

連載

研究機関紹介

Automotive Research & Testing Center

Kuo-Liang Weng and Chao-Wen Chiang
Automotive Research & Testing Center, Taiwan

Automotive Research & Testing Center (ARTC, please see Figure 1) was established in 1990 by the Ministry of Economic Affairs in Taiwan together with the Ministry of Transportation and Communication, the Environmental Protection Administration and representatives of the enterprises of Taiwan based on the Automotive Industry Development Policy, which was approved by the Executive Yuan on March 15, 1985. Our objective is to be committed to the R&D of related technology, the improvement of product quality and internationally recognized testing and certification services, as well as assisting the government of Taiwan in stipulating and managing

regulations and standards, as illustrated in Figure 2.

Based on the beliefs in “Impartiality, Technology and Service”, ARTC is responsible for the integration of research resources and the upgrading of industrial technology throughout the entire Taiwan. We are backed by a complete series of laboratories, a proving ground, testing technologies, experience in analysis, innovation capability in key components and systems, and joint efforts of the industrial, academic and research circles, so we can assist related companies in Taiwan with the development of potential and anticipated products. At the same time, inline with the need for interna-



Figure 1: Main entrance of ARTC

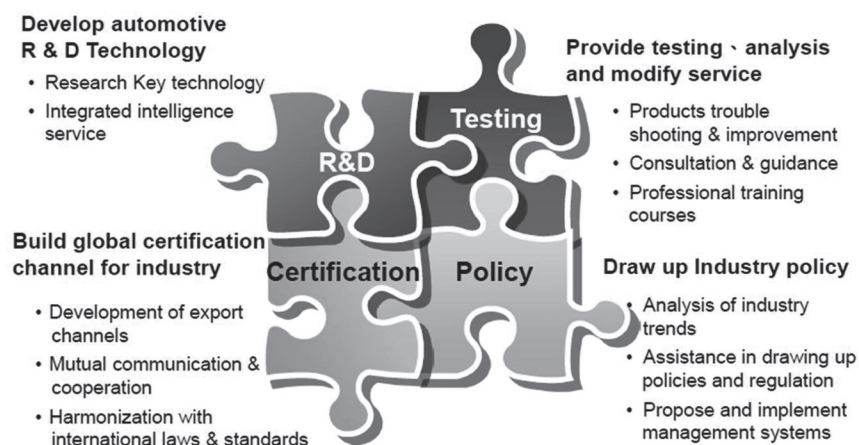


Figure 2: Operation missions of ARTC

tionalization, we have gradually built up a global certification network to promote excellent products to the world. ARTC is, therefore, a partner of government of Taiwan on safety and environmental issues; we also provide assistance in planning industrial policy.

In response to demands for better safety, environment protection and electronic control, ARTC has constantly focused on innovative technology, and we hope to move on with industry to break through leading technologies under the counseling measures from the government of Taiwan. Under our quality policy of “complying with legislation, satisfying our customers, with all members participating and constantly improving”, we are committed to becoming “the pioneer of technical innovation & knowledge service for vehicle”.

Research and development: Concentrating on research and leading a new era

ARTC persists the principles of sustainable development and value creation in advanced vehicle research. We make the effort of innovation and development to achieve the following:

- Improve the vehicle safety,
- Enhance the effects of environmental protection and energy saving,
- Make more convenient and comfortable to operate the vehicle,
- Assist the advanced development of automotive industry.

ARTC is working in response to research trends of vehicle safety, environment protection, intelligence and electronic applications, and to demands of variety challenges of auto-

motive industry. Based on the ability of automotive research and testing, the high quality R&D teams, and integrating the advantages of Taiwan electronic with IT industry, we devote to develop the key and progressive technology, advanced system models and innovative service applications which have long-term benefit to the industry.

ARTC takes the mechatronics control, lighting, image recognition and vehicle-to-vehicle communications technology that has been built up to develop many advanced systems and components across five areas of Intelligence, Safety, Green Energy, Optic and Chassis (please refer to Figure 3). These include safety enhancement systems, e.g. forward collision warning system (FCWS), blind-spot detection system of heavy truck, blind-spot detection and door opening warning system(BDS), dual-visions forward safety warning system (DFSW), automatic parking system(APS), around view monitor system(AVMS), driver status monitor system(DSMS); driving convenient systems, e.g. image type adaptive front-lighting system(IFAS), distributive lighting system for vehicular headlamp(DLS), electric parking brake system(EPB), electric power steering system(EPS); energy saving systems, e.g. intelligent LED headlamp; and intelligent systems such as telematics system and vehicular collision avoidance warning system. Moreover, we continue taking part actively in the issues of energy saving and environmental changes such as developing electric vehicles and green systems, and the study of improving efficiency and convenience and reducing traffic accidents by means of electronics and communication technologies.

ARTC drives many cooperative projects by integrating R&D alliance and cooperation of industries, academics, and research institutions in Taiwan. Besides, ARTC also cooperates

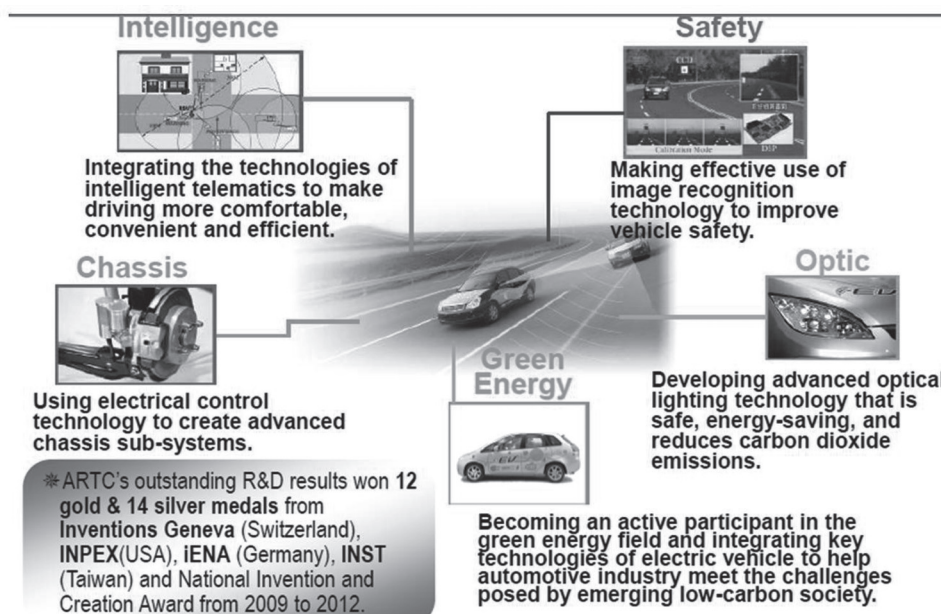


Figure 3: Five areas of R&D of ARTC

with international excellent research institutions to execute the R&D activities by merging professional specialties, manpower, and equipments. The developments and results of projects are helpful obviously. Moreover, the international experts and consultants were also invited to Taiwan to exchange the valuable opinions and industrial experience with domestic engineers by making presentations and giving technical supports during each R&D stage.

ARTC holds and attends numerous seminars, exhibitions, and international conferences each year to publicize the breakthroughs. The research achievements are realized by sharing the studies results with industries to encourage and to rich the development environments. Therefore, the innovation technologies and patents of intellectual property are authorized and transferred to vehicle industries over the years. This has led to great accomplishments that have made Taiwan's automotive products more attractive to makers and consumers in worldwide markets.

ARTC will continue to work with expectation of 'creating new value in motor vehicles', and to develop the improved technologies and research strategies. In the future we hope to develop even more outstanding and more value-added products for leading in Taiwan, trending in Asia, and looking for world. We believe that ARTC will play a critical role to enhance the harmony and tolerance between human, vehicles and environment; and ARTC will create the completely new future for the automotive field.

Laboratories: Synchronized research & testing technology and capability with world

Since ARTC was established with the support of the Science and Technology Projects introduced by Ministry of Economic Affairs of Taiwan, we have set up a network of twelve laboratories and developed the national integrated research and testing platform. The technical service fields

include vehicle safety, component quality, emission and fuel economy, noise vibration and harshness, electro-magnetic compatibility, vehicle performance assessment, computer-aided engineering, automotive optic design and calibration, etc, as illustrated in Figure 4. With technology transfer, strategic alliance, consultation and cooperation with industrial and academic circles, ARTC could provide the integrated service from product design to certification, and is devoted to the development and improvement of automotive products and the validation of the effective application of research results.

Proving ground: First world class proving ground in Taiwan, leading industry to approach global markets

Major vehicle dynamic performance covers high-speed driving, low, medium and high-speed steering, medium and high-speed straight driving, braking on turns, up-and-down hill driving and parking braking. Every test, regardless of whether it is related to product development or the legislative compliance, must be conducted in a testing area that meets all standards and takes all the basic requirements into consideration for testing operations so that the testing staff can perform to the best of their ability in accurately evaluating various performance standards.

The nine test tracks located on 119 hectares of grounds ensure that our on-road safety and performance testing meets every requirement, as illustrated in Fig. 5. With this facility, vehicles are tested for driving performance (test items include subjective assessment, power, braking, handling safety, ride and drivability), as well as durability and failure-mode. The functions of the proving ground of ARTC are listed in Table 1.

Design features of ARTC Proving Ground:

1. The test tracks and additional equipment are in compliance with international requirements. A complete research & test platform can satisfy various needs during vehicle

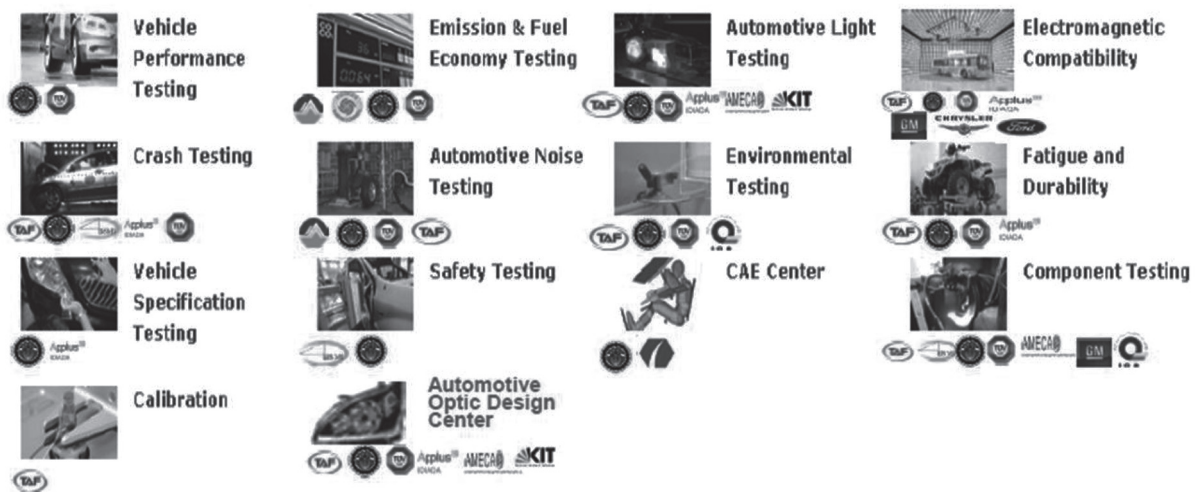


Figure 4: Current capabilities of varied fields (12 labs and 2 researching centers)

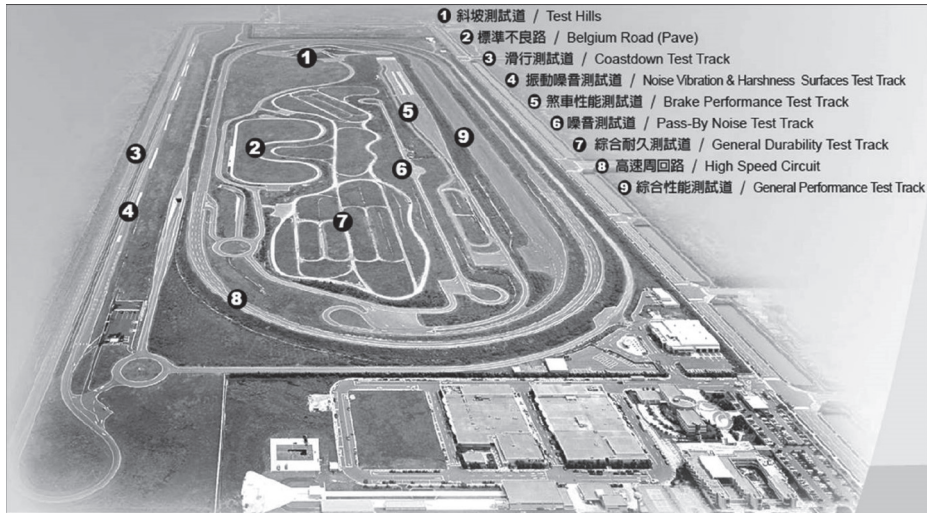


Figure 5: Proving ground of ARTC

Table 1: Functions of proving ground of ARTC

| 研發及產品改良 Research & Development | 相關法規、共同標準 Test Procedures、Regulation and Standards | 高速周回路 High Speed Circuit | 綜合性能測試道 General Performance | 煞車性能測試道 Brake Performance | 噪音測試道 Pass-By Noise | 綜合耐久測試道 General Durability | 標準不良路 Belgium Road (Pave) | 斜坡測試道 Test Hills | 滑行測試道 Coast down | 振動噪音測試道 Noise Vibration |
|--|---|-----------------------------|--------------------------------|------------------------------|------------------------|-------------------------------|------------------------------|---------------------|---------------------|----------------------------|
| 性能測試 (Performance Test) : | | | | | | | | | | |
| 煞車 (Braking) | • CNS D3015, D3030, D3114, D3198 • FMVSS122, 135、ECE R13H, R13, R78 • EEC 93/14、SAE J843, J299 | | | | | | | | | |
| 防鎖死煞車 (ABS) | • CNS D2201、SAE J46 • ECE R13H, R13, R78、EEC 93/14 | | | | | | | | | |
| 加速 (Acceleration) | • CNS D1074-4, D3016, D3031 | | | | | | | | | |
| 滑行 (Coast down) | • CNS D3017、SAE J1263、ECE R83 • EEC 70/220 | | | | | | | | | |
| 爬坡 (Climbing) | • CNS D1074-5, D3019, D3034 | | | | | | | | | |
| 轉向 (Steering) | • CNS D3119, D3120、ECE R79 | | | | | | | | | |
| 操縱安定性 (Handling) | • CNS D3131、ISO 3888, 4138 | | | | | | | | | |
| 乘適性能 (Ride) | • ISO 2631-1 | | | | | | | | | |
| 最高速 (Maximum Speed) | • CNS D3018, D3039、EEC 95/1 | | | | | | | | | |
| 速率計校正 (Speedometer Calibration) | • CNS D1001、ECE R39、EEC 2000/7, 75/443 | | | | | | | | | |
| 噪音 (Noise) | • CNS D3058、ISO 362 • EEC 97/24、ADR 83、SAE J1477 • ECE R51, R41, R117 | | | | | | | | | |
| 振動噪音性能 (Noise Vibration & Harshness) | | | | | | | | | | |
| 懸吊特性 (Suspension) | | | | | | | | | | |
| 牽引力 (Traction) | | | | | | | | | | |
| 耐久測試 (Durability Test) | | | | | | | | | | |
| 加速耐久 (Accelerated Durability) | | | | | | | | | | |
| 實用耐久 (General Durability) | | | | | | | | | | |
| 底盤結構強度耐久 (Structural Durability) | 可依下列方式執行： 1. 依廠規需求 2. 主觀評價 3. 與送測廠商討論之測試規劃 | | | | | | | | | |
| 高速驅動耐久 (High Speed Powertrain Durability) | | | | | | | | | | |
| 主觀評價測試 (Subjective Assessment Test) | In accordance with： • Custom-made requirements. • Subjective assessment. • Planned testing conditions. | | | | | | | | | |
| 其他 (Other) | | | | | | | | | | |
| 空氣震盪動作 (Airbag misuse) | | | | | | | | | | |
| 運轉性測試/評估 (Drivability Test/Assessment) | | | | | | | | | | |
| 路面干涉性測試 (Curbside Impact Test) | | | | | | | | | | |
| 低級音(裝配性)測試 (Squeak & Rattle Noise Test) | | | | | | | | | | |
| 水密性測試 (Waterproofing Test) | | | | | | | | | | |

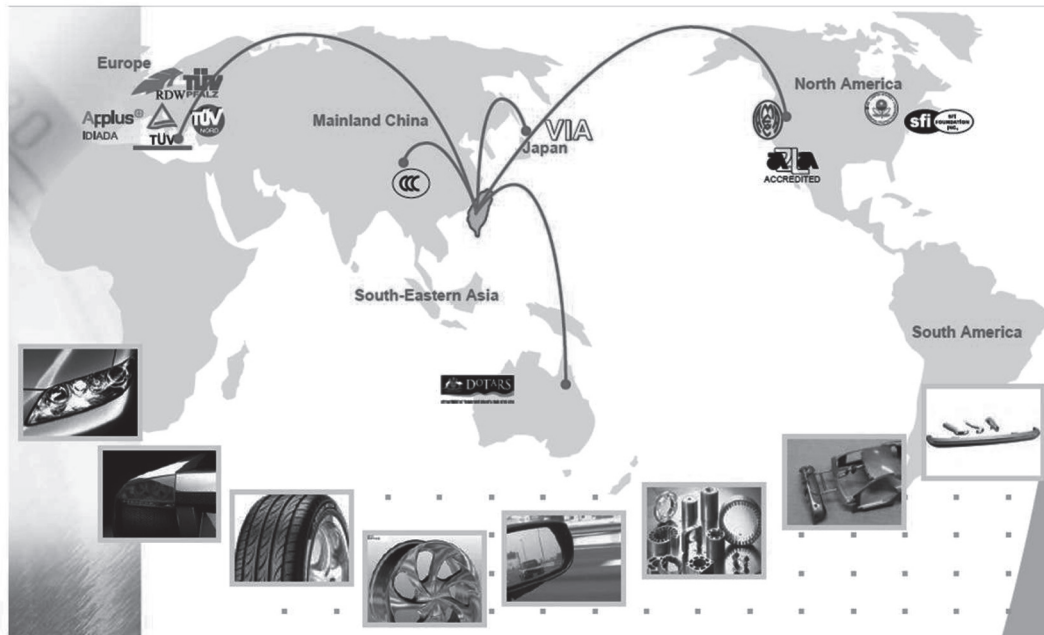


Figure 6: Global certification services of ARTC

development, also the redundant investment is saved, overall cost is lowered and the schedule of development is shortened.

2. Various performance tests compliant with ISO, FMVSS, ECE/EC, CNS and other customized items can be done.
3. Complete software and hardware facilities make ARTC the best place to demonstrate the performance of products.

Certification serve: In synch with rest of world, to facilitate market development

As trade becomes easier throughout the world, Taiwan's vehicles and components manufacturers have to speed to open up global markets, providing after-market (AM) service and developing opportunities as original equipment manufacturers (OEM). We will continue expanding the territory to ensure that we are in line with the needs of our clients.

To contribute Taiwan's manufacturers to export worldwide, ARTC has been cooperated with overseas organizations such as AMECA, A2LA, AQRP, EPA in US, VIA in Japan, DOTARS in Austria, TÜV in Germany, RDW in Netherlands and IDIADA in Spain, as illustrated in Figure 6. Manufacturers get great benefits of efficient schedule and lower the developing cost.

Besides the assistance with the approaches into the markets in Europe, USA and Asia, ARTC began to participate APEC Automotive dialogues since 2003 to cooperate with the global administrative departments and certification organizations in Asia and Pacific region. In the future, ARTC will gradually dedicate in regulations research and certification channel in South-east Asia, India and Latin America to expand its service territory. With the aim to assist automotives to participate in fast growing area, we do endeavor to help the automotives

to get new national certification.

Building up public trust: Making improvements to ensure our customers' satisfactions

Besides quality system is certified under ISO9001 and ISO/IEC 17025, ARTC have been approved for local and global authorities as well. We hold more certificates from Taiwan Accreditation Foundation (TAF) than any other organization in Taiwan. We are known and trusted by every sector in the domestic industry, and our experience in quality control is respected and used many manufacturers in the market. We distribute our know-how through a T-shaped system in which the lateral arms are the general resources and certifications services, while in the vertical direction we offer technology guidance and transfer as well as basic development assistance for those who want to improve their quality as well as to protect the rights of consumers. Meanwhile, ARTC is also providing its experience in related testing programs, quality systems consultation and laboratory verification to Taiwan's industry to build up an excellent image for Taiwan's products.

Prospect: Marching onto international stage with automotive industry

The development of automotive industry can be traced back more than 100 years. In Taiwan, it also goes back over 50 years. Taiwan started real development of its automotive industry with a series of policies enacted in 1972 than enabled the industry to grow through various stages of growth by introducing new manufacturing techniques. This was followed up by aggressive development of overseas markets, which quickly brought good results.

With Taiwan's entry into WTO and the pressure for market globalization and liberalization, the automotive industry is now at the critical moment for structural adjustment. In response to the growth of the global automotive electronics market, we should fully utilize Taiwan's competitive advantage in electronic industry to further strengthen our ability of developing complete vehicles and key components. Taiwan will thus be able to utilize the advantage of 'designed in Taiwan' (DIT) to become a research and development center as well as a supplier of high value-added components in the Asia Pacific region.

In the future, harmonious co-existence among people, vehicles and the environment is absolutely essential. Taiwan's automotive industry is on the verge of entering a new era, and ARTC will function as a bridge and medium for communication among the industry, government and research organizations based on our belief in "Impartiality", "technology" and "service". We are now ready to approach the global markets and extend the vision of people's life by applying the latest technology with "speed that only Taiwan can offer, quality that meets international standards, and prices that beat the rest of the world".