Dog Clutch with Blocking Mechanism

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Main target is to propose a functional gearshift mechanism based on the face dog clutch. This face dog clutch has to have dogs shaped in the way that they provide minimal circular backlash to avoid clash during torque direction change when engaged. Axial force arises on these dogs when transferring torque in engaged state and this force acts in the direction of disengaging the clutch. Therefore a blocking mechanism which would prevent unwanted disengagement and guarantee successful engagement anytime has to be present.

For the design of the blocking mechanism I use inspiration from various mechanical principles, propose corresponding solutions and then compare their advantages and disadvantages. Main criteria are complexity, number of parts and and corresponding manufacturing costs, weight and axial length of the clutch.

Dog clutch with blocking mechanism can be used in any application where connecting of two rotating shafts is necessary. It is designed especially for the automotive industry and can be particularly useful in cooperation with an electric motor which can provide synchronization of angular speed difference of the shafts. Dog clutch with blocking mechanism can therefore replace traditional synchromesh units used in mechanical parallel shaft gearboxes for example in parallel hybrid vehicles.

Prototype of one selected solution of the dog clutch with blocking mechanism was manufactured and its functionality was successfully tested in the VW MQ200 gearbox as a replacement of the synchromesh unit. Patent application of the invention was filed at the Czech Industrial Property Office on June 26, 2017 under the name of “Řadící spojka” (“Shift Clutch”), file No. PV 2017-371.

Further design improvements of the dog clutch prototype and proposals of more suitable solutions are under investigation.