MATHEMATICAL SIMULTATION IN OBTAIN SOME SPECIAL METALLIC STRUCTURES

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Abstract: *This paper aims to present the mathematical simulation in obtain some special metallic structures who are obtained using unconventional process.*

Due to the lately development in composite materials, the paper aims to analyze the influence of certain technological factors, and optimizing the processes that occurring.

Keywords: *metallic structures, unconventional process.*

1. INTRODUCTION

The technology development has imposed increasing demands on choice of materials special purpose in obtaining new classes of materials with special properties.

The purpose of this paper is to present the technologically obtain layered metallic materials whose production by using nonconventional methods are applicable in the aircraft, chemical and defense industry.

2. THE TECHNOLOGICAL PROCESS SIMULATION

One of the methods for preparing composite structures for special equipment, is the explosive cladding. The technological process is based on the conversion the kinetic energy resulting from the detonation the explosive charge at the interface of the welding heat, which leads to the interface plate and thus melting the welding thereof [4].

The metal diffusion takes place gradually, and it is influenced by the structure of the plates to be welded and the distance between them.

The principle is illustrated using the data from the mathematical modeling of this phenomenon. Following the explosive charge detonation, will form an angle of collision between the plates due to plasma jet resulted melting interface boards.

However, both the thickness and physical and mechanical properties of the plates will not be affected.

After bringing the plates to dimensions that are intended to be coated and their positioning for welding - by separating them by spacers - the entire surface of the top plate will be placed the explosive in a box made of a material that will destroy the load at the time of detonation so that its presence does not affect the structure of the plated material.

Spacers are only designed to create the optimum distance between the plates to be welded. [3]

In **FIG. 1** shows the 2D finite element model simulating the mounting, in order to plating.

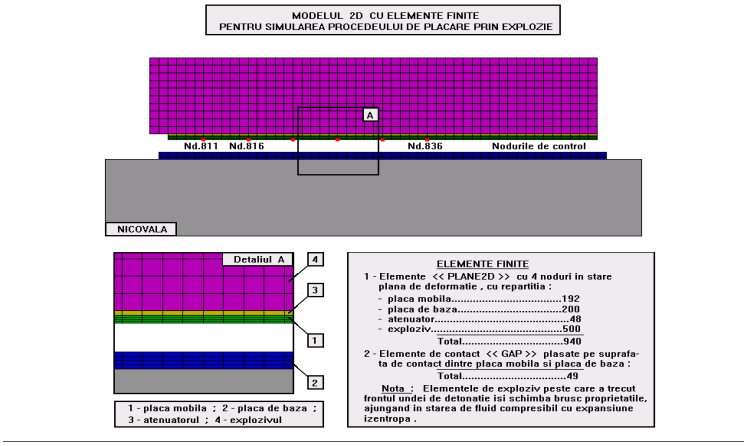

FIG. 1. The 2D Finite Element Model from the simulated Explosion Welding Process.

For the explosive welding process to take place, the following basic requirements must be met, namely: the emergence of the jet at the interface and to obtain a contact pressure allowing stable development of interatomic links [1].

The speed of the detonation wave propagation is influenced by the density of the medium.

In **FIG.2** is presented the mathematical simulation of technological process sequential plating explosion at different times. [2].

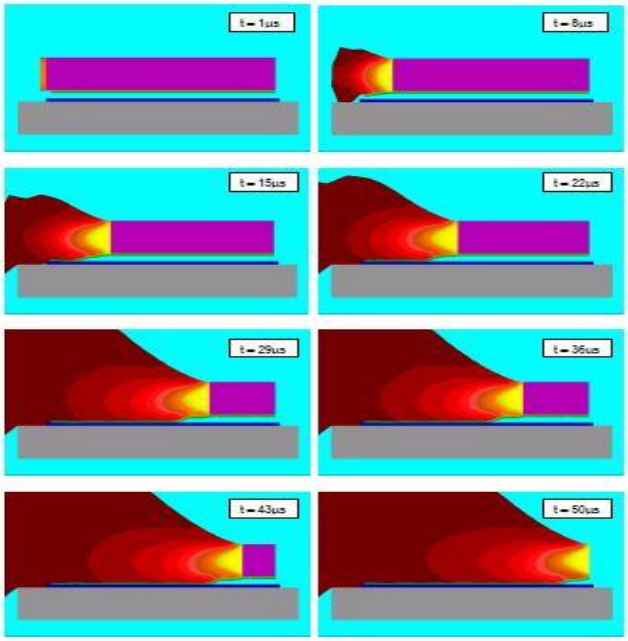

FIG. 2. Sequential stages from the welding explosive process.

Front collision product, as they get clean the contact surface will then, because the pressure, to achieve welding plates. This welding connection is characterized at the structural material overlap by a plate, in section, the contact surface having an undulating character.

In this way, the plate can be welded having a surface area of up to 30 m^2 and a thickness ranging from 0,025 mm to 1000 mm.

The velocity field of fittings, are represented in **FIG. 3**.

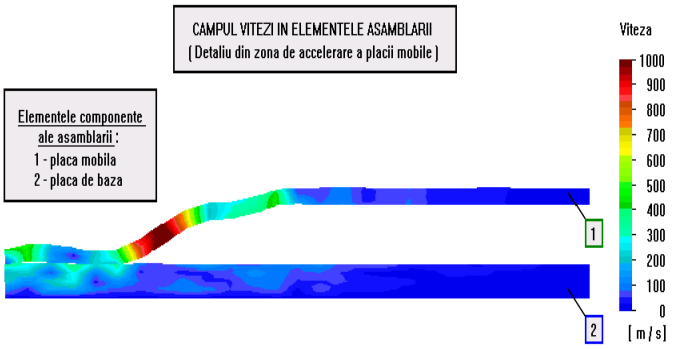

FIG. 3. The speed's field in the assembly elements: 1- the movable plate; 2- the basic plate.

FIG. 4 present the mobile plate moving and the dynamic angle collision on this unconventional process by welding plates.

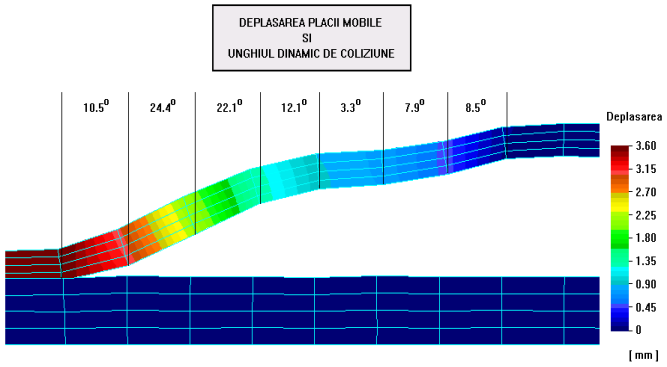

FIG. 4. The mobile plate moving and the dynamic angle collision.

Besides the beneficial effects of explosive cladding technology in **FIG. 5**, some imperfections due to the quality and coated surfaces can be observed.

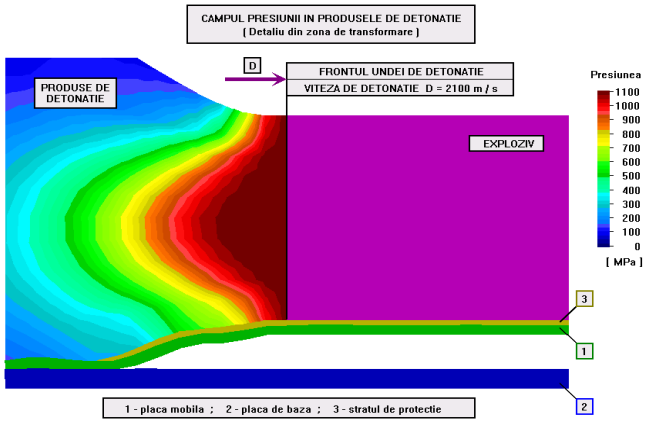

FIG. 5. Presure field in detonation products: D - the detonation wave front; 1- the movable plate; 2- the basic plate; 3- the protect layer.

CONCLUSIONS

Of the submitted work emerges the importance of using technological methods in obtained unconventional structures with special properties for the top civilian and military technology.

The simulate using the finite element method, the unconventional plating by explosion technology, aimed at highlighting the advantages of applying such a process technology due to its simplicity and the fact that the internal structure of the component materials is not affected.

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