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# **A Trial of Thicker Layer Semi-Rigid Pavement With Modified Polymer Mortar**



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# 1. Introduction

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## □ Road pavement:

### ➤ Flexible pavement (asphalt concrete pavement)

Easy to install, but no resistance to oil, chemicals, etc.

### ➤ Rigid pavement (cement concrete pavement)

High durability, but long time to install, difficult to maintain and repair.

### ➤ Semi-rigid pavement (asphalt concrete filled with cement mortar)

- Easy to install,
- High skid resistance,
- Easy to maintain and repair,
- Resistance to oil, chemical,
- High durability.

So, semi rigid pavement has been widely used in Europe since 1990s.

# 1. Introduction

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## ❑ Composition of semi rigid pavement:

Open graded asphalt concrete (void content: 25-30% by volume) + high strength high fluidity polymer modified mortar to resist rut and permanent deformation.

## ❑ Thickness of semi rigid pavement:

As for road, bus bay, etc., thickness of **50mm** is enough, but for airport runway entry taxiway/taxiway junction, because of heavy loading and high frequency of traffic, 50mm may not be enough. So a **thicker layer** of semi rigid pavement needs to be tried.

## **2. Polymer Modified Mortar**

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### **2.1 The Requirements For Polymer Modified Mortar:**

- ☐ **Good fluidity (Workability)**
- ☐ **High strength (Compressive and Flexural strength)**
- ☐ **Combination of the above two**

## **2. Polymer Modified Mortar**

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### **2.2 Chemilink Polymer Modified Mortar SS-141**

#### **□ Chemilink high performance polymer modified mortar**

- **High fluidity**                      ➔ **Easy application**
- **High early strength**            ➔ **Early opening to traffic**
- **High long-term strength** ➔ **Low maintenance**

**Testing data is shown as table below:**

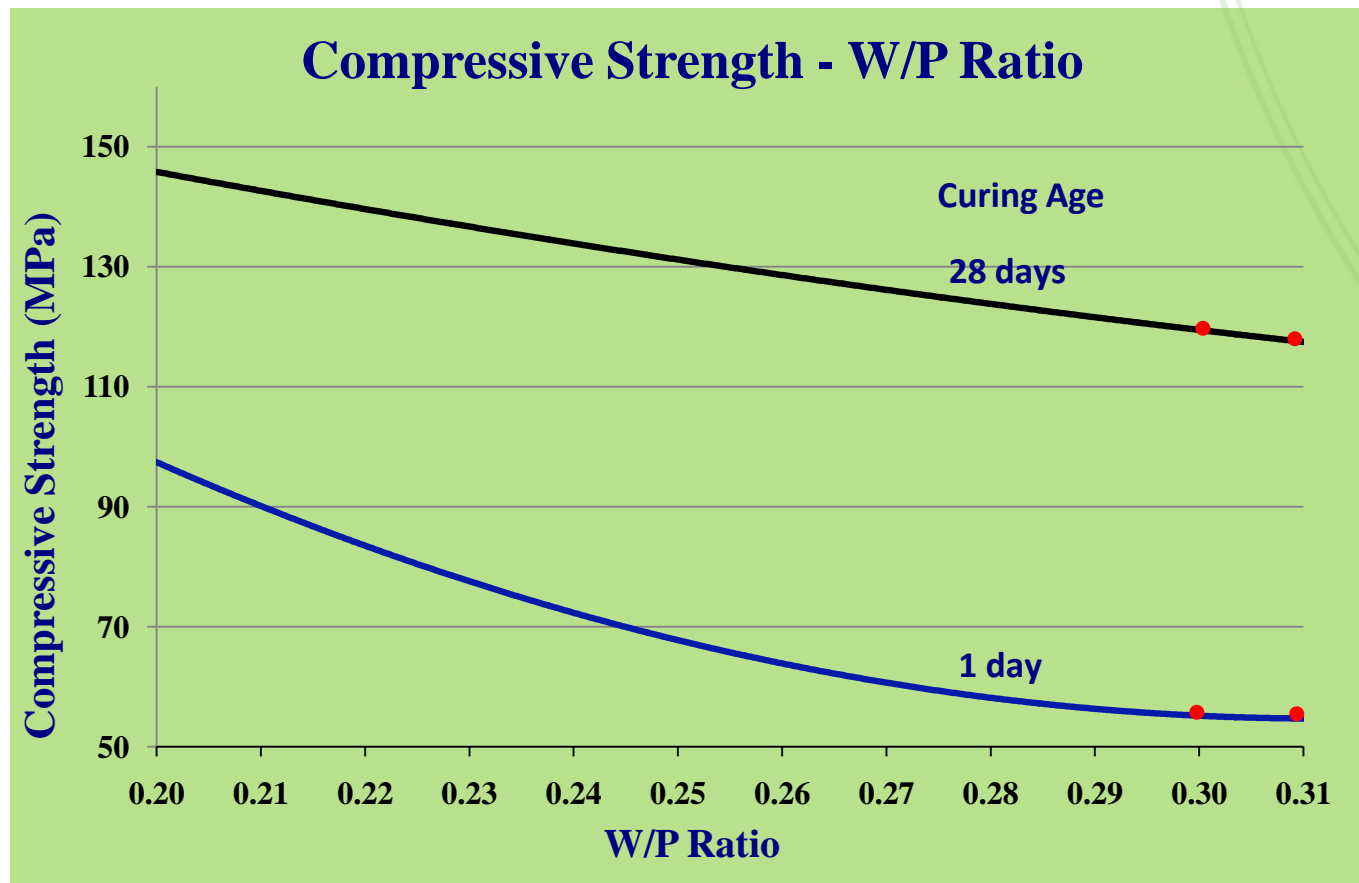
## 2. Polymer Modified Mortar

### 2.2 Chemilink Polymer Modified Mortar SS-141

Properties		Test Method	Chemilink SS-141	Spec (1) (from website)	Spec (2) (in tender document)	Spec (3) (in tender document)
Fluidity (Workability)		ASTM C939	13~27 Seconds	-	10-14 Seconds	10-14 Seconds
		JASS15- M103	27~31 cm	-	-	-
Compressive Strength	12 hrs	BS EN 12390	20~30 MPa	-	-	-
	1 day		55~85 MPa	55 MPa	-	-
	7 days		100~120 MPa	-	-	40MPa
	28 days		120~140 MPa	110 MPa	40~50 MPa	-
Flexural Strength at 28 days curing		BS EN 12190	7 ~ 15 MPa	15 MPa	6~8 MPa	6 MPa
Setting Time		EN 196 - 3	2~3h, 3~6h, 6~8h	8~12 hours	2~3 hours	2~3 hours

## 3. Thicker Layer Semi-Rigid Pavement

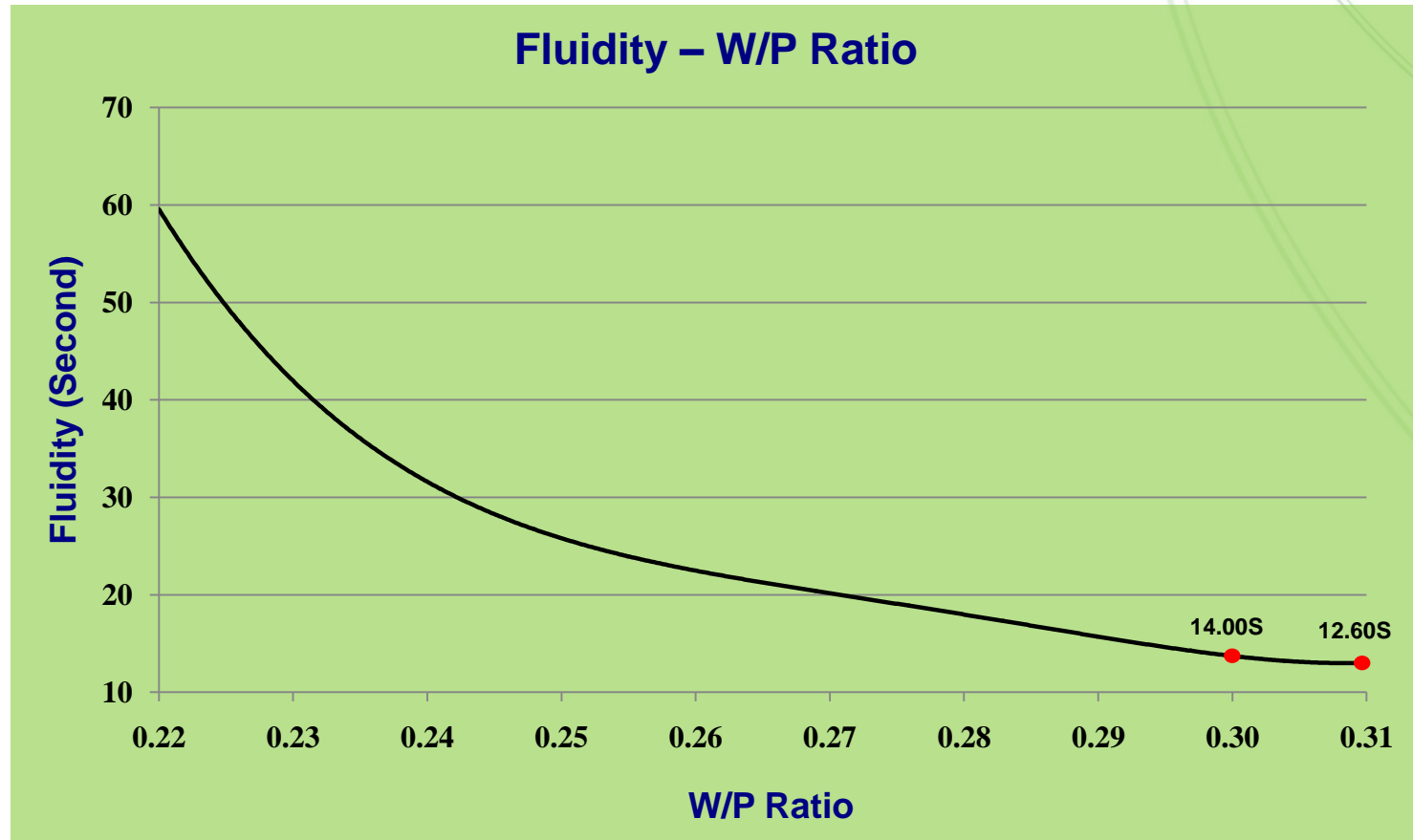
### 3.1 W/P Ratio Selection of Chemilink Polymer Modified Mortar SS-141 For This Trial





## 3. Thicker Layer Semi-Rigid Pavement

### 3.1 W/P Ratio Selection of Chemilink Polymer Modified Mortar SS-141 For This Trial



### **3. Thicker Layer Semi-Rigid Pavement**

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#### **3.1 W/P Ratio Selection of Chemilink Polymer Modified Mortar SS-141 For This Trial**

□ The above 2 figures show that:

As  $W/P = 0.30 \sim 0.31$

➤ Compressive strength of Chemilink SS-141:

1-d  $\geq 55\text{MPa}$ , 28-d  $\geq 110\text{MPa}$ , and

➤ Fluidity  $\leq 14\text{seconds}$ ,

Meet all specs.

□ So, we select W/P ratio of  $0.30 \sim 0.31$  to do this trial

## 3. Thicker Layer Semi-Rigid Pavement

### 3.2 Construction Procedures of Semi-Rigid Pavement



Coring



Spraying Primer



Laying Porous  
Asphalt Concrete



Compacting Porous  
Asphalt Concrete



Finished Surface of  
Porous Asphalt Concrete

## **3. Thicker Layer Semi-Rigid Pavement**

### **3.2 Construction Procedures of Semi-Rigid Pavement**



Loading Polymer Modified  
Mortar into Mixer



Mixing cement mortar with  
water at W/P ratio of 0.30~0.31



## 3. Thicker Layer Semi-Rigid Pavement

### 3.2 Construction Procedures of Semi-Rigid Pavement



Filling Cement Mortar into  
Porous Asphalt Concrete



Spreading Cement Mortar



Vibrating



Surface Just After Filling



Hardened Surface

## **3. Thicker Layer Semi-Rigid Pavement**

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### **3.3 Sample Coring**



## **3. Thicker Layer Semi-Rigid Pavement**

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### **3.4 Sample Cored For Testing**



80mm thick



## **3. Thicker Layer Semi-Rigid Pavement**

### **3.5 Skid Resistance Testing For This Trial**





## 3. Thicker Layer Semi-Rigid Pavement

### 3.6 Test Result of Semi-Rigid Pavement For This Trial

Properties	Test Method	Result	Spec (1) (from Website)	Spec (2) (in tender document)	Spec (3) (in tender document)
Compressive strength at 8 days	EN 12390	12.5 MPa	-	-	7 MPa
Compressive strength at 28 days		14.5 MPa	7~10 MPa	7~10 MPa	-
Flexural strength at 28 days	EN 12390	6.65 MPa	3.5 MPa	3.5 MPa	3 MPa
Wet Surface Skid Resistance	ASTM E303	78 BPN	-	-	60 BPN
Impermeability	DIN 18130	impermeable	-	-	-
Curing time	-	4 hours	-	4~8 hours	4~8 hours

## **4. Conclusions**

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### **This Trial Presents That:**

#### **1) Chemilink Polymer Modified Mortar SS-141**

- **Compressive Strength:  $\geq 55\text{MPa}$  (1-d),  $\geq 110\text{MPa}$  (28-d)**
- **Flexural Strength: 7~15MPa (28-d)**

**Meets all specs**

#### **2) Semi Rigid Pavement (80mm thick) (Chemilink SS-141 as grouting)**

- **Compressive strength (28-d), 14.5MPa**
- **Flexural strength (28-d), 6.65MPa**

**Meets all specs**

#### **3) Chemilink Polymer Modified Mortar SS-141 Can Be Adjusted to Meet Different Requirements.**



**Thank You for Your Attention!**

