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Reverse engineering and refurbishing of an Mi-24 helicopter main gear box

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2016
http://hdl.handle.net/10539/20634

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ABSTRACT

The Mi-24 helicopter is one of the most famous heavy lift helicopters designed with a net weight of 8.4 tonnes, while its gross weight is 12.5 tonnes. This helicopter is powered by two TV3-117 turbo-engines, coupled to a VR-24 main rotor transmission gearbox, which reduces the engine speed from 15000 Revolutions Per Minute (RPM) to the main rotor speed of 240 RPM. This research aims to show the functionality of the Mi-24 helicopter main gear box, to find the opportunities to extend the running hours (before maintenance) and to refurbish the gear box locally in South Africa. The research follows the principles of Reverse Engineering (RE) and Refurbishing. The principles involve the extraction of information from an existing product in order to establish its function and to re-create specifications which can be used to make, maintain or refurbish a similar or superior item. This dissertation has exposed some of the theory of the design of the Mi-24 main gearbox components and their functionality; including similar selected helicopters' main drive mechanisms. The probable defects that are common to helicopter transmissions, the specifications and the Computer Aided Design (CAD) drawings are also presented. The research concludes that, with the cooperation of the local aerospace industry (including the army), the academic institutions and government; it is possible to get the necessary certification, licensing, training, specialised equipment and to establish a Maintenance Organisation, to refurbish the Mi-24 helicopter gearbox locally in South Africa.