



REPAIR/REPLACEMENT OPTIONS FOR CONCRETE LINED IRRIGATION CHANNELS

CASE STUDY

JOINT REPAIR WITH EMACO S90 (SEACRETE)

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Case Study – Emaco S90 (Seacrete)

1 Background

This case study is based on a method employed in the Murrumbidgee Irrigation Area (MIA) at Leeton NSW for the repair of concrete lined irrigation channel joints. The repair option described in this case study has been used successfully for the repair of both joints and cracks in concrete lined channels. This repair option has proven suitable for most types of joint repair.

Maintenance staff in the MIA have carried out trials on several different recommended materials for channel joint repair and have consistently found this product to meet the following requirements:

- Must be able to be installed rapidly (time constraints relating to irrigation needs and budget constraints)
- Must be cost effective (relative to the option of replacement)

LIST OF MATERIALS TRIALED BY MIA STAFF AND THEIR COMMENTS

PRODUCT NAME	APPLICATION	COMMENTS
Fulaprene	Repairing cracks and joints up to 6mm	-Slow application rate -Limited expansion ability
Silicone	Repairing cracks and joints from 3mm to 6mm	-Slow application rate -Concrete has to be completely dry
Amaclad	Repairing fine cracks	-Requires 7 day curing period -Tended to peel off under water
Concrete Mortar	For repairing major cracking and joints	-Suitable for repairing the base of badly cracked channels
Emaco S90 (Seacrete) Rapid Set Mortar	Repairing large cracks	-Suitable for repairing large cracks in a short amount of time

2 The Problem

The problem of failing joints (and cracking) in concrete lined channels in the MIA is significant and directly contributes to loss of irrigation water and potential revenue. Primarily the damage to the channels has been caused by the gradual deterioration over many years (some channels in this area are over 60 years old). Many sections of channel are now drawing near to the end of their practical life. With this in mind it must be realised that any repair option has to be able to be carried out with a minimum of expense, otherwise complete channel replacement may prove to be the more viable option.

Figures 1 and 2 -Damaged channel with previously unsuccessful joint repair



The options considered for the repair of this channel were:

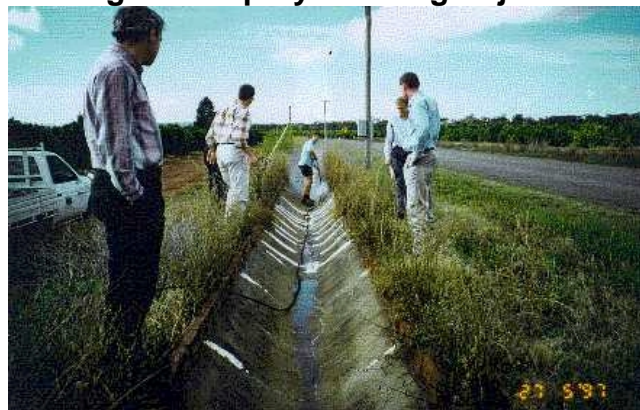
- a. Complete replacement with new concrete lining
- b. Poly lining
- c. Spot patching and joint sealing using Emaco S90 rapid set mortar

It was decided that the channel potentially had enough useful years of service remaining to justify the use of option (c). This repair option would ensure several more years of service without the major capital expenditure required for options (a) and (b).

3 Solution

The surface of the existing lining and the interior of the joints were cleaned by water blasting with pressures of 4000 to 4500 psi. This water pressure proved adequate to remove sufficient unwanted material from the joint/crack cavity.

Figure 3 -Spray cleaning of joints



The rapid setting mortar was mixed with fresh water to form a paste of a suitable slurry consistency to bond to the surface as well as flow into the crevices of the joint. The amount of fresh water used depends on the proposed application and the insitu temperature/humidity.

Due to the rapid setting characteristics of the material only a few litres of product were mixed at one time. The product was spread over the joint using a gloved hand, ensuring that it was also allowed to run/pushed well into the exposed joints/cracks.

Figures 4 and 5 -Hand placement of product into joints



The surface being treated was always moist and the product was maintained in a slightly moist state after application to retard the setting process. Small hairline cracks have formed when the material is not moistened after application.

The product is dry to touch in approximately 5 minutes and the channel was returned to service 10 minutes after the application.

4 Conclusions:

- If used in northern Australia's hotter climate there may be justification for laying moistened hessian over the repaired joints to ensure hairline cracks do not form from the product setting too quickly.
- The material is suitable for dry, moist and below water applications.
- This material can be inserted into vertical joints if it is prepared to a putty like consistency and forced into the joint.
- Not suitable for areas with high foundation movements as the product sets quite rigidly and has little flexibility.
- There are some difficulties when learning how to prepare the material and maintain it at a suitable consistency. This is overcome as the operational personnel become more familiar with the material.
- The cost of the Emaco S90 is \$2.50 per kilogram (20kg bags) and in accordance with the manufacturer's guidelines should produce 0.0112m³ of mortar.



See Table 1 for the typical compressive strengths of 50mm cubes of the product placed at 21°C.

TABLE 1

Age	MPa
1 Day	10
3 Day	18
18 Day	27

5 References/Acknowledgments:

Master Builders Technologies, EMACO S90 Data Sheet, Seven Hills

Malcolm Seymor, Murrumbidgee Irrigation Corporation, Leeton

Further Information

Further information on this document can be obtained by contacting the author, Mr Scott Walton of Department of Natural Resources, Engineering Services (Queensland) on (07) 4783 0555.