CLAIMS

1. Method for manufacturing a sound-absorbing panel (10) with a sandwich structure and having the shape of portions of cylindrical surfaces for reducing the noise impact of an aeronautic engine, comprising the following steps in sequence:

a) providing a first skin (12) ~~in~~ made of a thermoplastic polymeric material;

b) making a plurality of micro-holes (18) through the first skin (12) by mechanical punching of the first skin (12);

c) having the first skin (12) undergo a process of thermoforming on a mold;

~~c~~d) securing ~~said~~the first skin (12) to a central layer (14) by arranging a structural adhesive layer between the first skin (12) and the central layer (14) ~~and/or by a thermal weld between the first skin (12) and the central layer (14)~~; and

~~d~~e) securing ~~said~~the central layer (14) to a second skin (16) by arranging a structural adhesive layer between the central layer (14) and the second skin (16) ~~and/or by a thermal weld between the central layer (14) and the second skin (16).~~,

~~2. Manufacturing method according to claim 1,~~ wherein at least two adjacent components among the first skin (12), the central layer (14) and the second skin (16) comprise uncured polymerizable material~~,~~; and

wherein step ~~c~~d) and/or step ~~d~~e) further comprise the step of:

~~e~~f) having the first skin (12), the central layer (14), and the second skin (16) undergo a curing process in autoclave with vacuum bag, according to a specific pressure and temperature cycle, for co-curing the uncured components.

~~3. Manufacturing method according to claim 1 or to claim 2, further comprising the step of:~~

~~aO) having the first skin (12) undergo a process of thermoforming on mold.~~

~~4. Manufacturing method according to claim 3, wherein step aO) follows step b).~~

2. The method according to claim 1:

wherein the step d) further comprises securing the first skin (12) to the central layer (14) by a thermal weld between the first skin (12) and the central layer (14); and

wherein the step e) further comprises securing the central layer (14) to the second skin (16) by a thermal weld between the central layer (14) and the second skin (16).

~~5~~3. Sound-absorbing panel (10) obtained by a method according to any one of the preceding claims.

~~6~~4. Sound-absorbing panel according to claim ~~5~~3, wherein the central layer (14) is made of ~~in~~at least one of:

a) a thermoplastic material~~,~~;

b) ~~or in~~ aluminium;

c) ~~, or in~~ a material with a meta-aramid base; and

d) ~~, or in~~ a composite material with a phenolic resin base reinforced with glass fibres.

~~7~~5. Sound-absorbing panel according to claim ~~5~~ 3 or to claim ~~6~~4, wherein the central layer (14) has a honeycomb structure.

~~8~~6. Sound-absorbing panel according to any one of claims ~~5~~ 3 to ~~7~~5, wherein the second skin (16) is made ~~in~~ of at least one of:

a) a polymeric material; and

b) ~~or in~~ a composite material with a thermosetting polymeric matrix and a fibre reinforcement.

~~9~~7. Sound-absorbing panel according to any one of claims ~~5~~ 3 to ~~8~~6, wherein the thermoplastic polymer material of the first skin (12) is made ~~in~~of at least one of ~~a thermoplastic polymer material in the list comprising~~: PEEK (poly ether-ether-ketone), PEK (poly ether-ketone), PEI (polyether-imide), nylon, PET (polyethylene terephthalate), PAEK (poly-aryl-ether-ketone), PPS (poly-para-phenyl-sulphide), PA (poly amide), PPSU (poly-phenyl-sulfone), PC (poly-carbonate), and PP (polypropylene).

~~10~~8. Sound-absorbing panel according to any one of claims ~~5~~ 3 to ~~9~~7, wherein the first skin (12) has a thickness comprised between about 300 and about 1500 micrometres, more preferably between about 500 and about 1200 micrometres.

~~11~~9. Sound-absorbing panel according to any one of claims ~~5~~ 3 to ~~10~~8, wherein the micro-holes (18) cover a percentage of the area of the first skin (12) comprised between about 3% and about 50%, more preferably comprised between about 3% and about 15%.

~~12~~10. Sound-absorbing panel according to any one of claims ~~5~~ 3 to 9~~11~~, wherein the diameter of the micro-holes (18) is comprised between about 100 micrometres and about 3000 micro metres, preferably between about 1000 and about 1500 micrometres.

~~13~~11. Sound-absorbing panel according to ~~any one of~~ claim~~s~~ ~~6~~4 ~~to 11~~, wherein the central layer (14):

a) is made ~~in~~ of the~~a~~ thermoplastic material; and

b) includes~~has~~ a three-dimensional structure formed by a plurality of walls that are mutually converging and/or intersecting, adapted to distance the first skin (12) from the second skin (16), and to define, between them, a plurality of resonance chambers (20) of variable geometry, each resonance chamber (20) being in communication with the outside of the sound-absorbing panel (10) through at least one micro-hole (18) of the first skin (12).

~~14~~12. Aircraft engine nacelle (22) comprising a sound-absorbing panel (10) according to any one of claims ~~5~~ 3 to ~~13~~11.