Hydraulic Power 100 kW
Max. flow rate 250 L/min
Max. Hydraulic Pressure 24,000 kPa
- **Measuring the hydraulic power, lifting force, oil pressure, temperatures etc.**



ROPS testing system

- Type : Hydraulic
- Specification : max. load 20 t (Horizontal & Crushing Load)
- Measuring the load applied to ROPS and deflection of structure and strength of seat belt anchorage.



Lateral load



Vertical load



Seat belt anchorage testing system

○ FOPS testing system

- Confirming the safety of FOPS from the pendulum



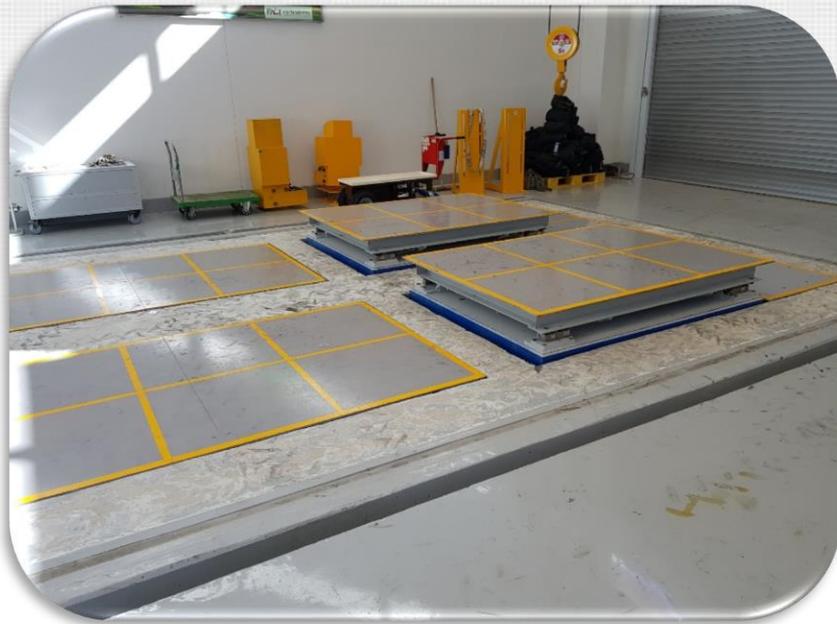
Level 1 : 45 kg (right)

Level 2 : 227 kg (left)

Test Equipment in FACT

Position of center of gravity

- Type : Load Cell
- Measurement Range : 20,000 kg (5,000 kg x 4 ea)
- Measuring the position of COG, theoretical overturning angles etc.

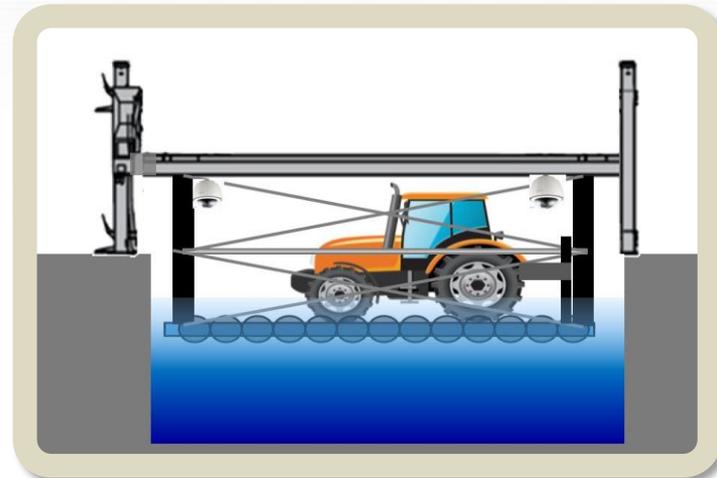
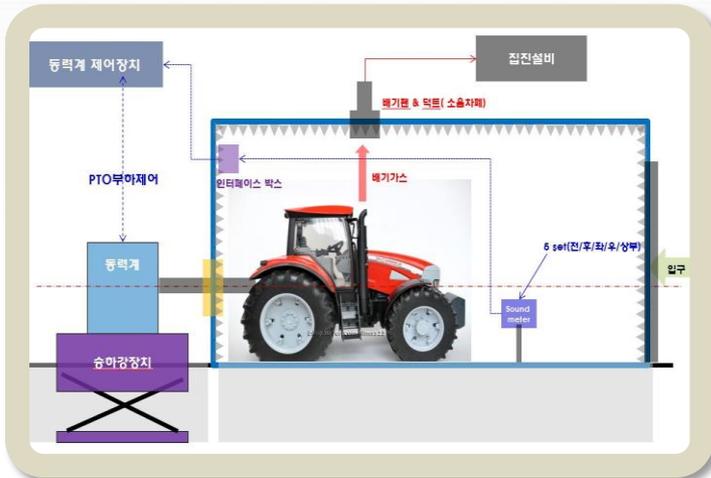


Overturning angle test

- Type : Hydraulic Cylinder
- Specification : maximum overturning angle 45°
- Measuring overturning angles in static condition of machines



Noise test chamber and Waterproofing cistern



Test Equipment in FACT

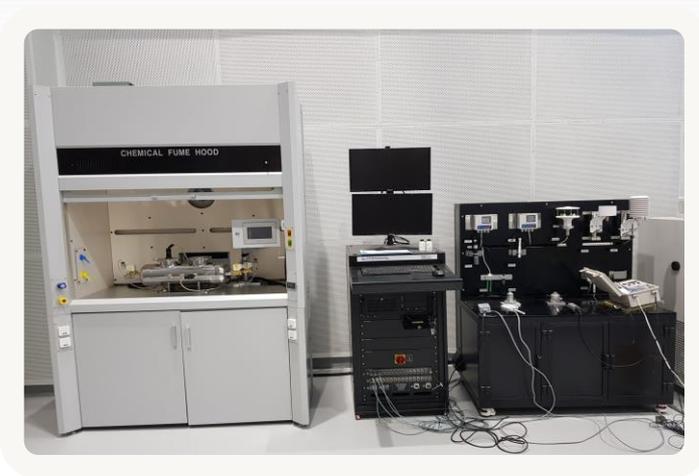
Heat-pump and Agri. Heater performance testing



Agri. Product – Refrigerator and Dryer performance test



Testing for Drone sprayers and Smart-Farm devices





FACT

Thank you