EFFECT OF GLYCOL CONCENTRATION ON THE TENSILE CHARACTERISTICSOFAIRCRAFT COMPONENTS IN AA2014 ALLOY

FUCINEUMBRE

R. Maccaglia

1. Introduction

Aluminum alloys are usually divided into two categories:

- **plastic deformation alloys**
- **casting alloys**

They belong to the plastic deformation alloys :

- **series 2xxx**
- **series 6xxx**
- **series 7xxx**

These aluminum alloys are most widely used to make many semi-finished products (rolling, forging) that are hot forging plastically and then undergo heat treatment to improve their mechanical strength.

Aim

The purpose of this work,carried out in collaboration with Fucine Umbre, is to study AA2014 aluminum alloy, most widely used in the aircraft industry, quenched in a bath at different polymer concentrations of the T6 heat treatment and analyze how this affects the final mechanical properties

2. Methods

Process parameters

Select process parameters according to applicable international specifications and based on the current process carried out by Fucine Umbre

Parameters	Requirements for AMS2770
Solubilization temperature	502 ± 6°C
Solubilization soaking time	1,5 h minimum
Temperature of quench bath	At the start of quench, shall not exceed 32 °C
Max concentration of glycol	10 ÷ 22 %
Quench delay	15 second maximum
Immersion time	1 minuti minimum
Aging temperature	177 ± 6°C
Aging soaking time	8,5 ± 9,5 h

Polymer concentration and specimen making

Based on the applicable range of polymer concentration (10÷22%) and base on the current concentration used by Fucine Umbre, we selected 6 different concentrations.

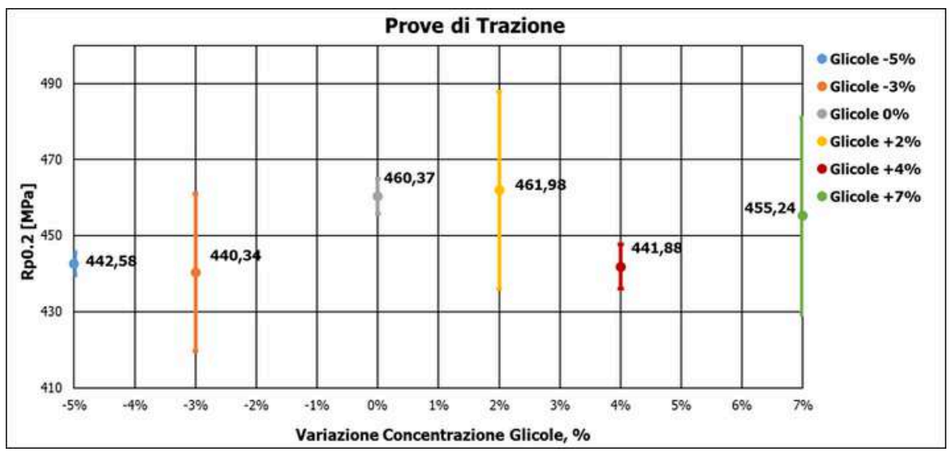
After 36 specimens were made, 6 for each different polymer concentration, so as to have greater repeatability and accuracy of results.

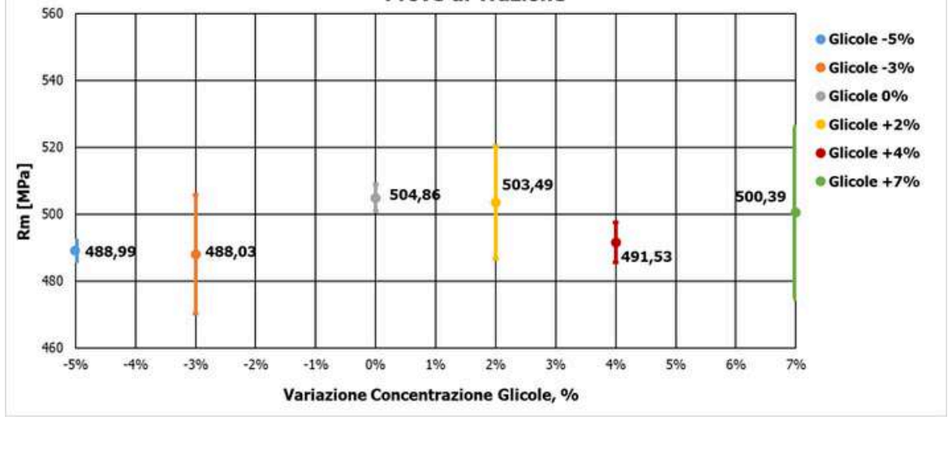
Number of concentrations	Concentrations
1	10%
2	12%
3	15%
4	17%
5	19%
6	22%

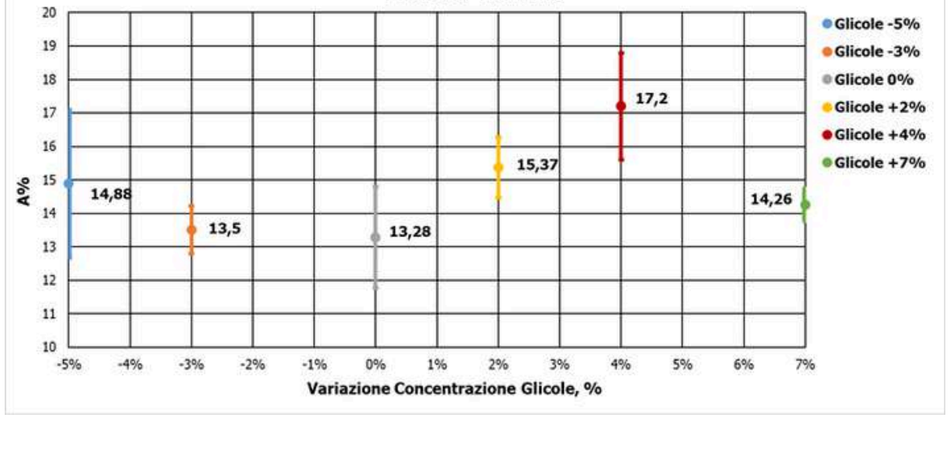
3. Results

After heat treatment (T6) was carried out, first the hardness and conductivity values were studied to get an initial answer on the performance of the treatment at different concentrations.

Next, specimens used for the tensile test were made from the same parts used for the test, and the values obtained were analyzed.







4. Conclusion

From the tests conducted, it was found that different polymer oncentration does not bring substantial change in hardness and conductivity.

On the contrary, as far as mechanical properties are concerned, while all values conform to the minimum values required by the applicable specification, there are comparable benifits using a concentration already in place at Fucine Umbre (15%) and a concentration of 17% of the polymer.