element, the rest being aluminum and incidental elements and impurities. Said 7xxx series aluminum alloy is overaged such that it should comply simultaneously with three conditions relating to yield strength, FSP performance and spall resistance. The chemistry of the 7xxx-series aluminum alloy claimed by US Patent No. 8,206,517 largely overlaps with that of alloy AA7085. U.S. military specification MIL-DTL-32375 (MR) covers 7085 wrought aluminum alloy armor plate for non-fusion welded applications in nominal thicknesses from 0.500 to 3.000 inch. According to this specification, 7085 alloy should only be used as unweldable appliqué armor.

[0010] It is generally difficult to achieve 7XXX alloys that have simultaneously high armor piercing resistance (AP) and fragment simulated particle (FSP) resistance. It is still more difficult to achieve 7XXX alloys that have also an acceptable behaviour after welding and may consequently be also used for manufacturing welded armor hull walls.

Summary

[0010a] In one aspect of the present disclosure, there is provided an armor component produced from a 7xxx series aluminum alloy, wherein the aluminum alloy consists essentially of:

- 8.4 wt.% ≤ Zn ≤ 10.5 wt.%
- 1.3 wt.% ≤ Mg ≤ 2 wt.%,
- 1.2 wt.% ≤ Cu ≤ 2 wt.%
- at least one dispersoid forming element with a total dispersoid forming element content higher than 0.05 wt.%;
- the remainder substantially aluminum, incidental elements and impurities;

wherein the 7XXX alloy is in the form of a plate having a thickness of about 0.5 to about 3 inches;

wherein the 7XXX alloy is aged to achieve:

(i) a fragment simulated particles V50 ballistic limit such that

$$V50\ (FSP\ 20mm) > 1633\ T^2 - 1479\ T + 1290$$

where 'T' is the thickness plate (unit: inch) and the unit of V50 is feet/s.

(ii) an armor piercing V50 ballistic limit such that:

$$V50\ (0.30cal\ AP\ M2) > -282\ T^2 + 1850\ T + 610$$

where 'T' is the thickness plate (unit: inch) and the unit of V50 is feet/s.

[0010b] In another aspect of the present disclosure, there is provided a method of producing an armour component disclosed herein, comprising:

a) casting said alloy into ingot form;

b) homogenising said ingot;

c) hot working said ingot to obtain a plate;

d) solution heat treating;

e) quenching;

f) optionally stretching to obtain a plastic deformation from about 1 and about 3 %;

g) aging at least in two steps, the aging treatment corresponding to the following 2-steps treatment: about 4-8 hours at about 110°C-130°C + about 12-20 hours at about 140°C-160°C.

[0010c] In a further aspect of the present disclosure, there is provided a method of producing an armour component disclosed herein, comprising:

a) casting said alloy into ingot form;

b) homogenising said ingot;

c) hot working said ingot to obtain a plate;

d) solution heat treating;

e) quenching;

f) optionally stretching to obtain a plastic deformation between about 1 and about 3 %;

g) aging, the total equivalent time at 150 °C of aging treatment not exceeding 25h.

Description

[0011] A first object of the invention is an armor component produced from a 7xxx series aluminum alloy, wherein the aluminum alloy consists essentially of:

- 8.4 wt.% ≤ Zn ≤ 10.5 wt.%;
- 1.3 wt.% ≤ Mg ≤ 2 wt.%;
- 1.2 wt.% ≤ Cu ≤ 2 wt.%;
- at least one dispersoid forming element with a total dispersoid forming element content higher than 0.05 wt.%;
- the remainder substantially aluminum, incidental elements and impurities;

wherein the 7XXX alloy is in the form of a plate having a thickness of about 0.5 to about 3 inches, i.e. about 12.7 to about 76.2 mm;

wherein the 7XXX alloy is over-aged to achieve:

(i) a fragment simulated particles V50 ballistic limit such that:

$$V50\ (FSP\ 20mm) > 1633\ T^2 - 1479\ T + 1290$$

where T is the thickness plate (unit: inch) and the unit of V50 is feet/s.

(ii) an armor piercing V50 ballistic limit such that:

$$V50\ (0.30cal\ AP\ M2) > -282\ T^2 + 1850\ T + 610$$

where T is the thickness plate (unit: inch) and the unit of V50 is feet/s.