# POSTER SESSION

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# A pavement full-depth reclamation case study using cold *in situ* recycling with foamed bitumen

## INTRODUCTION

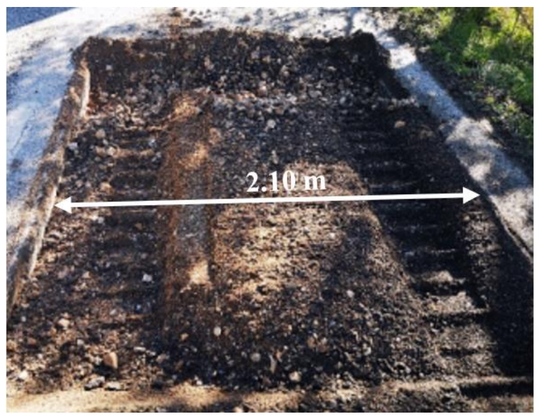
The new "Circular Economy Action Plan" presents a set of initiatives to normalise and encourage sustainable products and services, changing consumption patterns to avoid waste production.

In the road paving sector, it becomes logical that recycling distressed pavements is one of the best circularity solutions. The full-depth reclamation of asphalt paving materials using cold *in situ* recycling may be one of the alternatives that is most sustainable and easier to implement in specific situations.

## OBJECTIVE

This case study aims to assess a recycling technology used *in situ* to implement a full-depth reclamation of a distressed pavement based on foamed bitumen.

## RECYCLED LAYER COMPOSITION




*In situ* extraction of reclaimed material

Sample of milled material for lab testing


Specimens of cold recycled material with foamed bitumen produced in the laboratory

## RECYCLED LAYER CONSTRUCTION

The recycling solution comprised the following construction process:

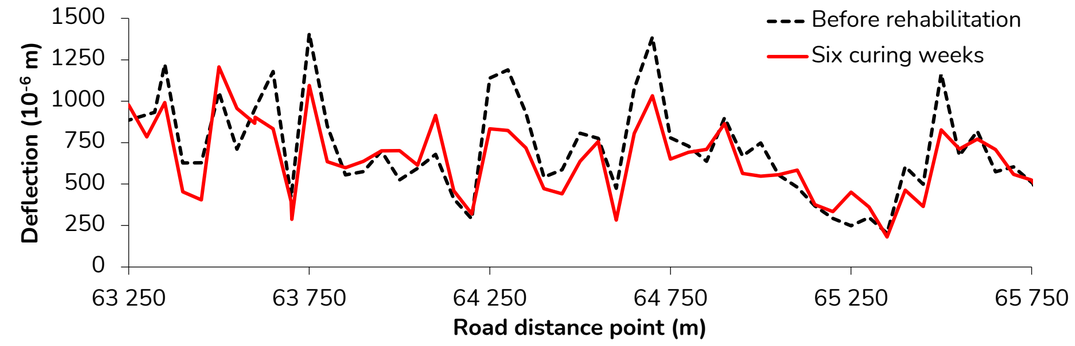
- Application of 2.0% lime over the existing pavement
- Cold *in situ* recycling of the pavement with 2.6% foamed bitumen in a thickness of 0.16 m
- Application of tack-coat at a rate of 0.5 kg/m$^2$
- Overlay with a 5 cm surface course (AC 14)


Recycler used for full-depth reclamation and addition of foamed bitumen

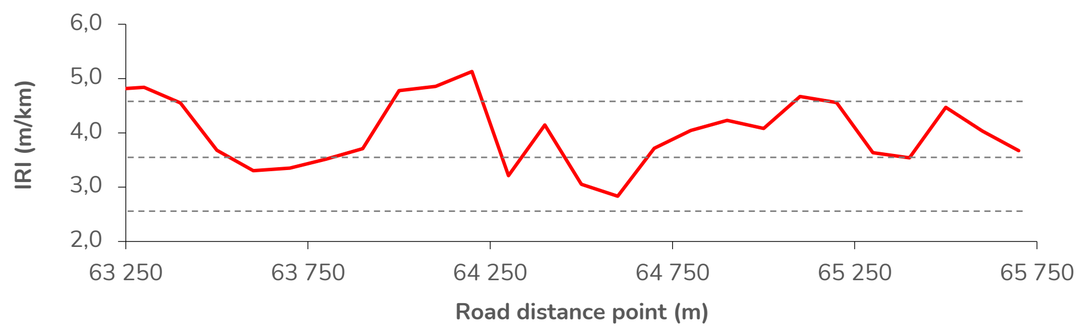

Paver used to apply the new recycled layer in the pavement trial

## RECYCLED LAYER QUALITY EVALUATION

### Load capacity with FWD




### Longitudinal roughness

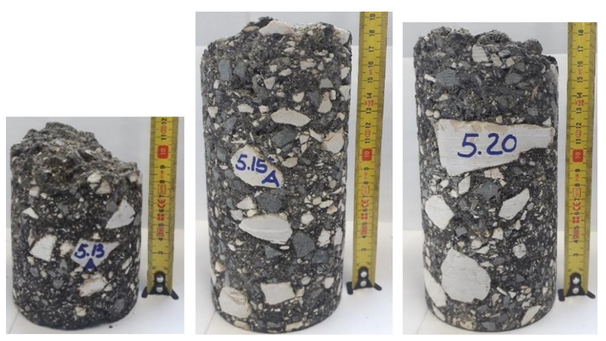



### Surface condition evaluation

Typical surface condition of the foamed bitumen recycled layer in the trial

Specific areas of the recycled layer presenting some surface ravelling

### Evaluation of cored samples




Visual appearance and thickness of some core samples extracted in the pavement trial

Indirect dry tensile strength ($ITS_d$) on layer top and bottom regions of recycled material

| Parameter | Range | Mean |
|---|---|---|
| $ITS_d$ on layer top (kPa) | 373 to 754 | 516 |
| $ITS_d$ on layer bottom (kPa) | 156 to 521 | 333 |

## CONCLUSIONS

- *In situ* full-depth reclamation with foamed bitumen is a viable solution to reduce the consumption of new materials and the production of wastes close to zero, assuring a sound performance of the pavement.
- The recycled material should be overlaid with HMA layers for a better long-term performance of the pavement and to improve the roughness characteristics.

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