The IKT to Asia in 2018 saw delegates attend a range of different sites across South Korea, Japan and China.

BROADENING HORIZONS

AUSTRALIAN ASPHALT PAVEMENT ASSOCIATION PROVIDES A REPORT OF ITS 2018 INTERNATIONAL KNOWLEDGE TRANSFER TO ASIA, DETAILING THE LATEST INNOVATIONS AND ADVANCEMENTS IN FLEXIBLE PAVEMENTS ACROSS SOUTH KOREA, JAPAN AND CHINA.

Once again, Australian Asphalt Pavement Association (AAPA) led Australian and New Zealand flexible pavements professionals from member road construction companies, consultancies, state road authorities and bitumen suppliers to exchange expertise and experience with like-minded professional bodies overseas.

AAPA has led similar delegations at regular intervals over the past 30 years through Europe, the United States of America and South Africa. However, this marks the first time in AAPA history it has undertaken its International Knowledge Transfer (IKT) across Asia, visiting South Korea, Japan and China.

IKT benchmarks Australian / New Zealand flexible pavements engineering and construction practice against those around the globe. The transferred learnings drive opportunities for continual improvement in engineering, construction, sustainability and safety. Many learnings were ascertained from the tour, which are shared below.

MOVE AWAY FROM CONCRETE

The Asian countries visited all have a mature highway network. In each of the countries, the delegation was advised that due to the challenges with performance characteristics, opportunity costs and long term maintenance of concrete pavements, there has been a general move away from concrete in favour of asphalt. This shift towards heavy-duty flexible pavements for improved affordability, ride, noise and maintainability wasn't a surprise to the group.

RECYCLED ASPHALT PAVEMENT (RAP)

Asphalt is one of the most renewable materials on the planet, being 100 per cent reusable. RAP usage in Asia (in particular in Japan and South Korea) is greater than Australia. In Japan RAP makes up 80 per cent of all new asphalt material placed. Since no RAP is allowed in the open graded surface layers, the RAP content of base layers regularly exceeds 90 per cent. In China there is government incentives for Contractors to use in excess of 50 per cent RAP. Road construction firms, through performance-based specifications have greater autonomy and road authorities do not cap the amount of RAP allowed in pavements.

The higher RAP percentages drive changes in the production plant design. A separate drying drum for RAP is typically installed to allow the production of high RAP content mixes. There is greater company research and process around the binder impact in RAP mixes - compared to Australia – and rejuvenator is used at RAP contents greater than 20-30 per cent.

USE OF COLD AND WARM MIX TECHNOLOGY TO REDUCE ENERGY COSTS

The use of cold and warm mix asphalt in Asia is prevalent. This leads to greater safety and sustainability benefits in the production and delivery of flexible pavements. The motivation is predominantly a reduction in energy cost, not workability and the contractor is able to nominate the temperature range with the modulus assumptions built into the design.

IMO 2020 will see a new global limit for ships to use fuel oil on board with a sulphur content of no more than 0.50 per cent (the current limit is 3.50 per cent). The sulphur restriction on fuel oil means that many oil refineries will have to make substantial investments in upgrading their facilities to meet the IMO 2020 requirements. Since bitumen production is linked to fuel oil production, this has potential implications

for bitumen availability. The SK refinery was visited in South Korea and this refinery produces over 2 million tonnes of bitumen per annum. The Australian annual consumption (as a benchmark) is in the order of half this volume from this one refinery.

SK advised that it is currently investing US$1 billion in its refinery to meet the new IMO requirement.

SUSTAINABLE ASPHALT PLANTS

In dense urban areas there are greater environmental requirements for emission controls. This requires some asphalt plants to invest in technology such as vacuums and plasma to reduce emissions. The tour was hosted by Ammann in China, where many of the new plant environmental controls being explored by this group were presented.

CONSTRUCTION

Across the countries visited the opportunity of intelligent compaction technology is being explored for greater quality control in the delivery of bituminous pavements. There are several well documented benefits of intelligent compaction for asphalt, including: uniformity and density and efficiency and documentation of the compaction process.

This technology is available in Australia and being trialled by AAPA members. As part of the AAPA continual improvement program, work is underway to assess and implement the technology uniformly across the country

In high dense urban areas the effects of noise and heat sink are managed through the painting of existing rigid pavements to reduce the glare and heating of surrounding buildings. However, more widespread is the use of open grade asphalt, which shows significant benefits on both these attributes.

SAFETY

Australia / New Zealand benchmark well with Asia in roadworker safety management, however, some differences were noted on major freeways, in particular:

- The use of colour to delineate work zones and gain attention of the travelling public.
- Led flashing as opposed to reflectors alone to delineate traffic zones.
- Less traffic controllers on-site, with greater autonomous controls used.
- As in Australia, autonomous braking and tracking systems are being trialled on heavy equipment to reduce the risk of incidents related to interaction with workers / pedestrians.
- The beginning of increased use of smart technology such as drones for on-site compliance. This technology is currently in trial showing great promise for: availability of real-time data, automatic data input into a BIM, reduced workers 'on site' and preparation of as constructed drawings.

The tour undertook a number of guided tours seeing amazing historic sites such as temples, gardens, marketplaces, local cultural shows and traditional eateries The AAPA IKT 2020 will be announced following the 18th AAPA International Flexible Pavements Conference and Exhibition in August.

AAPA would like to thank its hosts and supporters in Asia, without whom the tour wouldn't have been possible: Korean Institute of Civil Engineering, Korea Expressway Corporation, Hyundai Engineering and Construction, Sakai Heavy Industries, ShiraokanPlant, i-Construction Expo, Nichireki Corporation, Public Works Research Institute, Zhejiang Highway Association, Geochina conference, ZCCC, SouthEast University, APT, Ammann, Tongji University