

Location	<b>Leirosa, Figueira da Foz, Portugal</b>
Client	STORA ENSO – Celulose Beira Industrial SA
Date	2000
Services	Detailed design and construction support.
ABES member	ABES Portugal - <b>GIPAC</b>



### Description

The structure consists of a supporting structure for a chimney, with a strong corporative image. The steel structure can be divided in three parts, for ease of description. In the first part a framed structure with constant spans is presented. This substructure is supported by a slender one, which has the function of guaranteeing the vertical support to the chimney and to the leaf (Part 3).

**PART 1** - Regular frame structure supported on top of the existing building (concrete structure). This structure has four levels. The first level is at a height of 127.0m (note that the ground level is at a notional height of 100m above the sea level). The spans have a total length of 7m and are braced horizontally and diagonally in the middle span. Above this platform a three level tower was built with a total height of 9 meters. The spans are 3.5m long. The last platform of this structure is at a level of 136 meters. The beam elements are made of steel profiles IPE400 and HEB400 for the columns.

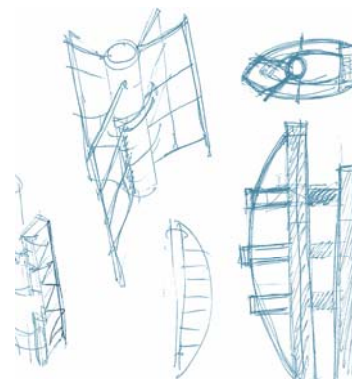
**PART 2** - In this part of the structure horizontal and vertical supports were installed to accommodate horizontal displacements of the chimney due to temperature variations, and therefore this substructure involves the chimney

In order to resist the horizontal forces, eighteen cables, in groups of 3 cables, were placed on two opposite sides of the structure. The cables were connected to the structure through a ring. The main aim of this ring was to make all the cables converge to the same point (torsional centre of the structure). The columns are made of profiles CHS 273.0x10.0 and all the horizontal curved elements are made of profiles CHS 168.3x10. The steel cables have diameter  $\varnothing 20$ .

**PART 3** - In the structure of the leaf the outside line was defined with steel profiles CHS 355.6x12.5 and in the inner part CHS 168.3x10.0 profiles were used to form the veins. Due to the size of the profiles it was very difficult to camber the curved elements, therefore cut and join using templates was adopted.



During construction



Initial drafts.