

Review of Practices of Safety Assurance in Chinese Railway – Evolution Post-Accident

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ABSTRACT

With high-speed line growing from zero to longest in the whole world within six or seven years; several new metro lines commissioned each year in single city; Chinese railway market and industry is no doubt the most fascinating, vibrating and fastest-growing one around the globe. Chinese railway has suffered severe set-back in 2011 from the infamous Wenzhou semi high-speed line accident, but the industry is not defeated. A series of changes have happened from top to down in the industry; the pace of development has never slowed and the industry is now ready and is poised to take on the global market.

The authors of this paper come from the industry with first-hand experience of the accident, have gone through and witnessed the practices and the changes of the industry from pre to post accident. This paper examined the lessons learnt from the accident, the risk brought with the fast development and ever-growing complexity of the railway from the points of view of the supplier, the third party and the regulator.

China has its railway industry and capacity since long time ago; and its industry and market are relative open compared with some self-sustained relative closed ones. The industry has been tracking developments in over-seas counterparts especially that of Europe in technology, practices and standards. Ever since the CENELEC railway safety standard (EN50126 series) published around the turn of the millennium, the railway academic society in China had been promoting the concept and principle of them. By 2005/6 some suppliers had begun the trial of the standards' application in their product development. The CENELEC standards, now International standards have been widely adopted by the industry following the shockwave of accident, regulatory changes, and market requirements. The CENELEC standards were established then under the specific European regulatory and general societal background. This paper looked through the journey that the industry took in adopting CENELEC standards and International practices in assuring the safety of the railway in the general fast development background. The main roles involved, the supplier, the third party and the

regulator work in the general framework as described in the standards. However, under the general culture and regulatory background which is different from that of Europe, relevant parties played a slightly different roles in a Chinese specific way. This paper also looked at this arrangement; its involvement, characteristic and the effectiveness; and its prospect in helping the Chinese rail industry into the International market.

BACKGROUND

Like many countries in the world Chinese railway used to be a closed industry. The railway authority, the user (mainline railway administrations), and the suppliers were all one big state-owned family. As China began to open up and reform its economy more than 30 years ago, railway industry also gradually changed its structure. But it only gathered its pace from the turn of the new millennium. China has seen six major speed enhancements from 1997 to 2007. In the first speed enhancement line speed of three key routes linking some of the key big cities had been upgraded to 140Km/h; while the sixth one had seen a Passenger Dedicated Line (PDL) network with line speed above 200Km/h covering key major cities and southeast coastal regions established. While China only opened-up its first-ever high speed route at 350km/h in 2008 just before Beijing Olympic; the total high speed route with speed over 250Km/h will be over 19,000Km by 2015, more than any other countries combined, in only 7 years.

The fast development has changed the ways the industry works and also brought lesson learnt. The Chinese railway industry is regarded by average people in China even as of today as the not yet opened-up and transparent industry in China-the last one of its kind. Yet the industry actually operates very similar to many other industries of the commercial world now. The suppliers compete to submit their product to be accepted by the user, the authority guards the safety by approving products that can be used in railway – though the way it has been done has changed considerably since the Wenzhou accident.

The Wenzhou railway accident of 23 July 2011 was a major accident at the peak of railway construction. The direct (technical) cause of the accident was the issue of a signalling product design. The general background is the fast development of the railway, the high demand of product, the lack of resources to meet the demand, the challenges of managing the development and approval of modern complex safety critical product, etc. According to the State accident investigation report, almost all parties involved from operator, product supplier, product acceptance and approval body, to construction management, etc are all at fault.

The investigation report pointed out the development process of the product has not rigorously followed the relevant procedures; inadequate planning, development management, review, test, approval etc activities have been conducted leading to product design fault.

The investigation report also pointed out the issues associated with approval of the product. There was no clearly defined technical approval criteria for the product, and there was no clearly defined approval procedure for new product (like the one concerned). There was loophole for the authorising of the product to be used.

The accident shocked the country and was a real set-back for the industry. The high speed line building and general railway construction had almost been ground to a halt after the accident, (the speed has resumed now and is probably even faster than pre-accident). The railway management and administration has been completely overhauled, and so is the product approval process.

CURRENT PRACTICE

For modern complex signalling product development, the European (now IEC) standards EN50126 suite has been widely adopted by the suppliers now. The European standards have been known to the Chinese signalling industry ever since they were firstly published some 15 years ago thanks to the Chinese railway academia society. But they were not used by the industry for some time because of lack of understand of them. Then some leading suppliers started to adopt them in product development around 8/9 years ago with the help of consultancy firms from Europe.

Now the independent third party played an important role in product development safety assurance, and the role has been changing. At the start of the process, the Chinese suppliers lack the understanding of the European standards. To say there was big gap between the then Chinese supplier practices and the European standards was not fair. The suppliers had their own ways of delivery the development and safety assurances, it is only they had not been doing that systematically and consistently, and presenting the information in a defined way.

The then key issues the third party consultancy focus was to make sure the suppliers understand the technical requirements and process requirements set by the standards. The activities involves giving the supplier training, interpretation of the standards, checking on the development output at each step to make sure they understand the requirements and doing it correctly.

As the suppliers take on more and more projects, they now have good understanding of the standards. And as the Wenzhou accident impact subsiding and railway construction gather up speed again, the key issue saw by the third party consultancy shifted. As they are under pressure to deliver, some started to try to play smart and cut corner. The third party's key focus is now back to the "independence", observe them and make sure they do not cut corner in the work.

The approval process has also been changed, the safety approval of product to be accepted in mainline railway now has clearly defined process. It involves third part assessment/certification before administrative approval can be given.

Interestingly as Ricardo Rail Asia also operates other Asian area, the author saw very similar things happening in Korea and Japan, the other two countries who have railway supplier industry. The Korean and Japanese suppliers, especially the Japanese who had their own ways of doing things and were doing well are adopting European standards. They are also going through the process of learning – practice – becoming competent, with the help of independent third party, only maybe some time lagging their Chinese counterparts.

CONCLUSION

The Chinese railway industry now operate in similar mechanism as that of European countries, the European (IEC) standards are widely used. The Chinese railway construction will still be in high pitch for the next few years. But the suppliers also have the remit to sell their product/service in International market. They will soon be competing at the same level ground with their European counterparts in International market.