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Research

Natural replacement seashells in porous asphalt mixture for parking lot pavement

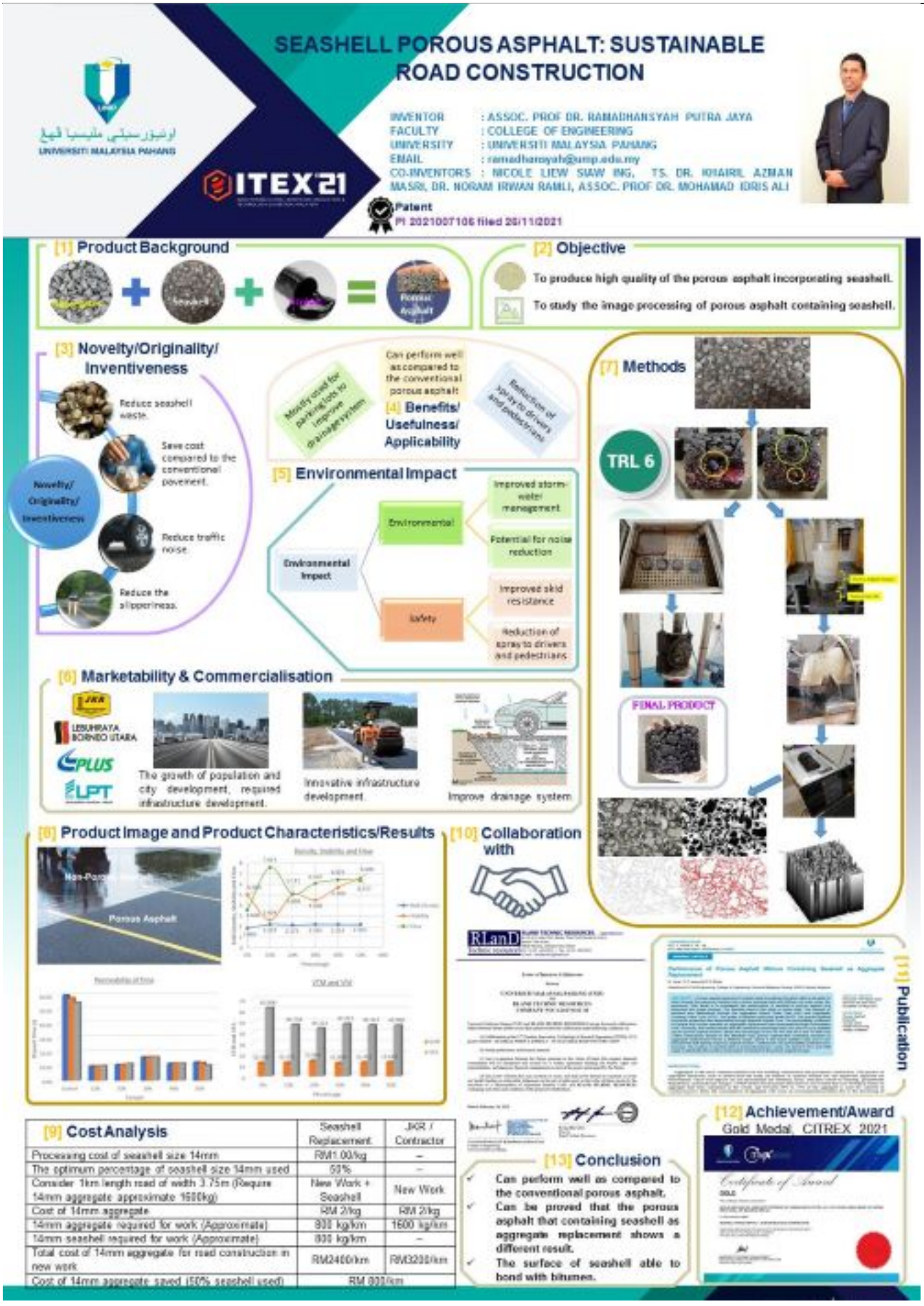
18 January 2022

PAYA BESAR, 12 January 2022 - Water is a major factor contributing to road pavement damage, especially in parking lots.

Water will diffuse and produce moisture and cause a saturated aggregate layer.

Therefore, to overcome this problem, a study titled Seashell Porous Asphalt - Sustainable Road Construction by a researcher and lecturer of the College of Engineering (KKEJ), Universiti Malaysia Pahang (UMP), Associate Professor Dr. Ramadhansyah Putra Jaya, 42, was successfully carried out to evaluate the effectiveness of seashells in porous asphalt as a natural replacement material (aggregate).

According to Associate Professor Dr. Ramadhansyah, the main use of porous asphalt pavement is for parking lots that allow water to drain through the pavement surface into the stone recharge bed and infiltrate the soils under the pavement.



[9] Cost Analysis

	Seashell Replacement	JKR / Contractor
Processing cost of seashell size 14mm	RM1.00/kg	–
The optimum percentage of seashell size 14mm used	50%	–
Consider 1km length road of width 3.75m (Require 14mm aggregate approximate 1600kg)	New Work + Seashell	New Work
Cost of 14mm aggregate	RM 2/kg	RM 2/kg
14mm aggregate required for work (Approximate)	800 kg/km	1600 kg/km
14mm seashell required for work (Approximate)	800 kg/km	–
Total cost of 14mm aggregate for road construction in new work	RM2400/km	RM3200/km
Cost of 14mm aggregate saved (50% seashell used)	RM 800/km	

“So far, seashells has never been used in porous asphalt pavement engineering.

“Seashells have great potential to be used as an aggregate replacement in the design of pavement mixtures to improve road performance, especially in areas that receive heavy rainfall.

“This research started in July 2020 and completed in June 2021,” said the researcher hails from Banda Aceh, Indonesia.

He said aggregate usage in building construction and road pavements is very high at the moment.

“The large use of aggregates will create environmental problems such as the deterioration of natural earth resources.

“Therefore, this study uses seashells as an aggregate replacement material in porous asphalt mixtures.

“It is one of the alternatives to reduce the use of natural earth resources,” he said, who received his doctoral degree from Universiti Sains Malaysia (USM).

The study was conducted with a postgraduate student, Nicole Liew Siaw Ing and assisted by three lecturers, Ts. Dr. Khairil Azman Masri, Dr. Noram Irwan Ramli and Associate Professor Dr. Mohamad Idris Ali from the Department of Civil Engineering, KKEJ, UMP.

He said seashells are mixed into the main components of porous asphalt pavements as aggregate replacement materials to increase the strength and durability of the pavement.

“The use of seashells as an aggregate replacement material is expected to improve the performance of porous asphalt pavements, especially in areas that receive heavy rainfall.

“It can also be expanded in other constructions such as pedestrian walkways and concrete drain covers.

“We are also collaborating with Rland Technic Resources as a building materials manufacturer.

“Collaboration with government agencies is being worked on with the Public Works Department (JKR Malaysia) to expand the use of seashells as replacement materials for road pavement,” he said.

This research won a gold medal at the CITREx 2021 competition and a gold medal at ITEX 2021.

He also conducted research titled Waste Cooking Oil as Bio Asphalt and Waste Plastic as Green Road.

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