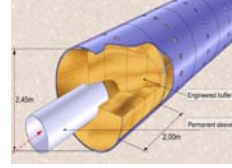
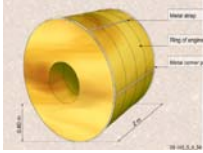


CONTEXT: Andra's objective within Module 1 of the European ESDRED Project is to manufacture large buffer rings and to use them as engineered barriers in order to demonstrate the technical feasibility of a such concept for radioactive-waste disposal. The French National Radioactive Waste Management Agency (ANDRA) hired a consortium of other organisations, including the French Atomic Energy Commission (CEA) and two companies, *Minéraux et Produits Chimiques* (MPC) and *SEGULA Ingénierie* with a view to manufacturing and testing the rings. That consortium, called GME, had the role to develop all the industrial processes necessary for the fabrication of buffer rings and discs at scale 1, as well as the related means for transport, and handling of the rings, the assembly by sets of 4, the packaging of buffer rings assemblies, all the procedures, etc...



Choice of the press – design, fabrication of rough components, machining and assembling of the mould

65000 ton press INTERFORGE Issoire, France

The mould was designed and calculated by the GME (SEGULA) using CATIA V5

Casting of the lower part of the mould FERRY CAPITAIN Joinville, France

The same after sand blasting and trimming

Persons involved in ESDRED Project Module 1. First visit to the press site

Polystyrene model for casting mould

Just after stripping

Some raw components

Mould body

Auxiliary components

Lifting device equipped with vacuum cups

Stripping kit

Fabrication of dummy concrete rings for testing auxiliary equipment

Preliminary tests & mixture preparation

The complete mould weight ~ 100 tons

Acceptance day at Le Creusot with Andra's experts

Preparation of the mixture at MPC's workshop 50 big bags for ~ 70 tons

Lifting the mould body

Production of rings and discs

Disc adaptation

The GME TEAM

The main production took place on the 18 December, 2006 from 5 a.m. to 9 p.m., non stop. 11 rings and 2 discs, 2.3 m diameter, 0.5 m high, 4.12 tons were compacted, packaged and transported by truck. 30 people participated to this adventure, including 9 from GME

Cleaning operation

Handling, Assembling, Packaging, Transport

Handling a ring

Transport and deposit on the cradle, by sets of 4

Tilting device

Very good alignment within sets

Set lifting tool (20 ton capacity)

Transport container

Mechanical Testing of a ring

Coring for lab tests

Before Brazilian test

After Brazilian test

The first test consisted of checking the mechanical resistance by lifting the ring using a steel tube inserted in the central hole. The ring remained about 1 month in that position. Then the ring was put again on its pallet, transported by truck, righted again, and was subjected to a "Brazilian shearing test"

Acknowledgments: Among the many people involved in this adventure, special thanks are due to the Project managers, MM Bosgraud and Seidler who had confidence that the GME be successful in producing the bentonite rings. Ferry Capitain, Le Creusot Mécanique, Aubert & Duval, Interforge, Secom are also recognized for their active and efficient contribution to the project, and of course the GME TEAM...