



Warm mix Asphalt

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Overview

- Definition?
- How does it work?
- Features and Benefits.

Effect of Polymer Additives SBS on properties of Asphalt Mixture. -

- Conclusions.

WMA techniques were used to reduce the viscosity asphalt binder at certain temperatures and to produce asphalt pavements at lower temperatures than conventional hot mix HMA.



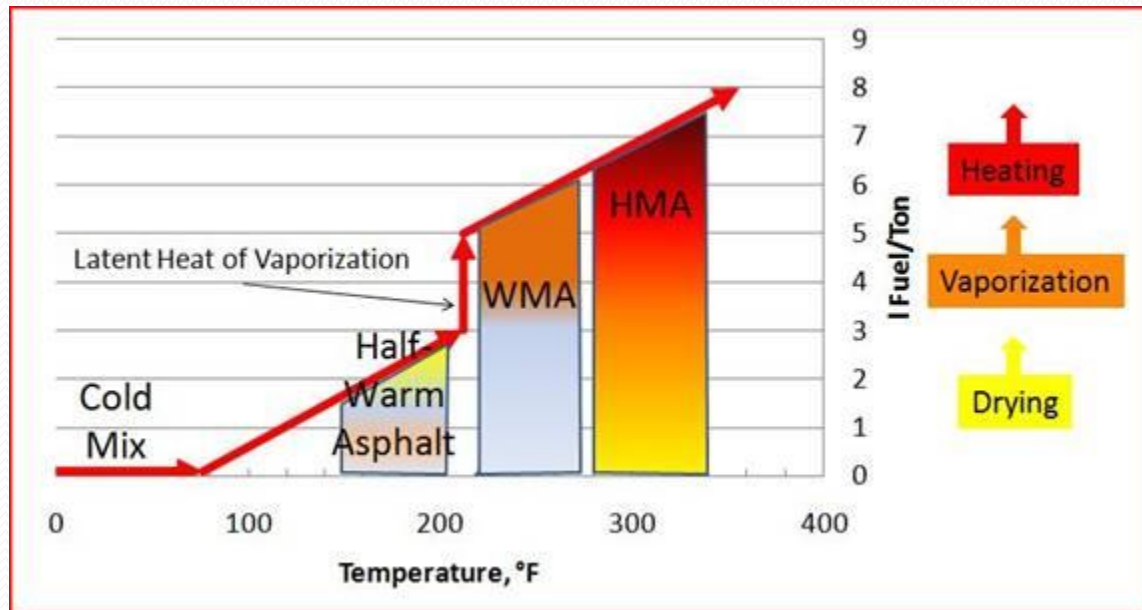
Three major classes of WMA technologies

- Process that use some form of additives. (organic or chemical or hybrid)
- Process that use water.
- Process that use both water and additives.

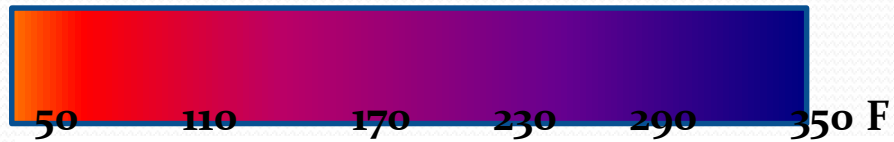
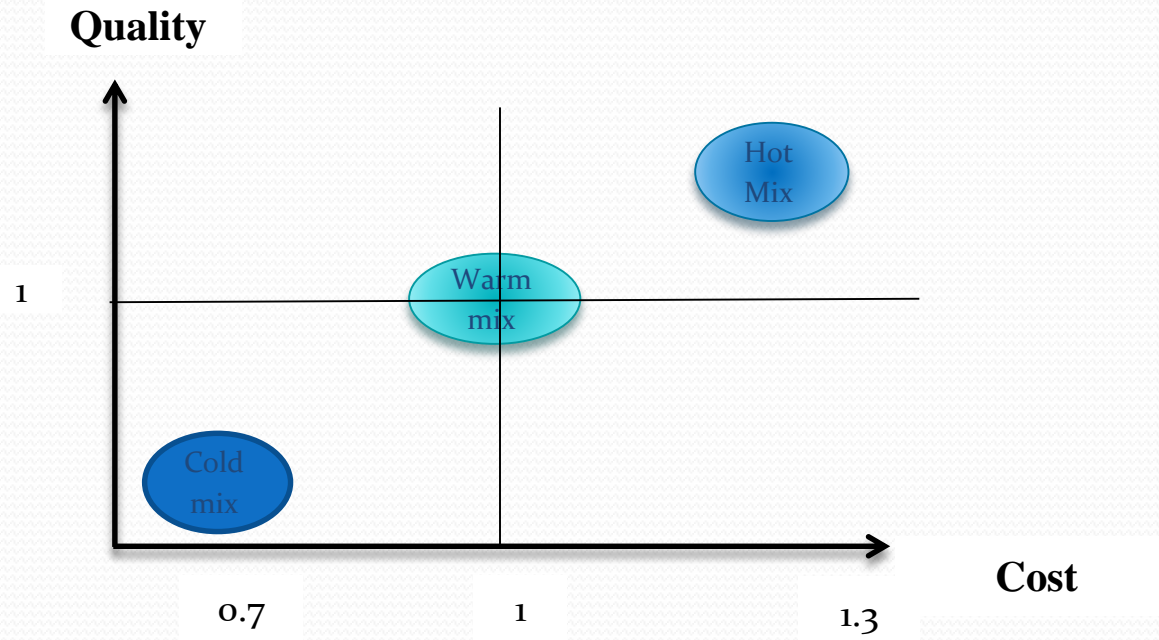
Several ways to classify WMA technologies

- One is by temperature reduction
- Hot Mix Asphalt greater 275 °F (135 °C)
- Warm Mix Asphalt 220-275 °F (100 °C)
- Half-Warm asphalt mixtures 180- 220°F (100 °C)
- cold mix 60 °F

Classification by Temperature



Positioning of WMA



Production Temperature

Why WMA

- Lower fumes & emissions (30% reduction in CO₂)
- Lower energy consumption (30%)
- Lower dust emissions (50-60 %)
- Decreased binder aging (reduced binder oxidation)
- Early site opening
- Cool weather paving
- Compaction aid for stiff mixes

Better Working Conditions for Workers(Lower Fumes emissions 30-90%, Temperature)




HMA Control Section



WMA Section

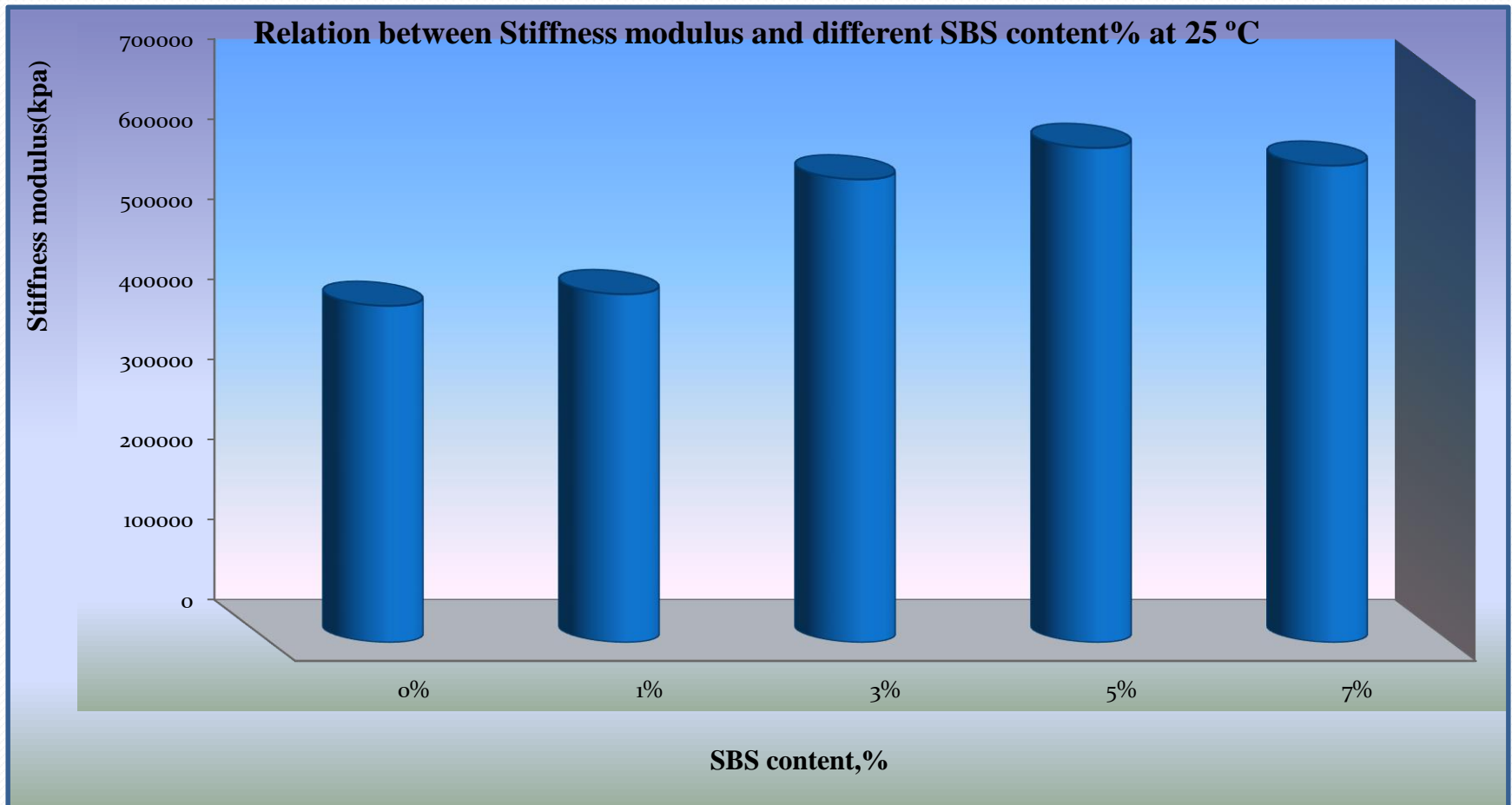


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- Sustainability
 - Improved air quality at the plant.
 - Improved air quality on the grade.
 - Longer life pavement.

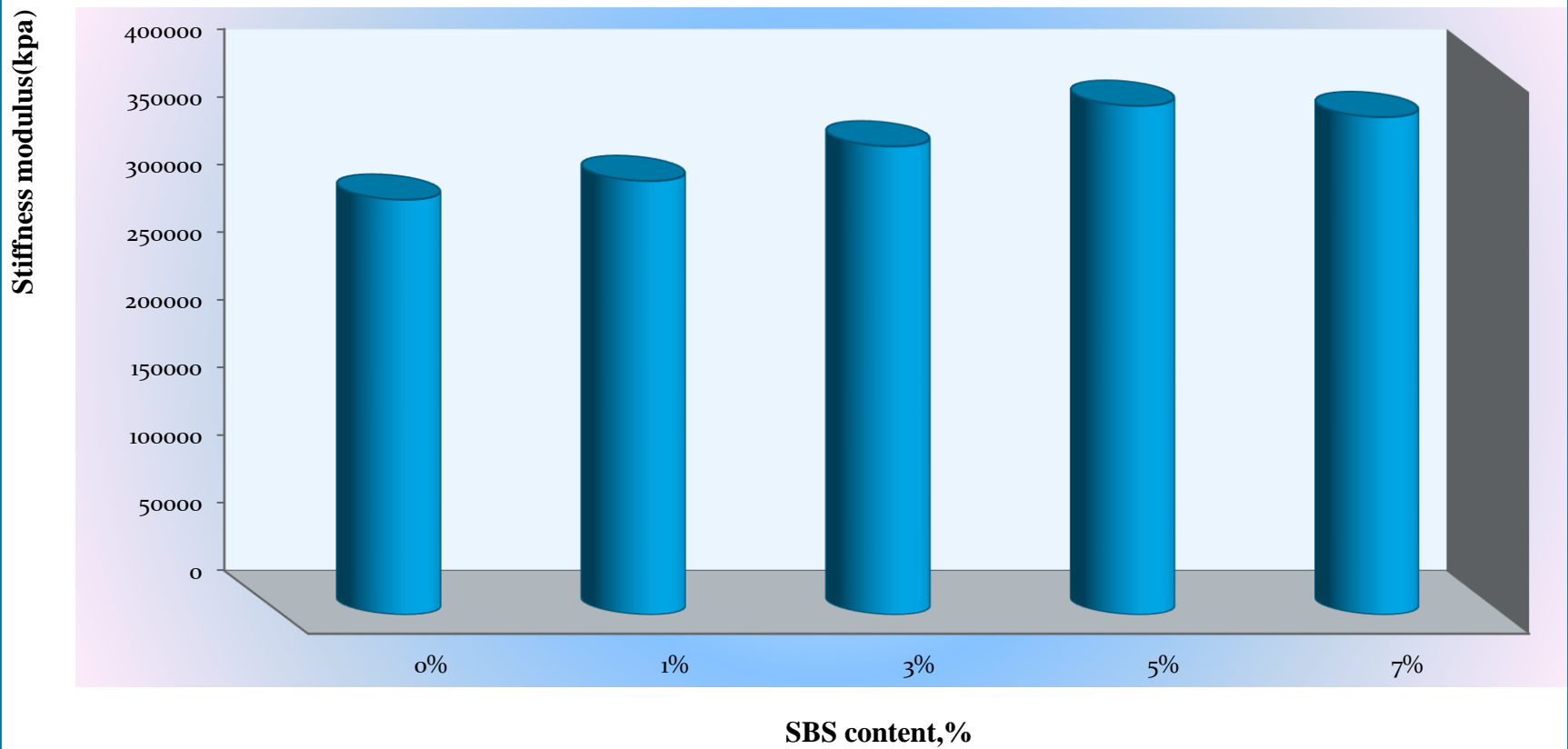


Effect of SBS on Asphalt mixture properties

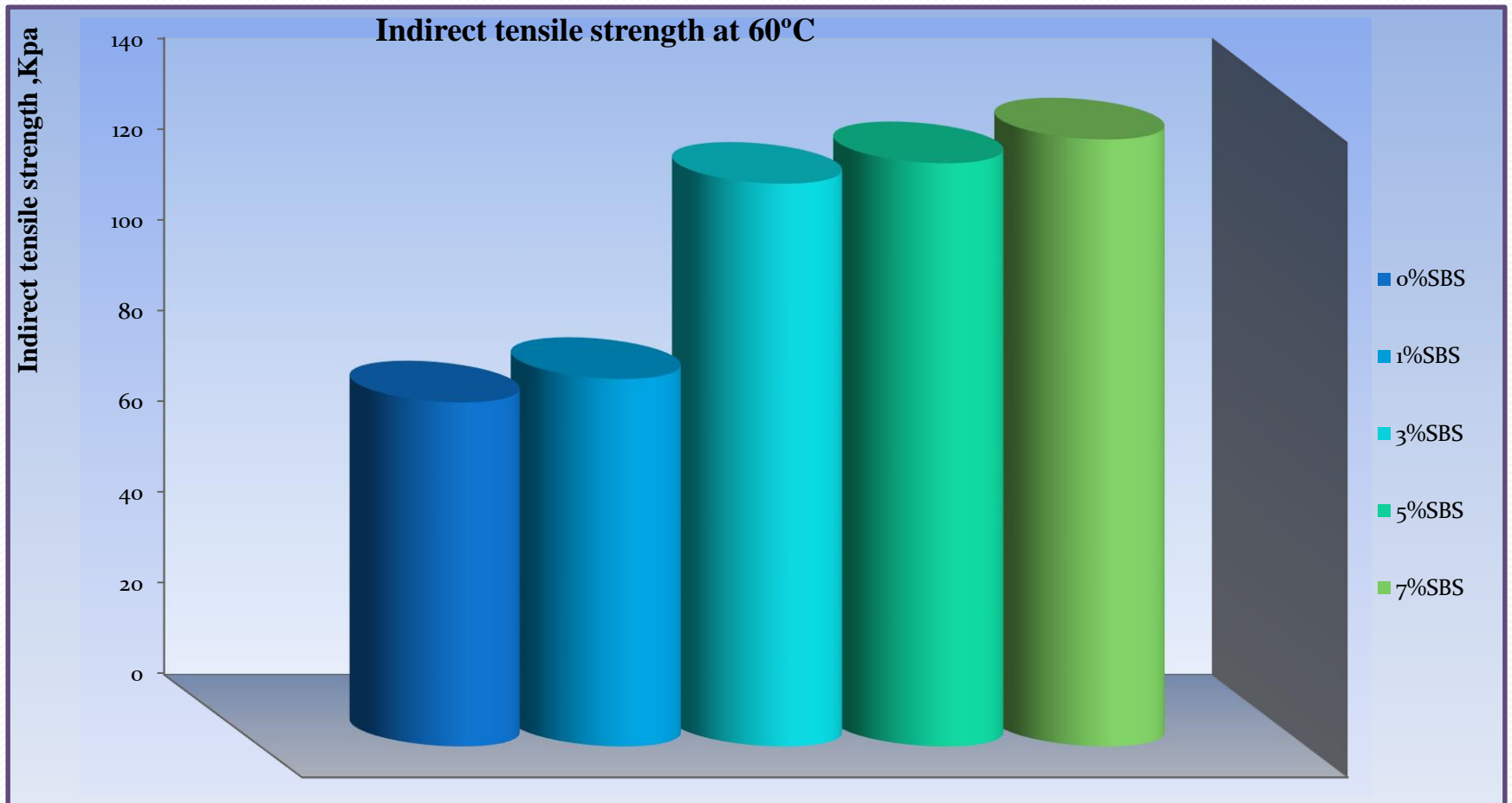
Effect of SBS on Creep Stiffness



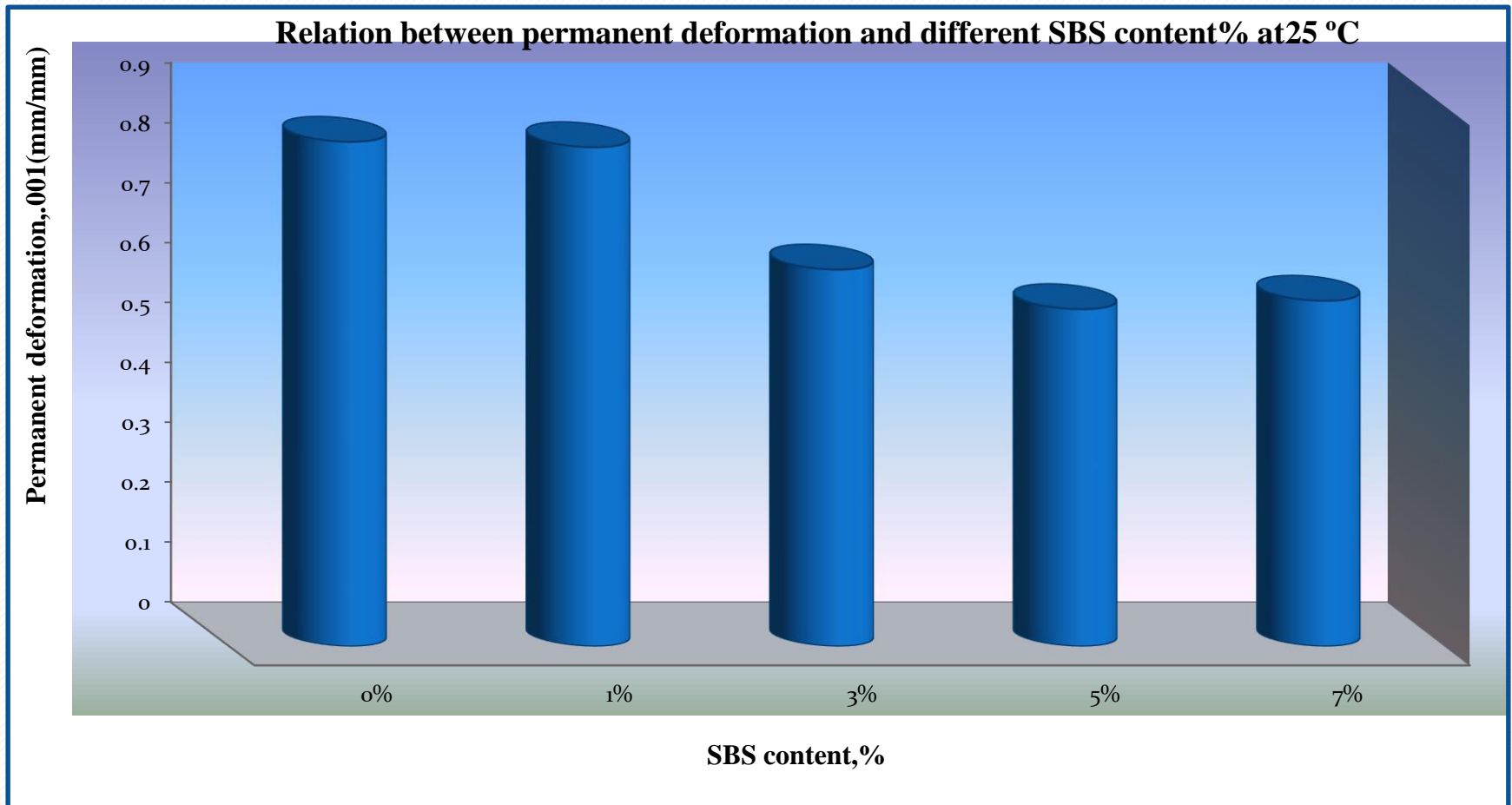
Relation between Stiffness modulus and different SBS content% at 40 °C

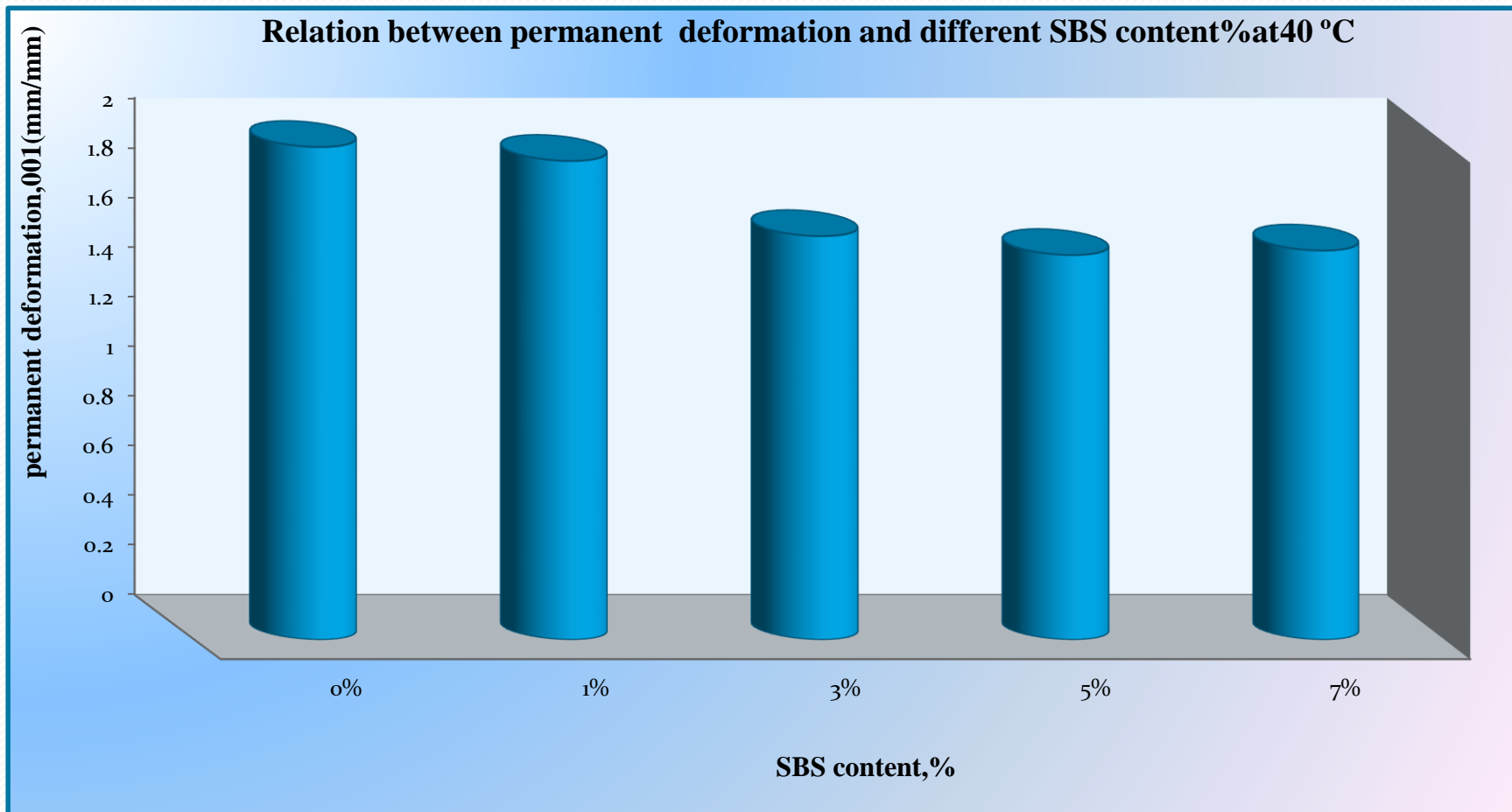


Effect of SBS on ITS



Effect of SBS on permanent Deformation







the percent of added SBS has a great effect on cohesion of mixture which can be conducted by indirect tensile strength ITS test, results show the increase of ITS with SBS %. of asphalt

The creep test gives an indication about the rut potential in pavement surface due to the increase in temperature. The rut depth and permanent deformation and stiffness varies according to the percent of SBS.

The percent of 3% was found to be the optimum value to be used for modification of asphalt cement properties to achieve pavement properties and to minimize the modification cost. -

● التوصيات

- التوجه الى اعتماد الخطات الاسفلتية الدافئة واجراء البحوث العلمية ذات الصلة والتي تعتمد على الاضافات للرابط الاسفلتي وتسمح للتعامل مع الاسفلت وتنفيذ الاعمال الاسفلتية بدرجات حرارة منخفضة اقل ب 20 و 40 درجة مئوية. والتي بدورها تتضمن على :
- دراسة خصائص Aging , viscosity , fatigue بالنسبة للرابط الاسفلتي للخلطات الدافئة والباردة ومقارنتها مع الخلطات الحارة.
- مقارنتها مع المواصفة العراقية للطرق والجسور بالنسبة للخلطات الاسفلتية الحارة



Thanks.