PLAITED STEREOTOMY
Stone Vaults for the Modern World
All 3d-models are realized by Giuseppe Fallacara during his research program at the ICAR Department of Politecnico di Bari, directed by Prof. Claudio D’Amato Guerrieri.

The sketch on the right side is made by Giuseppe Fallacara.

The sketches on page 13 are made by Luc Tamborero.

The hand-made sketches on page 26 are made by Luc Tamborero and Luca Fraccalvieri.

The image on page 27 (LMGC90) is made by Ali Rafiee.

The images on page 27 (lower) and page 34 are part of a study for stone and iron vaults that Maria Rita Campa has experimented during her doctoral thesis at the ICAR Department of Politecnico di Bari (E. E. Viollet-le-Duc innovation and tradition: language of form and connection between form and structure in the conception of polyhedral vault).

The images on page 27 (lower) are realized in collaboration with Stella De Paola, Enrica Leonardo, Vincenzo Minenna, Francesco Peschechera, Rossella Refolo and Nicola Sacco during their final workshop in architecture degree thesis (2007–08) at the Politecnico di Bari (Professors: C. D’Amato Guerrieri, G. Fallacara).

The images on page 27 (lower) and page 34 are part of a study for stone and iron vaults that Maria Rita Campa has experimented during her doctoral thesis at the ICAR Department of Politecnico di Bari (E. E. Viollet-le-Duc innovation and tradition: language of form and connection between form and structure in the conception of polyhedral vault).

All the images of the chapter Projects are rendered by Domenico Di Nardo.

The image on the cover is made by Giuseppe Fallacara and represents Sphera.

The photos accompanying the text are made by the authors except for: 20 (top), 21 (top) and 23 (left) are made by Richard Etlin; 23 (right) is made by José Calvo López.

All the projects are made by Giuseppe Fallacara.

Abeille vault is made by the company “Leopizzi 1750” of Parabita (Lecce – Italy) for the 2006 Venice Biennale directed by C. D’Amato Guerrieri.

Sphera vault is made by “3d Pierre” of Nanterre (France) for the Stone Construction Stage of Isle d’Abeau (Lyon).

All the constructions are made with the supervision of Mécastone.
La main prodigieuse de l'artiste, égale et rivale de sa pensée.
L'une n'est rien sans l'autre.

Paul Valéry
TABLE OF
CONTENTS

Stereotomy Revisited

Claudio D’Amato Guerrieri 11
José Carlos Palacios 12

Stereotomy
Acrobatic Stone Vaulting Past and Future

The Acrobatic Tradition 18
Stereotomy: The Art of Cutting Stone 19
Stereotomy: Masterpieces 22
Stereotomy Today 24

Projects 37

Constructions

2006_Abeille Vault 57
2007_Truchet Vault 63
2008_Flat Vault 69
2008_Sphera 75

Credits 81
Stereotomy Revisited
The acritical acceptance of design paradigms developed in northern Europe and North America, has led to an increasing use of solutions that bear little or no connection with tectonic research and are often in blatant contrast with it, emphasizing their reliance on the pure domination of form. There has been a paucity of critical consideration of the relationship between design and construction, meaning the creative potential of technique, and this has led to the diffusion of certain characteristics in research and architectural production that have become evident today in the loss of a complex and unitary approach, founded on the values of the rationality of the architectural organism and on the acceptance by architects and engineers of the Vitruvian triad of *venustas*, *firmitas*, *utilitas*. This has occurred both in structural research that is not interested in the “form” of the building and, in a symmetrical and opposite manner, in experimentation with composition where the architect, like the fashion designer, simply stamps his signature on the product.

In order to reconstitute a unitary culture of design and construction that reaches beyond the particularities of modernism and post-modernism, the role of stereotomy, now based on computer modeling for post-processing with computerized numeric control (CNC) machines, may prove strategic because it can help restore theoretical and practical unity to the process of designing and building an architectural work. In the twenty-first century, the professional figures of the architect and the stonemason may concretely become reunited once again in the same person.

Claudio D’Amato Guerrieri
Venice, July 2006
Some time ago, we were likely to think that stereotomy was a dead science, only surviving in some limited intellectual circles. Nowadays, only in a few European universities there are still some departments concerned with finding out about this science and recreating it, the mighty cultural phenomenon generated by stone masonry.

We are dealing with a scientific discipline that, for several centuries, led the art of building to the highest intellectual summits. Since the early Middle Ages, the vaults were designed as spatial networks so that they could be interpreted as separate arches, that is as curved lines whose geometrical shape could be monitored by the significant medieval geometrical tool: the plan/elevation projection. Later on, in Renaissance times, a higher level of geometrical knowledge will enable to define more accurately the complex volume of the *voussoires* with which the classical vaults were built, simple-shaped vaults but complex in their breakdown. In the following centuries, stone masonry, supported by a constantly evolving geometry, would reach its highest degree of development: utter freedom. From then on, any architectural shape can be imagined with the assurance of achieving the cutting of the *voussoires*’ structure more appropriate and spectacular.

In the XIXth century, when this development had reached its very summit, stereotomy collapses and falls into oblivion; the massive masonries of traditional architecture succumbs to give way to a new architecture based on a structural set up never imagined before.

Nevertheless, there is still some hope. New geometrical skills gave way to new developments in stereotomy. Digital monitoring allows expansion of the limits of geometry.