

# TRIBOLOGICAL OPTIMIZATION OF RECIPROCATING MACHINES ACCORDING TO IMPROVING PERFORMANCE

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**ABSTRACT:** Lowering fuel consumption and exhaust emissions continue to be prime targets in the development of technology applied for Motor Vehicles and their equipment. Into the focus of attention are the reduction of the vehicle weight as well as, in the field of internal combustion engine technology, more efficient combustion system and accessory components.

As a complex system, the internal combustion engine accounts for a major part of the vehicle mass. The key components, the cylinder head and the cylinder block, for heavy loaded diesel engines, are today almost exclusively produced from aluminium. Also, by application of the aluminium pistons, it reduces engines' weight and inertial forces, as well as the engine vibrations. According to the later, the use of lightweight materials for construction of engine's accessories as it is small air reciprocating compressor for braking system of trucks and buses, has significant contributions to the reduction of equipped vehicle mass.

The advantage of aluminium with regard to the specific weight is notable, but exist the problem because it has considerable disadvantages in terms of the thermal expansion coefficient. The greater thermal expansion would cause unacceptable deformation and higher clearances during reciprocating machine operations. These high clearances would drastically increase the oil consumption and worsen the acoustic excitation. With additional coating on the cylinder liner surfaces it overcoming of poor aluminium strain properties. The application of tribological inserts towards lowering friction resulting in higher performance. The authors hope to obtain more measurement data on the test rig for small air reciprocating compressors in the Engine Laboratory at the Faculty of Engineering University of Kragujevac, which is currently being brought into operation.

**KEY WORDS:** Reciprocating aluminium machines, Plasma spray coating, Lowering friction

## POBOLJŠANJE PERFORMANSI KLIPNIH KOMPRESORA TRIBOLOŠKOM OPTIMIZACIJOM

**REZIME:** Smanjenje potrošnje goriva i emisije izduvnih gasova i dalje će biti glavni ciljevi u razvoju tehnologija koje se primenjuju kod motornih vozila i njihove opreme. U centru pažnje je smanjenje težine vozila, kao i u polju razvoja tehnologija motora sa unutrašnjim sagorevanjem, primenom efikasnijeg sistem za sagorevanje i pomoćnih komponenata

Iako je složen sistem motor sa unutrašnjim sagorevanjem motor predstavlja značajan deo ukupne mase vozila. Najvažnija komponenta, glava cilindra i blok cilindra, kod teško opterećenih dizel motora, danas se isključivo proizvode od aluminijuma. Dakle, primenom aluminijumskih klipova, smanjuje se težina i vibracije motora. Primena lakih materijala za

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izgradnju motora i opreme kao što je mali klipni kompresor kočionog sistema kamiona i autobusa, ima značajan doprinos smanjenju ukupne mase vozila.

Prednost aluminijuma u odnosu na specifičnu težinu je evidentan, ali ima nedostatke u pogledu značajnog koeficijenta termičkog širenja. Što je veće termičko širenje dolazi do većih deformacija ali i većih zazora u procesu rada klipnih kompresora. Ovi visoki zazori dovode do značajnog povećanja potrošnje goriva i povećanja akustičkih pobuda. Sa dodatnim premazom površine cilindarske košuljice poboljšavaju se destrukcione osobine aluminijuma. Primena triboloških umetaka za smanjenje trenja dovodi do boljih performansi. Autori se nadaju da će dobiti više podataka iz ispitivanja na mernom mostu za ispitivanje klipnih kompresora koji je razvijen u Laboratoriji za motore Fakulteta inženjerskih nauka Univerziteta u Kragujevcu, koji se trenutno uvodi u rad.

**KLJUČNE REČI:** Klipni aluminijumski kompresor, Plazma prevlake, smanjenje trenja