

Part 3

Lower temperature asphalts ,

ie “warm”, “half-warm”

and cold

Lower temperature asphalts have been around for a long time, even in the UK.

We used to use mixes coated with bitumen emulsions in surface courses.

These fell out of favour about 50 years ago except on remote Scottish islands where there is no mixing plant so long delivery times using ferries.

Today, for environmental and cost reasons, here in the UK we are starting to deal with mixes made at lower temperatures viz:-

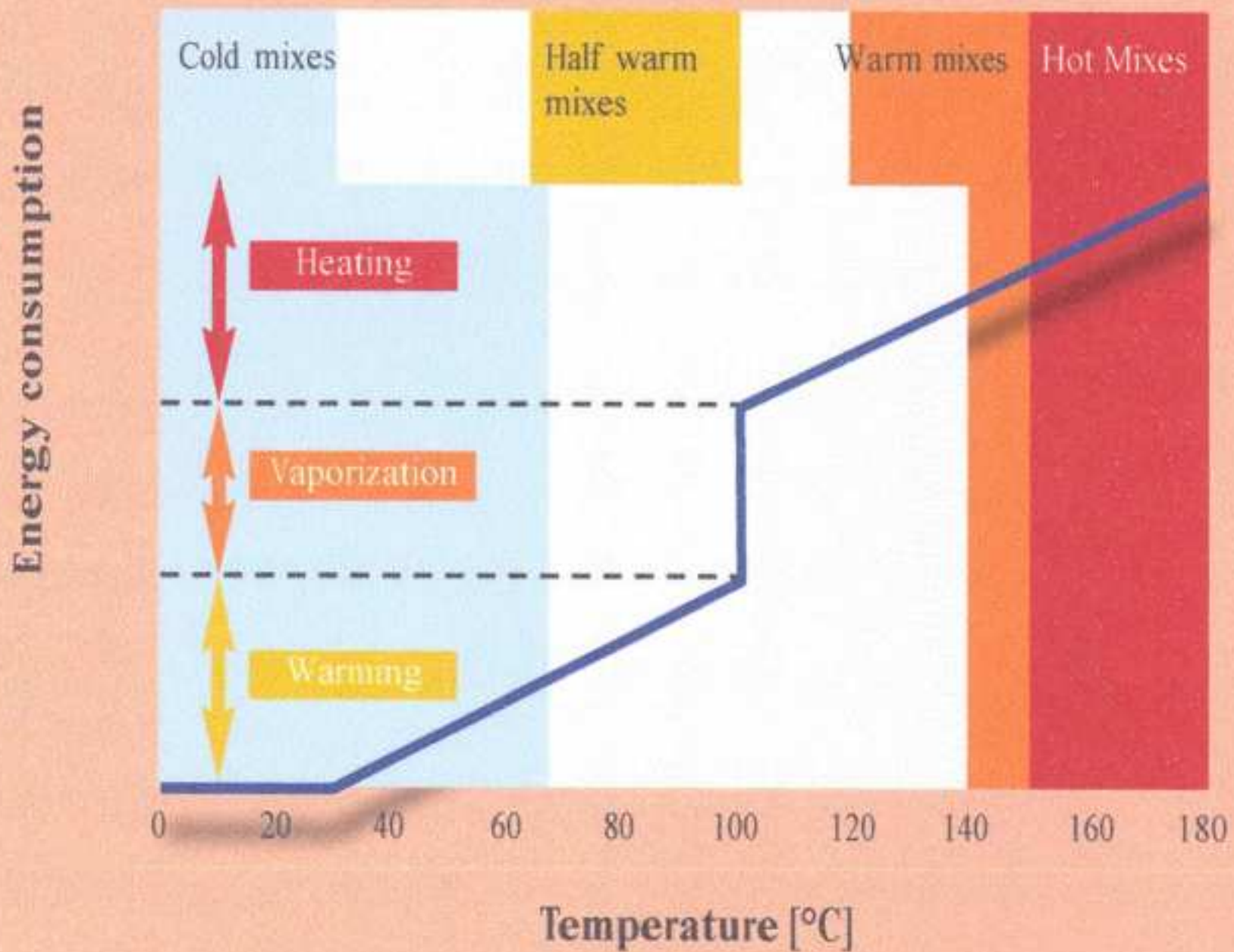
Cold mixes, up to 70C.

Semi-warm, 70 to 100C.

Warm, 100 to 140C.

Hot mixes are over 140C.

The next slide shows how much heat energy is used in producing each type



Increasingly, we are now using low temperature asphalts very successfully **as long as ambient temperatures are above about 10 C.**

For machine paving, there is no noticeable difference in laying characteristics nor in hand lay work as long as they are sufficiently hot.

A typical delivery temperature is 130 C. but producers will increase this if requested

Some contain wax additives, eg Sasobit which increase the workability of the mix at the lower temperatures.

A Sasobit modified asphalt at 140 C. has the same workability as a hot mix at 160 C.

But BEWARE, at 100 C. the mix “freezes”

(This is useful when working in winter, but it can also be used at 160 C. to give much greater workability when site conditions are bad)

Other mixes use a variety of chemical or other additives to give these cooler mixes the workability needed for compaction. These are either used to modify the bitumen or added at the mixer.

One additive is zeolite, added to the mixer in pellet form, which produces steam when compacted.

Over-zealous mixing at the plant with some additives can cause the steam to be made too soon so its benefit is not seen on site

“Life” was an early Bardon name for its Half-warm asphalt

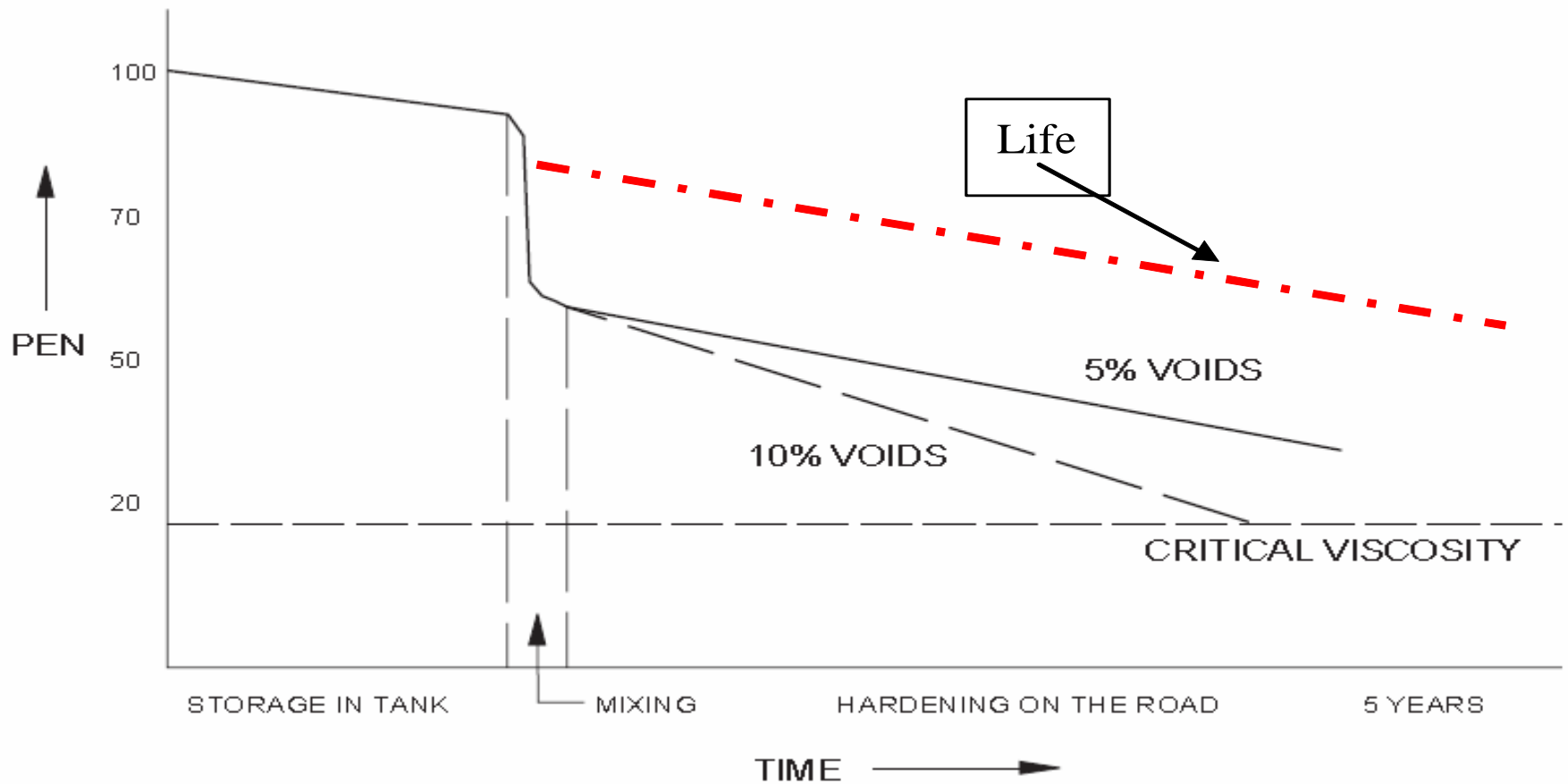
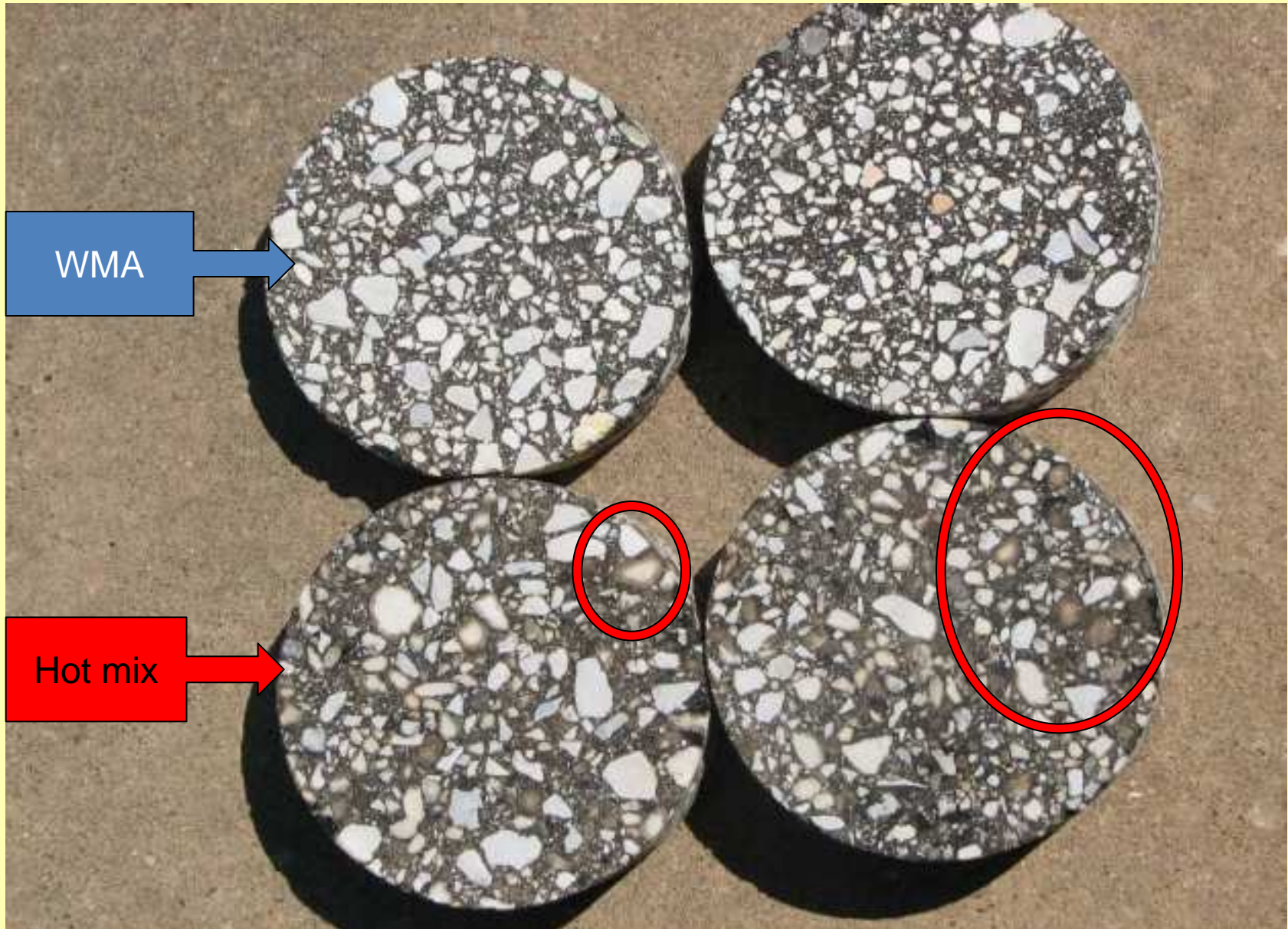


Fig 3.6 : Changes in Penetration of Conventional 100 pen Bitumen with Time, for Mixtures of differing Voids Contents

Source: Management Info

Bitumen absorbs less into the aggregate, allowing for a greater effective binder content => durability



A European spec is already being drafted for these low temperature and even cold mixes

It will include the following features.....

Reclaimed asphalt (RAP)

Widely used in low temperature asphalts elsewhere
So will cover the grading of RAP not grading of
aggregate in the RAP

Tar in reclaimed asphalt

Will be permitted in cold mix asphalt
BUT excluded from warm and half-warm mix asphalts

It will cover transport, laying and compaction

For **base asphalts** there will be several additional requirements in BS 594987

eg **Minimum stiffness of substrate**

No minimum delivery or rolling temperatures

BUT a requirement for PTR rollers

Drafts now available at National Specification level with associated NFG covering.....

Warm Mix Asphalt
Half-Warm Mix Asphalt
emulsion-based Cold Mix Asphalt

See TRL Report PPR666

TRL PPR666

is available as a free download from
TRL website

-<http://www.trl.co.uk/>
-Just search for “PPR666”

Better working conditions – low fumes



“If only all asphalt was like this” Enterprise, laying operative



Lancet

The following slides are of Tayset base used on the partial reconstruction of the A90 near Dundee.

The base is 300mm thick, **100% RAP**, mixed with a modified bitumen,

It was laid in 2 no. 150mm layers on a 200mm sub-base with a 100mm hot asphalt overlay

A90 reconstruction using Tayset base mix, checking the stiffness of the formation



Re-rolling the formation



Re-checking the formation (Note German dynamic plate)



Rolling the sub-base



Laying the Tayset base



Compacting the base



Compacting the base



Checking base compaction



Rolling with a PTR



Sealing the base with bitumen emulsion



Ball Haye Street, Leek



With proper care in mixing, transport, laying and compaction, there is every reason to think that these mixes will be at least as good as hot asphalts.

One downside is that it will not be possible to use chipped HRA, the asphalt will not be hot enough to flux the bitumen coating on the chippings

Any questions?