A quantitative analysis method of greenhouse gas emission for mechanical product remanufacturing based on Petri net

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ABSTRACT

The increased greenhouse gas (GHG) emission is one of the consequences of environmental change. Waste mechanical products remanufacturing is a good production mode for environment protection. Nevertheless, GHG emissions are inevitably generated in the remanufacturing system. Some uncertainties would exist in the remanufacturing system due to the different damage statuses of old mechanical products, which result in dynamic GHG emissions. Recent studies on the characteristics of GHG emissions for mechanical product remanufacturing are not yet available. This study proposed a quantitative analysis method of GHG emissions for mechanical product remanufacturing based on Petri net. In this method, the boundary of the remanufacturing is initially defined, and the dynamic characteristics of GHG emissions are analysed. Then, a GHG emission analysis model based on Petri net is constructed. Finally, the GHG emission of a PCL803 centrifugal compressor rotor remanufacturing as a case is analysed by this proposed method. This method could provide a guidance to quantitatively analyse the characteristics of GHG emissions, and suggestions for mechanical product remanufacturing to realize cleaner production and sustainability.

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Metoda za kvantitativno analizo emisij toplogrednih plinov za obnovo mehanskih izdelkov, temelječa na Petrijevi mreži

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POVZETEK

Povečana emisija toplogrednih plinov je ena od posledic okoljskih sprememb. Obnova odpadnih mehanskih izdelkov je dober način za varovanje okolja. Kljub temu pa se emisije toplogrednih plinov neizogibno ustvarjajo tudi pri obnovi. Zaradi različnih poškodb starih mehanskih izdelkov, se pri obnovi pojavijo nekatere negotovosti, ki povzročajo dinamične emisije toplogrednih plinov. Novejše študije o značilnostih emisij toplogrednih plinov pri obnovi mehanskih izdelkov še niso na voljo. V tej študiji je bila predlagana metoda kvantitativne analize emisij toplogrednih plinov za obnovo mehanskih izdelkov na osnovi Petrijeve mreže. Pri metodi so najprej definirane omejitve obnove ter analizirane dinamične značilnosti emisij toplogrednih plinov. Nato je izdelan model analize emisij toplogrednih plinov, ki temelji na Petrijevi mreži. Končno se s predlagano metodo analizira emisija toplogrednih plinov pri obnovi rotorja centrifugalnega kompresorja PCL803. Ta metoda bi lahko nakazala smernice za kvantitativno analizo značilnosti emisij toplogrednih plinov in podala predloge za obnovo mehanskih izdelkov, da bi dosegli čistejšo proizvodnjo in trajnost.

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PODATKI O ČLANKU

Ključne besede:

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