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# Using helium in liquid rocket engines

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*We study a possibility of using helium in propulsion plants with liquid rocket engines (LREs). We list those properties of helium that might be relevant to developing aerospace industry assemblies. We consider examples of using helium as a working body in contemporary LREs for ensuring the functioning of LRE propulsion plant systems (such as pressurisation of propellant tanks before launch or the automation component actuator); we also estimate the role helium plays in the work process taking place in the combustion chamber. We prove that using helium is advantageous as compared to other inert gases (for example, nitrogen). We show that, for a range of propellants, adding helium to the liquid rocket engine combustion chamber may increase specific impulse. We supply results of promising developments in the sphere of designing LREs with an autonomous cooling loop and state the advantages of this design option. We emphasise that the suggested method of upgrading existing LREs that employs the helium application techniques described in the article does not entail significant alterations to the engine design, which means it is economical.*

**Keywords:** *liquid rocket engines, helium, specific impulse, upper stage, promising design options*

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