- at least one dispersoid forming element, with a total content of dispersoid forming elements of at least 0.04 wt. %;
- the remainder substantially including aluminum, incidental elements, and impurities;

wherein said 7xxx series aluminum alloy is in the form of a plate having a final thickness of 0.5 to 3 inches and is manufactured by:

a) casting said 7XXX series aluminum alloy to obtain an ingot,

b) homogenizing said ingot;

c) hot working said homogenized ingot to obtain an plate having a first thickness T1;

d) cold working the plate having the first thickness to obtain a plate having a second thickness T2, wherein $T2 = T1 - (x_1 * T2)/100$ and $0.5 \leq x_1 \leq 15$;

e) solution heat treating;

f) quenching; and

g) aging;

so as to achieve an improved spall resistance compared to an armor component obtained with the same manufacturing process except that said manufacturing process does not comprise cold working before the solution heat treatment.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts an embodiment of the method used to determine the spall resistance score according to the present disclosure.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Unless otherwise stated, all compositional percentages are expressed in weight percent (wt.%), based on the total weight of the alloy. Alloy designation is in accordance with the regulations of The Aluminum Association known of those skilled in the art.

As used herein, the expression “up to” when referring to the amount of an element means that this elemental composition is optional, and includes a zero amount of this element. When the term “between” appears in the present application and claims, it is understood that the upper and lower numbers in the range are included. Similarly, “lower than” or “higher than” and such phrases include the numeral in the recited range.

The present invention relates to a method of producing an armor component, comprising :

What is claimed is :

1. A method of producing an armor component, comprising :

a) casting a 7XXX series aluminum alloy to obtain an ingot, wherein said alloy comprises or 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 content of dispersoid forming elements of at least 0.04 wt. %;
- the remainder substantially including aluminum, incidental elements, and impurities;

b) homogenizing said ingot;

c) hot working said homogenized ingot to obtain a plate having a first thickness T1 ;

d) cold working the plate having the first thickness to obtain a plate having a second thickness T2, wherein $T2 = T1 – (x_1*T2)/100$ and $0.5 \leq x_1 \leq 15$;

e) solution heat treating ;

f) quenching ; and

g) aging.

2. The method of claim 1, wherein $2 \leq x_1 \leq 10$, preferably $4 \leq x_1 \leq 8$.

3. The method of claim 1, wherein d) is a cold rolling step.

4. The method of claim 1, wherein g) includes at least a two step aging.

5. The method of claim 4, wherein said two-step aging includes :

- a first aging of 4-8 hours at 110°C to 130°C ; and
- a second aging of 12-20 hours at 130°C to 180 °C.

6. The method of claim 1, wherein g) is performed so that the total equivalent time at 150°C is between 5h to 50h, preferably 10h to 50h.

7. The method of claim 1, including, between f) and g), another cold working to obtain a plate having a third thickness T3.

8. The method of claim 7, wherein said cold working to obtain a plate having a third thickness T3 results in a plastic deformation ranging from 1% to 3%.

9. The method of claim 7, wherein said cold working to obtain a plate having a third thickness T3 comprises or consists of stretching .

10. The method of claim 1, resulting in an armor component having a final thickness ranging between 0.5 inch and 3 inches.

11. The method of claim 1, wherein said 7XXX series aluminum alloy comprises Zr as a dispersoid forming element, wherein 0.04 wt. % ≤ Zr ≤ 0.15 wt. %.

12. The method of claim 11, wherein 0.04 wt. % ≤ Zr ≤ 0.08 wt. %.

13. An armor component produced from a 7XXX series aluminum alloy comprising or consisting 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 content of dispersoid forming elements of at least 0.04 wt. %;
- the remainder substantially including aluminum, incidental elements, and impurities;

wherein said 7xxx series aluminum alloy is in the form of a plate having a final thickness of 0.5 to 3 inches and is manufactured by:

a) casting said 7XXX series aluminum alloy to obtain an ingot,

b) homogenizing said ingot;

c) hot working said homogenized ingot to obtain an plate having a first thickness T1;

d) cold working the plate having the first thickness to obtain a plate having a second thickness T2, wherein $T2 = T1 – (x_1*T2)/100$ and $0.5 \leq x_1 \leq 15$;

e) solution heat treating;

f) quenching; and

g) aging;

so as to achieve an improved spall resistance compared to an armor component obtained with the same manufacturing process except that said manufacturing process does not comprise cold working before the solution heat treatment.

14. The armor component of claim 13, wherein said 7xxx series aluminum alloy comprises Zr as a dispersoid forming element, and preferably wherein 0.04 wt.% ≤ Zr ≤ 0.15 wt.%.

15. The armor component of claim 14, wherein 0.04 wt.% ≤ Zr ≤ 0.08 wt.%.