***Final Equation in Terms of Coded Factors it is:***

$$Hardness = +92.20 + 3.57*A + 5.84*B - 6.75*A*B - 4.66*A^2\ 6.66*B^2$$

***Final Equation in Terms of Actual Factors it is:***

$$Hardness = -945.98637 + 9.10519*\ A\ Temperature + 41.54021*B\ Time\ -0.15000*\ A\ Temperature * B\ Time\ -0.020722*\ A\ Temperature^2\ -0.74028*\ BTime^2$$

*b) Response surface method (RSM)*

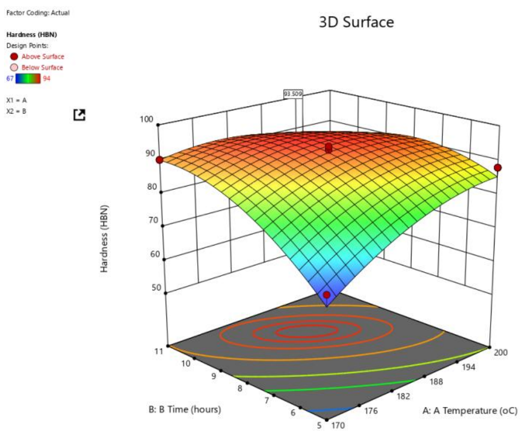


***Fig. 7*** *The response surface (3D) plot of Hardness vs Time-Temperature*

*c) Isocontours of the Indicator of Process (hardness, HBN)*

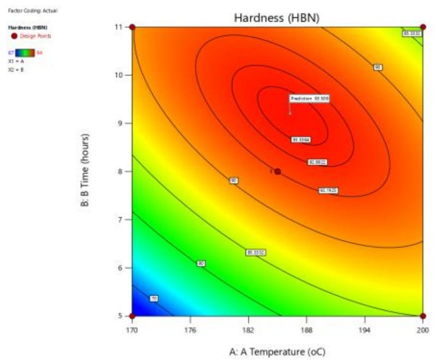


***Fig.*** *The contour plot of Hardness (HBN) vs Time-Temperature*

d) Effects of interaction between factors *(temperature-time)*

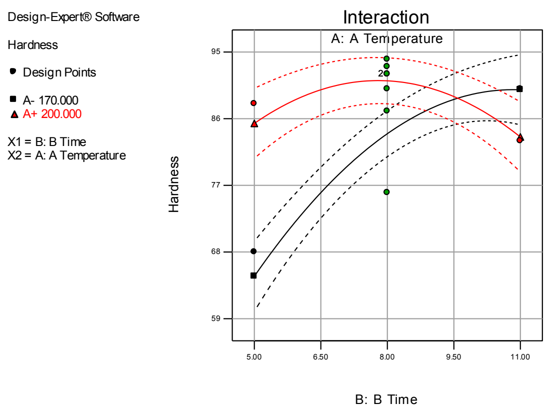


***Fig. 9*** *Interaction between factors*

## *7. Conclusions*

1. In this paper we have presented the methodology for the planning and analysis of the experiment for the case RSM-CCD applied in artificial aging of aluminum alloys.

2. Careful planning of the experiment ensures that the results are obtained with the right expectation, within low probability errors (p-values), with a minimum number of tests.

3. The RSM-CCD method provides in addition to the 3D graphical representation of the response surface also:

- *Mathematical model* of the dependence of the process indicator on the factors taken in the study
- The *effect of the interaction between the factors* and what is more important:
- *Isocontours* of the indicator depending on the factors within the studied limits.
- We consider the latter especially important for industrial operators as it serves them as a ***technological card*** for process management.
- We hope that this paper will be useful for various researchers who aim to optimize the parameters of a process, as we are convinced that it will serve us in future work to optimize the parameters of artificial aging of various connections of aluminium.

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## *9. Conflict of interests*

The author would like to confirm that there is no conflict of interests associated with this publication and there is no financial fund for this work that can affect the research outcomes.

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