SIMULATION AND ENGINEERING ANALYSIS OF A BUS BODY FRAMEWORK DESIGN BY MEANS OF APM WINMACHINE

A.L. Leonov   com@apm.ru

Bauman Moscow State Technical University, Moscow, Russian Federation

Abstract

The article deals with the question whether Russian computer-aided design systems are competitive when solving contemporary engineering problems. Investigating this meant creating a computer simulation of a bus body framework and performing a strength analysis of the design as subjected to static and dynamic loads. We ran our simulations using APM WinMachine, a Russian computer-aided design system, which is a fully fledged counterpart to non-Russian software packages (such as Autodesk, Dassault Systems, Siemens PLM Software), capable of replacing them. The article presents the basics of bus body design. We describe the tools we used for computations, including the finite element method. We suggest an algorithm for selecting structural materials. The article also presents the results of our computations.

References

[1] Aleksandrov M.P. Pod''emno-transportnye mashiny [Handling machinery]. Moscow, Mashinostroenie publ., 1984, 336 p.

[2] Ryakhovskiy O.A., ed. Detali mashin [Machinery parts]. Moscow, Bauman Press, 2014, 465 p.

[3] Kogaev V.P., Makhutov N.A., Gusenkov A.P. Raschety detaley mashin i konstruktsiy na prochnost' i dolgovechnost' [Strength and life duration calculation of machinery parts and constructions]. Moscow, Mashinostroenie publ., 1985, 224 p.

[4] Dunaev P.F. Konstruirovanie uzlov i detaley mashin [Engineering of machine components and parts]. Moscow, "Akademiya" Publ. center, 2004, 496 p.

[5] Reshetov D.N., ed. Mashiny i stendy dlya ispytaniya detaley [Machines and benches for parts testing]. Moscow, Mashinostroenie publ., 1979, 343 p.

[6] Zakharov M.N. Prochnostnaya nadezhnost' oborudovaniya [Strength reliability of the equipment]. Moscow, Bauman Press, 2011, 123 p.

[7] Zamriy A.A. Proektirovanie i raschet metodom konechnykh elementov v srede APM Structure3D [Engineering and calculation by finite element method in APM Structure3D]. Moscow, APM publ., 2010, 376 p.

[8] Zienkiewicz OC, Cheung Y.K. The finite element method in continuum and structural mechanics. New York, McGraw-Hill 1967, 272 p. (Russ. ed.: Metod konechnykh elementov v teorii sooruzheniy i v mekhanike sploshnykh sred. Moscow, Nedra publ., 1974, 238 p.).

[9] Shelofast V.V. Osnovy proektirovaniya mashin [Fundamentals of machine designing]. Moscow, APM publ., 2005, 471 p.

[10] Vorob'yeva G.A., Skladnova E.E., Erofeev V.K., Ustinova A.A. Konstruktsionnye stali i splavy [Construction steels and alloys]. Sankt-Peterburg, Politekhnika publ., 2013, 440 p.

Leonov A.L. — graduate student, Department of Machine Design Foundations, Bauman Moscow State Technical University, Moscow, Russian Federation.

Scientific advisor — V.V. Shelofast, Dr. Sc. (Eng.), Professor, Department of Machine Design Foundations, Bauman Moscow State Technical University, Moscow, Russian Federation.