

**INTERVIEW OF MR WEBB AND RUFFORD BY LU HAIZHU
AT THE EXPRESSWAY MAINTENANCE CONFERENCE IN NANJING
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Lu: Mr. Webb, Mr. Rufford, very glad to have you both here today. Could you please give us a brief introduction on your expertise and the work you are involved?

Webb: Broadly speaking on our common interest, we share interests in transportation, land transportation specifically. In my case, it is particularly infrastructure asset management, road network asset management, but my emphasis is on pavement, materials, surfacing types, bituminous materials, asphalt mixture design, pavement design, structural design, PMS systems, network planning, etc. We also produce for the provinces the statewide level future plans for maintenance intervention and cost estimation.

Rufford: Mainly, I am involved in the feasibility studies for investment in road infrastructure, so we help local and state governments make cases for funding for developing the road networks. So that is my main focus within the company.

Lu: Clear enough!

Webb: Further, another of my activities is with a private university in Australia called CPEE (Center for Pavement Engineering Education). CPEE provides specialist training for engineering, postgraduate engineering studies, because many of the universities don't have specialist subject areas in pavement engineering and it is only covered in limited areas in a small number of universities in Australia. So, we need a private university to cater for this market. CPEE provides this education on national level, predominantly by distance learning. People can do their master in pavement technology through this institute. I am also involved in a one-semester course on infrastructure asset management for undergraduate students in university of Tasmania. This course considers the broader infrastructures and their interrelationships not just the pavement component.

Lu: I think it is a little bit different in China; we have several universities with strong pavement engineering programs. In North America, they also have some universities with excellent pavement engineering programs, you probably know Prof. Haas from University of Waterloo and they have developed a pretty large pavement program there. In Australia you have a trend of developing college courses of this nature, is that because there is an increasing market demand for the infrastructure management expertise?

Webb&Rufford: Of course, there are a lot of works needed to do here now. Even in the pavement area, we realize in China there is much more emphasis on the environmental impact so it is not just the structural capacity or design capacity of the pavement. It is the whole environment; really it is more about integrated corridor management, everything that happens in the whole road reserve, or corridor, including the natural part of that, the trees the animals, the waterways, as well as making the structure capable for the future traffic demand.

Lu: The fact is in Jiangsu we have already developed some programs to help manage the pavements and bridges, even though not in quite an integrated way. Currently my company is also making efforts to develop a more integrated system and expecting to achieve the benefits only an integrated system can bring. Do you have any comments on this?

Webb&Rufford: That is a worldwide phenomenon, in our practice in road engineering, typically we emphasis on one thing or another; whether we build a road and a bridge; we do one thing and someone else comes along and does something else. But we didn't communicate very well. But we've noticed in China specifically, it is moving toward much more integration. It is easy for us to see this because in China things move rapidly. You can implement a system quite quickly and sometimes even the standards and specifications can be implemented in quite a rapid manner. That is very different from Australia.

China is in a very fast phase of development and also you have different political structure, which means that you can have a central government adopting a 5-year plan and you can roll out a high level strategy. Even though at the provincial level there are quite a lot of flexibility, you still follow a national plan. This is different from Australia and the USA, where they have federations. In history each state has developed its own specification and standards. So we have diversities from different states. It is understandable because we only have 25 million people. So it is very hard to pay for a very sophisticated modern infrastructure system with such a small population, around 1/3 of Jiangsu province.

Lu: I think it is similar in Canada, where I have studied for a couple of years, they have a huge land but small population, and thus they don't have that much demand to cross the land. They even don't have an expressway system. The reason why Australia doesn't have the incentive to invest too much for a very sophisticated modern infrastructure system should be the same.

Webb&Rufford: We do have a national expressway system and we have it administered under the federal level, this level of government does have a strategic plan and management for the national route, the interstate route; but under that, each state controls it. The next level is the local government, which has by far the longest length, then the state length and then the national length.

Lu: I almost forget my planned question. That is ok although, at least I can know the background and context of roads in Australia better. You said just now that the federal government does have some control on the highway network, what is its role? After these roads are built, which level of government is responsible for managing them? Where is money from?

Webb&Rufford: The federal government is mainly responsible for planning the national routes, the roads that link all the states. The money is from the federal government for that part of the network. However, the management is from the states. Aside from managing the national roads, the states look after their own roads as well. In 1974, the law was made that the Commonwealth of Australia took responsibility of all the major interstate roads; most of the budget is from federal government for national highway network and the rest of it is funded by the states.

Lu: I think it is still a little different from Canada, where most of the operating money is from the province, even for the highways included in the national highway system. The federal government only pays around 15% of all the money needed. Anyway, could you please give me a brief introduction on the history of the development of highway network in Australia?

Webb&Rufford: It started predominantly at the main population centers in Australia, a very focused area, predominantly on the east seaboard, the main capital cities, Brisbane, Sydney and Melbourne, and then to the south central Australia, and later to Perth in the west Australia. These are about 85% of the population. Nearly all the population just spread around these capital cities.

Lu: In national highways in Australia, do you have some common distresses in the pavement and in China, generally the pavements are in pretty good condition but depending on the regions, some regions may have water problems, cracking...?

Webb&Rufford: I think in Australia we have similar distresses as found in highways in China. Also our network predominantly is a little bit older, because Australia developed the network 2-3 decades earlier. We also have a longer design life, minimum 20 years instead of 15 years as in China. New South Wales, one of the states, they use a 40 year design life for their concrete roads.

Lu: Since you are mentioning it, just a quick question, what are the main pavements types in Australia?

Webb&Rufford: There are three main types of pavement in Australia. Sprayed bitumen seal on a granular layer without a structural layer. This type of pavement is even used on the interstate network. These pavements make up the majority of the total length of the Australian road network. In the city areas, we have asphalt pavement usually with multiple layers, just as that used in expressways in China, and then in some parts of the country they have concrete road, but overall they occupy only a small percentage, just a couple of percent. For the sprayed bitumen seal on granular layer type of road, it is sound enough and historically it has worked for us, but now less and less so because of the increasing traffic and age, most of them are near the end of their life. We in Australia have much bigger trucks we call road-trains, up to 50 meters, much longer than the typical truck length (19 meters) in China. Because of the traffic the maintenance is changing. It is not the same business as usual. Significantly, in the context of this meeting, most of our measure to investigate the pavement condition has been surface distress, predominantly, using laser profiler, that is the only thing we measure systematically on all the main road networks. We typically do it once per year.

Lu: Do you have any cement bound bases in the asphalt pavement roads in Australia?

Webb&Rufford: Yes, we have. We also call it composite/semi-rigid pavement. They supposedly have a higher strength. In some highly trafficked areas, we have deep-lift asphalt and composite pavements but a short length overall.

Lu: Let's move to the next question. So how widely the pavement management system is used in Australia?

Webb&Rufford: Again, most states run a PMS on a provincial level road. But it is not just one system, they don't have a national system. Why I am saying this is when you go down to the next level, they not only use different systems, they use different indexes and parameters. They use this to forecast the performance of their network.

There is an organization called Austroads. This is the association of all of the state road agencies and local government in Australia and New Zealand. This organization publishes the best current design guidelines for PMS and also covers many other subject areas. The guidelines are the minimum requirements of all the states. In each state, you can add more than what is listed in the guidelines. Actually, it is more than pavement, it covers bridges, traffic, environment, drainage etc. There are more than 120 guidelines in total and it is like the national standards, but the state governments choose to adopt the standards. They are not mandated by the national government, just like ASSHTO in the USA. We follow what happens internationally, we follow the SHRP program and adopt solutions relevant into our country.

Lu: For pavement management system, there are a lot of vendors for software packages. Some organizations even develop their own in-house systems. That is also what we are trying to do now. How about the PMS software packages in Australia?

Webb&Rufford: Some states use HDM4, a generic model originally from the World Bank and now managed by the World Road Association (PIARC). Some of them also use dTIMS™. There are different models but there is no nationally endorsed software package. Actually, we have one too in our own company that we offer to our clients. For local governments, they have dozens of different propriety systems. Each of them chooses the system they want to apply; even neighboring councils don't necessarily have the same system.

Lu: I think most of the highways in China are less than 15 years old and both of you have been very active in highway related consulting in China for more than 10 years, I suppose. Based on your observations, do you see some strengths or weakness in Chinese highway system in terms of maintenance or management?

Webb&Rufford: For strength, I think there has been quite a lot of focus on understanding the material properties, characteristics used in the road. Also, there has been much emphasis on capturing the data of highways in a systematical way, from visual assessment, like counting the cracks and potholes to automated detection systems, like laser roughness measurement, cracking measurements. In Australia, the new development there is traffic-speed deflection measurement. Till now, for most of the current condition measurements, we only had equipment available to measure things on the surface and we don't have a measurement of what is happening inside the pavement structure. We are using FWD or something like this to measure structure condition, but only on a project level instead of a network level, because of traffic and cost. In the last two years in Australia, there has been increasing use of the high-speed deflection measurements to get the

structural capacity of the road and a lot of money has been spent on this. In Australia, this machine was purchased from a Danish company called Greenwood. Two days ago we were also visiting a company called Zoyan in Wuhan, they have similar technology. Based on what we see in Australia, we have also talked to Dr. Zhang Zhixiang about the potential use of the Laser Dynamic Deflection Measurement System in Jiangsu expressways. In Jilin, we have also talked to our colleagues about experimenting with this technique on their highways.

Lu: Before I wrap up this interview, based on your long consulting experiences in different countries including China? Do you have some suggestions for us as a highway maintenance and managing company to improve our practice?

Webb&Rufford: I think we are travelling a parallel path. We can benefit from collaborating with each other. This is what we have been doing in Jilin province, For the last ten years we are making efforts to building relationship, exchanging practices, sponsoring delegates to Australia and also we have people come over to China. I think it is very important and a good way for sharing.

Usually people have high expectation. I don't think we have something you never thought about. We look around the world all the time and have visited most of the countries, the opportunities I think is not in the next big thing but an attitude of open communication and information sharing.

However, I do want to talk about something that I think is important that may be relevant to your question. As we all know, with traffic-speed deflection measurement instruments and GPR, another contactless, non-destructive measuring technique, we can understand the condition of the pavement structure, this is good and we will implement more in the future. The focus is to use this data to develop an integrated system, especially to get closer to predicting the remaining life of the pavement. We all agree on the theory of the early intervention, as in Australia we call it 'stitch in time'. For example, when we know the structure starts to degrade we can put some new surfacing to stop the water or do some early prevention. We all know the concepts, the opportunity is to use the data and do the analysis and come up with a smart system, a system that can process the data rapidly and correlate the data with each other. Finally, you can come up with new indexes and experiment that can relate to the performance better. Nobody have the answer yet. Otherwise we can all copy, I am sure.

Lu: I have a question for Mr. Rufford since you have mentioned that you are involved in make cases and feasibility assessment for new construction. How is the new highway construction going on in Australia?

Rufford: It is mainly about extending the city network out to the remote rural areas where they don't have a bitumen-surfaced road. People in some regions are very productive growing wheat and cotton but they don't have a surfaced road to take their produce to markets, so we do the feasibility assessment to justify the funding for these roads, so the local government can get the funding from the state and commonwealth governments.

Webb: I would like to add something more else I think is important.

Lu: Sure!

Webb: It is not about pavement structure but general road management. Traffic congestion is an issue for most of the countries. So what people should be concerned about is not only anticipating the structural degradation---the remaining life of the pavements, but also how we manage the current highway usage, that is controlling the capacity of the system. In Australia, we have a lot of ITS systems on our expressways to regulate traffic, one of our current focuses is to minimize the impact to the pavement from trucks since we all know that trucks can incur considerable damage to road pavements. We want to regulate the truck traffic but we don't want to stop the traffic. Also, we don't have tollgates as you have in China, so it is not easy for us the control the truck traffic. We mainly have two ways of dealing with the issue. One of them is to let the operators self-regulate themselves and make them load legally at the very beginning. If they can demonstrate their legal compliance, maybe in their office they may have their own weighbridge, maybe they have different certification or their vehicles have electronic identification systems. If we have WIM, we can confirm that with WIM, but WIM has limitations with accuracy and even we can have a number from WIM, we still need to have the results from a weighbridge to take to court. Our efforts are to minimize this and let the operator to self-regulate and give them incentives, like your truck can go to ETC lane instead of stopping at the weighbridge for checking. Truck issues are very important in Australia because we have a very high level of freight traffic and we have the highest level of truck per person in the world. And truck traffic is what causes a lot of the congestion.

In China, you regulate the truck traffic in different ways, maybe no trucks in daytime or in a required period of time of the day. It is almost impossible in Australia. Also, we all understand the perpetual pavement which is we know how to build but we can't afford to do it everywhere, you must be selective to the get the return on the investment. This is another difference between China and Australia. In China, you have already invested a lot and you have the pavement usage to build the entire infrastructure to high quality. Our challenge is that we have built a lot of pavements just enough for us at the cheapest price, but it has worked. If we can predict the service life of them well, say 15 years, we can minimize the maintenance in this period. Then we can invest accordingly and have a more realistic invest plan.

Hua: How do you deal with the noise problems in Australian highways?

Webb&Rufford: Are you familiar with OGFC? It is still asphalt pavement but it has only coarse aggregates and without fine aggregate results in an air void content of around 20%. So it is very quiet. For safety, it reduces the spray and water film. It must have a waterproof layer underneath of course. They are mainly used in the urban highways. If you drive behind a big truck, there will be a lot of spray in the rain but if the surface is open graded or porous asphalt there is very little spray and quiet surface.

Hua: Do you have service areas along the Australia expressways and how you deal with the sewage water?

Webb&Rufford:

Not like in China where they actually have bureau offices as well. In Australia, we only have pump stations, shops, toilets, and all the convenient facilities. Out of the city, we might have what we call rest areas where you can pull over and have a rest, park and sleep for a while. No food outlets, but there are WC, parking area, barbeque area if you want to cook something for yourself.

For sewage water, if it is in the remote area not connected to the main sewage processing system, we would have a small sewage treatment plant. By the way in Australia it is common for the maintenance of this type to be delivered by the contractor not the government. Although there is not a consistent contacting system across all Australia, it varies from regions to regions, yet the private company has done most of maintenance work.