Pavement surface materials used in urban areas

-The range of urban materials-

Egbert Beuving, Technical Director
European Asphalt Pavement Association (EAPA)

PIARC - International seminar on Urban Pavements
CRACOW (Poland) - September 21-22, 2005

Introduction

In urban areas

- wide variety of pavement materials is used
- In old days available local materials were used, like cobble stones

Around 1900

gravel

bitumen bound

cement bound

wood

rubber

iron

Nowadays

a broad scale of materials is available

- Functional requirements are important for choice
- In urban areas aesthetical aspects are key item

The final choice
based on
rational and
irrational arguments

Here in Krakow

Pavement users and usage

Difference urban and non-urban
Users: pedestrians up to heavy trucks

- Pavement:
  footpaths up to
  urban highways

- Pavements used for different functions
- In urban areas the traffic speed is low
- Roads often designed to reduce speed

EAPA

Functional requirements

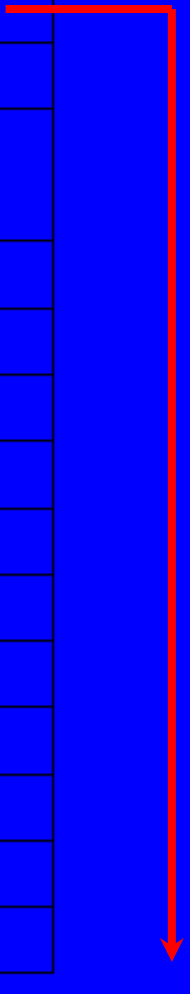
Choice of pavement surface material for urban areas

depends on the (functional) requirements

- general requirements (all types of roads) like highways
- additional requirements, depending on local situation / conditions

Requirements

User demand	Surface characteristic
Safety	Texture
	Horizontal (hydraulic) drainability
	Photometry
	Evenness
Comfort	Texture
	Horizontal drainability
	Photometry
	Evenness
Durability	Integrity
Environment	Recyclability
	Leaching / emissions
Construction - maintenance	Construction time
	Maintenance time



Performance Requirements for Pavemen

Additional requirements for urban areas

In urban areas people live, work, recreate, meet, relax and shop

- Pavement should be nice and attractive

- In urban areas also utility infrastructures as water, gas, electricity, telephone, tv-cable, internet, etc.

EAPA

Additional requirements (2)

Live-ableness and perception value

- preserve the aesthetical and historical and/or architectural identity (in historical centres)
- specific design with a variety in pavement types, element shapes and colours
- a certain surface texture or colour for a certain image
- quality of the outside environment

Additional requirements (3)

- Additional comfort requirements
- Smooth to avoid vibrations in buildings

- Requirements for trees and plants (water infiltration & air)
- Maintenance utility works
- (Additional) safety issues (high heels)

Materials available

Constructing materials

- Bituminous bound materials
- Cement bound materials
- (Small) paving elements
- Composite pavements
- Unbound granular materials

EAPA

Bituminous bound materials

- Asphalt concrete
- Coloured asphalt concrete
- Asphalt concrete with a print
- Asphalt concrete with pieces of mirror
- Mastic asphalt
- Coloured mastic asphalt
- Stone Mastic Asphalt
- Thin and Ultra thin asphalt concrete layers
- Double layered porous pavements
- Pervious pavements

EAPA

Bituminous bound materials

Ultra Thin AC

Cement bound materials

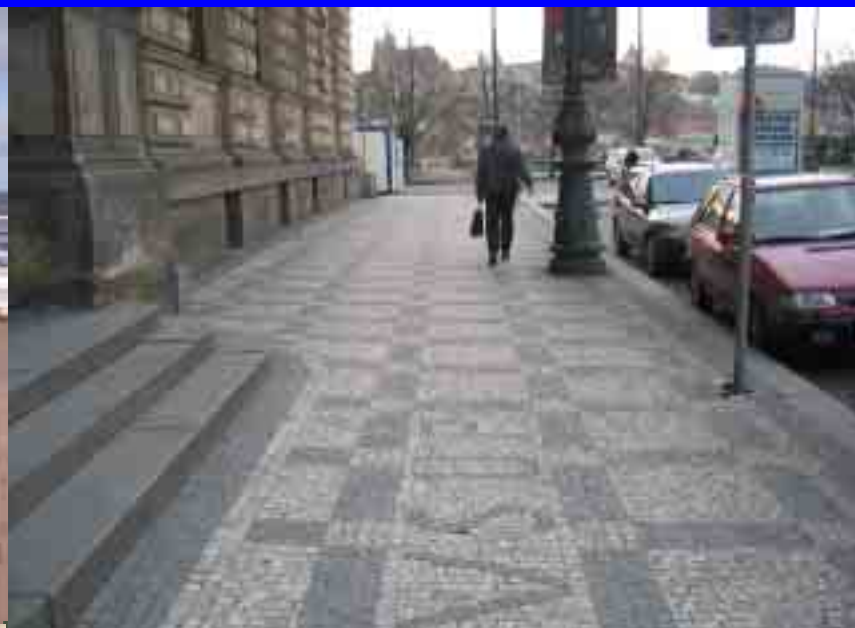
- Concrete slabs
- Reinforced concrete slabs
- Continuously reinforced concrete
- Concrete elements in different sizes
- Concrete with a (street) print
- Pervious pavements

(Small) paving elements

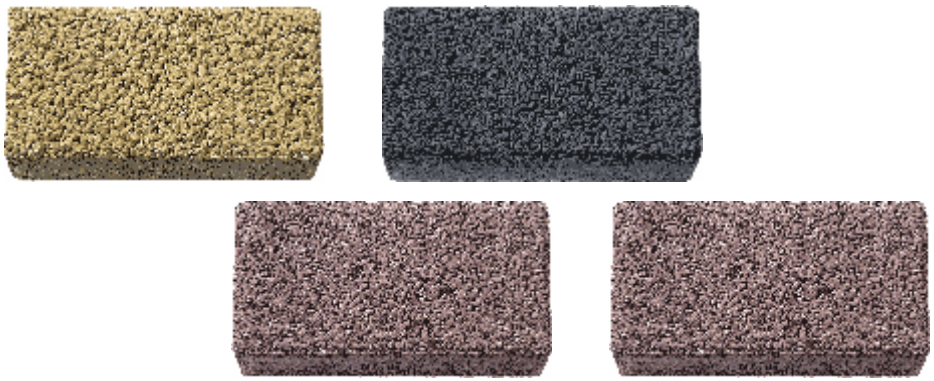
- Block pavers
- Cobblestones
- Terracotta pavers
- Pavers for porous pavements
- Pre-formed modular pavers of brick
- Pre-formed modular pavers of concrete

EAPA

(Small) paving elements



Silent Concrete Block Pavers



Selection of pavement type

depends on

- use of the pavement
- number of commercial vehicles per day
- comfort and safety
- noise reduction
- aesthetic arguments
- pavement thickness constraints
- impact of utilities below the pavement
- impact of road closures in construction phase
- budgetary issues and initial costs
- impact on maintenance operations
- life-cycle cost analysis

EAPA

Conclusions

For urban architects a wide variety available

Selection can be made based on

- different possible uses
- list of functional requirements
- additional requirement

Choice: rational and irrational arguments

Pavement engineer + urban architect
can choose the best solution