INTRODUCTION OF OVERSEAS TECHNICAL CENTER

Introduction of FUJITSU TEN TECHNICAL CENTER, USA, INC

Akihiro FUJIWARA Keiji FUJIMURA Hidenori TSUCHIDA Takeshi KONUMA



Introduction

7

More than 20 years have passed since the overseas technical activities started with one engineer in Los Angeles in 1985. In 2002, FTTC (FUJITSU TEN TECH-NICAL CENTER USA, INC) became an independent entity, and now it has grown to about 40 employees. Meanwhile in North America, a transforming automotive industry has been seen due to the full-scale local production by the Japanese automotive manufacturers, business expansion of the BIG3, expansion of local planning and development of vehicles, and others. Conforming to such changes, we have developed various functions over the years. However, we did not change our basic functions to evaluate the reception performance and sound quality of in-vehicle audio system under the local radio signal environment, and to find out the local customer demands with the input of our local staff. We continue to expand the evaluation scope and improve the accuracy with the progress of technical development factors. In the mean time, we work on the AE (Automotive Electronics) field with our customers in the medium term viewpoint, focusing on the products for convenience, safety and active safety. Recently, we started marketing activities with the anticipation of catching the trends of fast-changing services and functions of INFOTAINMENT devices.

Outline of FTTC

FTTC is located in the west of Detroit, Michigan in the United States and we have easy access to the factories and technical centers of the main Japanese/American automotive manufacturers. Also, we maximize the synergy with the sales department and quality control department and provide the proactive actions to our customers, taking advantage of impetus through the cooperation with FTCA (FUJITSU TEN CORP OF America). Similar to the American automotive manufacturers, the Japanese automotive manufacturers also aim at completing the whole cycle from the local planning and development to the local manufacture and sale in North America. As part of the design localization activities, we have pursued the localization by introducing the CAD to the panel design and mounting design of AVN and audio system. For the evaluation of reception performance and sound quality performance, we have conducted highly-specialized activities such as feeding the performance and functional specifications, which are customized to the market in North America, back to the development step of platform where various functions are integrated. Also we constantly investigate the technical trends of other companies (benchmark), verify the market evaluation result s of third-party organization (various evaluation results of JDP), and study the operability in a vehicle with the automotive manufacturers.

In AE field, we evaluate the millimeter-wave radar that contributes to the active safety system, antitheft device of vehicle, RES (Remote Engine Starter), etc., and support our customers. Also we anticipate the future needs considering the regulations and trend of standardization, and make suggestions of the next-generation products in cooperation with the engineering group in Japan.

2.1 Organization and Staff

FTTC operates in three sites, Los Angeles, Indianapolis and Detroit. As of the end of 2008, we have 27 local employees and 16 expatriates from Japan. The organization consists of following groups:

- ①Group specialized in the performance improvement for sound and reception
- ⁽²⁾Local mechanical design group, making full use of CAD
- ③Evaluation group that supports the development design works with automotive manufacturers
- (4) Design evaluation group for AE Products
- (5)Marketing investigation group that supports the product planning

Also, we have the advantage that we can always utilize the resource and facility of the quality control department of FTCA mentioned previously, and can promptly analyze the quality issue from the viewpoint of designers locally. This activity contributes to the market quality improvement significantly, resulting in the winning of JDP Customer Satisfaction Award 2009.

3 Efforts for CI-related Operation

3.1 Sound and Reception

In North America, a car is a very important means of transportation and people spend much time in a car every day. Under this circumstance, automotive manufacturers and their customers have high expectations for audio

FTTC continuously conducts benchmarking activity and investigation on user preferences and market trends to provide the sound system conforming to the preference of the users in North America. From the results, we propose the layout of speakers, specifications and sound functions that are optimized for the developed vehicle, and conduct the sound tuning and product development with the input from American staff.

In North America, people tend to spend a long time listening to radio broadcasts in their cars, so they have a high degree of interest in the "Radio." Therefore, to provide stable high quality sound to our customers, we need to improve the reception performance and respond to the radio wave environment varying from moment to moment while the driving. Recent trends have shown that the digital broadcasting (SDARS/Satellite Digital Audio Radio Service, and HD-Radio/Hybrid Digital Radio (Fig. 1)) has become popular in North America, in addition to the existing AM/FM analog broadcasting. In accordance with this trend we expanded and improved the test bench simulation, and feed the quantitative design requirements back to the development department, based on the evaluation result achieved from the actual radio wave. This information can only be made locally in the U.S., using the results from benchmarking activities of competitor products and sound tuning results under local condition (considering the difference of environment, modulation, output power, etc.) so that we know it is most suitable for the local market.

. <Feature>

- Transmitting by superimposing digital signal in band of current AM/FM analog broadcast (spectrum mask)
- Adopting hybrid system to switch to digital sound quality for more than medium/intense electrical field, and to existing analog sound quality for weak electrical field
- "Free broadcast" is available due to revenue in commercials
- Digital sound quality + text data (name of broadcast station, weather report, traffic information, etc.)

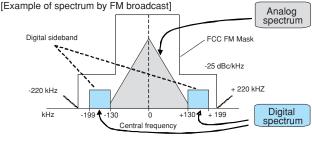


Fig.1 Outline of HD-Radio

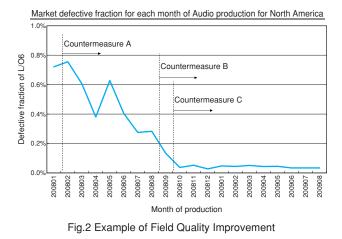
3.2 Mechanical Group Local Design and Quality Improvement of Deck Mechanism

The mission of the mechanical group is to work as a technical liaison between Fujitsu Ten Japan and automotive manufacturers in North America. We focus on defining design specification, vehicle installation, and faceplate panel design, etc. for the vehicles developed in North America. The group has three local employees and one expatriate from Japan. Recently, FTTC has led the design of 2010 TOYOTA AVALON radio faceplate panel and was actively involved with defining the specification for the GM 2013 model year radios for which new material will be used for chassis design. From a long term perspective, we will focus on the investigation and report of advanced technology of North America, specifically on the trends of size and weight reduction in the industry.

The mission of the deck mechanism group is to implement the quality stabilization activities mainly for deck mechanisms released in North America. The group has two local employees and one expatriate from Japan The focus of the group is to have early detection of defect information and take preventive measures, through the "obeya meetings" for deck mechanism quality and the regular meetings with Japan headquarters.

These activities contributed to the early resolution of market problems that have high tendency to occur, which led to the winning of JDP Award 2009. Starting with this group, the award was a great encouragement to all employees who are involved in this activity (Example of Improving Market Claim (**Fig. 2**)).

We will continue to put new quality stabilization plans in place, make new investigations on technologies and catch new business opportunities in North America.



3.3 OEM Activity

Streamlining of the American automotive manufacturers and further promotion for localization of the Japanese automotive manufacturers have a major impact on our local development system. In addition, the requirements including the reduction in size/weight, functional reconfiguration, etc. are increased, and characters of electronic devices are going to change significantly.

In response to the promotion of localization of the Japanese automotive manufacturers, as well as making the progress report of developed models, DR, and defect report of production models, we conducted various work group activities and held educational seminars of radio operation and design principles to strengthen the foundation together.

We focus on the trends of competitors in North America through the results from benchmarking activities of reception, sound and various functions, and demonstration vehicle. This information is also shared globally within Fujitsu Ten. Moreover, we contribute to improving and expanding the evaluation method, which includes the working activity to select the course for reception evaluation, and the working activity to evaluate the voice recognition that needs the unified evaluation method urgently as a new function (Example of Voice Recognition Evaluation (**Fig. 3**)). Thus, we continue to propose the improvement of evaluation, performance and function from a viewpoint of end users as a specialized manufacturer.

Especially for the American automotive manufacturers, our expatriate staffs devote themselves to coordinate with the development department, and related departments of our head office. Our operation is driven by local American staffs and supported by coordinators. Also for the Japanese automotive manufacturers, we will aim to make the same operation system.

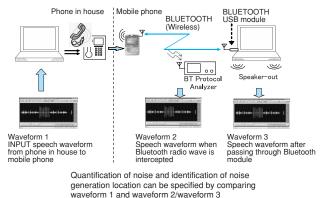


Fig.3 Example of Evaluation Method of Voice Recognition with BT (Bluetooth)-compatible Mobile Phone

4 Efforts for AE-related Operation

The AE products dealt in North America are divided into the following three fields:

- 1. Active safety device such as millimeter-wave radar, etc.
- 2. Convenience and safety devices such as antitheft device, RES, etc.
- 3. CRAMAS (Computer Aided Multi-Analysis System) that supports the development and design and contributes to the improvement of design efficiency

These are handled by three local engineers and three expatriates from Japan. The active safety device and convenience/safety device are designed by our headquarters. Customer support ranging from planning to following up after the mass production, the local evaluation and investigation on the products of other companies are conducted by FTTC (Test of RES in Cold Region (Fig. 4)). The CRAMAS mainly support the maintenance activity of customers who use the CRAMAS. As for the AE products, we investigate the trends of technology and regulations through technical seminar, exhibitions and information exchange with customers. Moreover, we aim to collect/share the information globally and regularly exchange with the technical centers in Japan, America and Europe.

4.1 Active Safety Device

Our millimeter-wave radars are delivered to the main automotive manufacturers in the world directly or through the parts manufacturers. The North America market is the best market that we can expect its growth. The development of active safety system for "Car that never collide" is as important as the efforts toward environmental problems in the United States. The various activities including the popularization of forward vehicle collision warning system, automatic operating system in the near future, etc. are conducted by the automotive manufacturers and government affiliated organizations. The role of FTTC is to understand this trend and contribute to the development of millimeter-wave radar that can be applied globally.

4.2 Convenience and Safety Device

The antitheft devices and RES products for dealer installed option for the automotive manufacturers are available. They are manufactured in FTdM (FUJITSU TEN de MEXICO) which is a production site in North America.

We make efforts for competitive product development that provides "convenience," "classiness," and "fun" to our customers with the cooperation between Japan side and America side.

4.3 Support Equipment for Development and Design

Currently, more than a dozen CRAMAS are utilized in the automotive manufacturers and parts manufacturers in North America for development, design and evaluation. FTTC provides the regular upgrade and maintenance service, and feed the customer demands back to the development group of our head office.



Fig.4 Test of RES in Cold Region (at a temperature of -30°C in Canada)

Product Planning Responding to Changing Times

For the promotion of product planning in North America, three local employees and one expatriate from Japan work in the Michigan office. The main work contents are the investigation/analysis of market trends in North America, HMI benchmark evaluation of vehicles in North America, projecting/planning of North America specific product specifications, support for the local customers, etc. The challenge that we currently address is to share the information from the investigation/analysis of market trends with our head office and other overseas subsidiaries efficiently and effectively.

5.1 Market Information System

In the Michigan office, there is information collected on a daily basis, such as the general information of North America, the benchmark results, the latest technical information from various exhibitions, etc. We think it is important to analyze and transmit them on a timely basis to reflect them in the next generation products. This group created an "information shelf" for large amounts of information to be shared with our head office. This enables everyone to browse the latest information and market trend in North America at anytime as the information is saved on Web (intranet). Thus, convenience and immediacy are the highlights of this information sharing system.

The information on Web system consists of the date of information acquisition, summary of information and main body of information. If the users require more detailed information, they can enter the contents into the online comment column and make the feedback including the request of continuous investigation, etc. to this group. Moreover, this system also has a function to search the related information from the information ever posted efficiently by entering the keyword.

This intranet Web system can also be used for surveys, which local staff can fill up in a short time. This helps to routinely evaluate new functions, design direction, HMI, and status of product usage, etc. for example, we use this system to narrow down the ideas in which the local preference of HMI is reflected.

5.2 Future

The fields to be focused on in the future include IT and ITS such as remote service, link-to-mobile-phone and surround monitoring system. We have started the survey analysis and projecting/planning of North America specific infrastructure and application. Especially in North America, not only the navigation or e-mail but also the Smart Phones are widely used and developed as a daily tool, and the linkage with the vehicle is important challenge in the future.

As shown in **Fig. 5**, we can predict that the Smart Phone has an impact on the previous added value and business area.

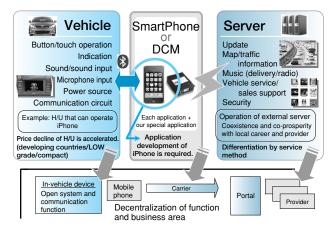


Fig.5 Prediction of Change of Functions and Services by Thin Client

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Conclusion

FTTC has continued to work with a keyword, "North America specific." We will contribute to the survey analysis from the viewpoint of local environment, local vehicles and local users, and strive to high value added and local specific feature functions.

6

From the result of annual benchmarking of competitor products, we can see that the North America specific sound quality and reception performance have been increasing consistently. The current trend shows that the HMI is gaining the attention with the complication of systems and rapid change of media. The technology to obtain the high sound pressure level in a car at a low cost and adoption of DSPs with high processing capacity are important items to be developed that directly affect the quality of our local activities. Therefore, we will continue to monitor the trend of other companies. Moreover, the innovative system design is required for performance and function to receive the broadcasting in the North America specific environment in which the digital broadcasting and analog broadcasting are mixed. We will surely feed the market needs back to the development department by strengthening the linkage with providers/businesses and the local operation.

We think it is important to further strengthen the foundation of our system to grasp business opportunities with the restructuring of the automotive industry. Especially we will start to strengthen the marketing department that has been weak. For products, we anticipate that the companies compete with each other to incorporate the system of function enhancement by onboard and off-board using software, which represents the progress of mobile phone, into the business of in-vehicle device. We will focus on this field by strengthening the advanced development planning field with IT/ITS group of our head office and others.



Fig.6 Staffs in FTTC who are Pleased to Win JDP Award 2009

Profiles of Writers



Akihiro FUJIWARA

Entered the company in 1981. Since then, has engaged in the design of CI products and reception system. Currently, the President of FTTC since March 2008 after residing in Thailand.



Entered the company in 2001. Since then, has engaged in the design development of navigation and audio system. Currently, the Sr. Coordinator of R&D Department of FTTC since December 2008.



Keiji FUJIMURA

Entered the company in 1978. Since then, has engaged in the development of safety system such as millimeterwave radar especially. Currently, the Vice President of FTTC since April 2009.



Hidenori TSUCHIDA

Entered the company in 1988. Since then, has engaged in the development design of CI multimedia products. Currently, the Vice President of FTTC since January 2007.