

# Pioneering in tunnel construction

## Collano cements waterproof barrier

### Temporary attachment of plastic sheeting

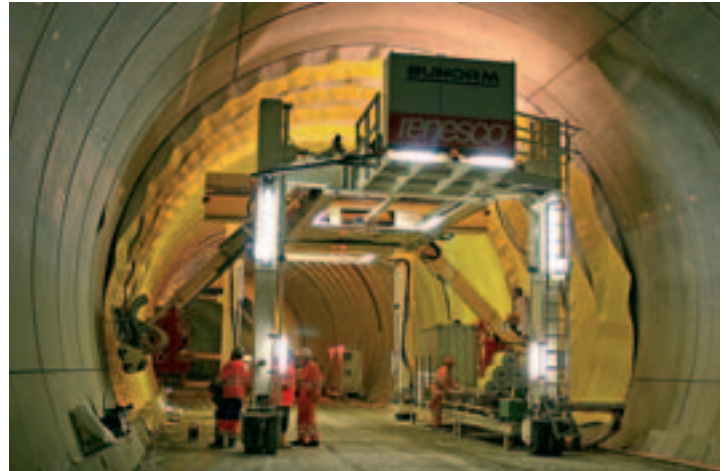
In a double-lined tunnel, a waterproof barrier of flexible plastic is placed between the outer lining – prefabricated concrete tubbing segments in the case of the Islisberg tunnel – and the in-situ-placed concrete inner lining. The plastic barrier must be temporarily attached to the outer lining before the inner lining is constructed. Usually, hook-and-loop fasteners or plastic washers are used for this purpose. The fasteners are embedded, with drill-hole or shot dowels, in the concrete to form a grid pattern, and the flexible plastic sheeting is temporarily attached to them by vibrating (hook and loop) or welding (plastic washers). The inner lining can then be placed without difficulty. This technique, widely used in the past, produces a somewhat irregular surface because the sheeting sags between fasteners, rather like a fabric-hung ceiling in a nightclub. This irregularity can result in wrinkles when the inner lining is placed. In order to avoid distortions and wrinkling, it is desirable to have the seal adhere to the outer lining in contiguous fashion.

### Mechanical adhesion to tubbing

The double-tube Islisberg highway tunnel, 5 km long, is being driven with a tunnel-boring machine and lined with tubbing segments. In these respects, it is a good example of industrial tunneling. But the project also has a number of pioneering features. One is that the waterproof barrier between the outer and inner linings is installed mechanically and bonded in place with an adhesive. In a single pass, an automatic sealing machine cleans and dries the supporting concrete, applies adhesive to the back of the plastic sheeting as it is unrolled, and presses it against the outer lining. The result is a web of waterproof barrier sheeting 2 to 2.50 meters wide, mounted in one operation. At the same time, the sheeting webs are welded together with an inspectable double seam. The interior work on the tunnel project as a whole will involve using Collano adhesive to install 220,000 m<sup>2</sup> of plastic sheeting material. Temporary adhesive fastening is proving to be an economical technique in tunnel construction.

### Collano – Innovation in Adhesives

Collano is an internationally active innovation company establishing new benchmarks for bonding with specialized adhesives. With its headquarters in Switzerland and subsidiaries in Germany, France and the United States, Collano generates revenues of CHF 100 million and employs over 300 people.



The newly devised adhesive process simplifies the installation of the waterproof barrier and is faster and less expensive than the conventional method using plastic washers or Velcro-type fasteners.

#### Technical data in brief

Project	Islisberg tunnel, N4 highway, Zürich west ring road, Switzerland; 2 tubes, each 5 km long
Construction	2002 to 2008
Partner	Paul Vogt, CMV AG, Allschwil, BUNORM AG, Aarwangen, Renesco AG, Bern
Application	PAVO Hot-Melt 20-02 applicator system for temporary mechanical adhesive fastening of waterproof plastic barrier material to concrete outer lining
Country	Switzerland
Product	Collano hot melt adhesive
Properties	foamed adhesive, mechanical application, good wetting, long open time, good adhesion to concrete immediately after application of pressure, low consumption