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### 打结器驱动齿盘打结性能对比试验研究

## Experimental research on performance of different knotter driving pulleys

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中文摘要:

驱动齿盘作为方草捆压捆机打结器的重要组成零件及总动力源,其参数特征对打结器成结率有着必然影响。目前打结器成结率受夹绳、割绳、脱扣不充分等影响严重,而驱动齿盘结构及参数对该失误影响显著,该文针对以上问题设计了分体式驱动齿盘CTRC\_I和CTRC\_II。其中分体式驱动齿盘CTRC\_I由CTRC底盘与反“9”字型凸轮块组成,CTRC\_II由CTRC底盘与圆弧切线型凸轮块组成。在相同试验条件下,通过与New Holland驱动齿盘进行室内试验对比分析可知,CTRC\_I齿盘的稳定成结率(90.0%)显著高于(P<0.05)New Holland(83.5%)和CTRC\_II齿盘(65.0%),凸轮结构对成结效果影响显著。New Holland齿盘与剑麻绳、CTRC\_I齿盘与聚丙烯绳、CTRC\_I齿盘与剑麻绳等3种配合具有较好的稳定成结率,比其他配合高22.7%~53.5%。不同转速下,CTRC\_II齿盘对捆绳的平均最大拉力最大,CTRC\_I齿盘最小。CTRC\_I齿盘所成绳结质量最高,但捆绳非有效消耗量也相对最大。最终采用层次分析法和功效系数法进行综合效益分析可知,CTRC\_I和New Holland齿盘综合性能优于CTRC\_II齿盘,且CTRC\_I与聚丙烯绳配合时,综合性能最好。

英文摘要:

As a key part of the knotter, knotter driving pulley is the total power source of the knotter used on briquetters. The parameters of knotter driving pulley are main factors for affecting the knotting rate. Two kinds of CTRC knotters (CTRC\_I and CTRC\_II) were designed to solve the present knotting problems, which including mis-clipping, mis-cutting and mis-tripping off the twine. CTRC\_I was composed of CTRC basal part and reversed “9” type cam block, while CTRC\_II was composed of CTRC basal part and arc-tangent type cam block. The comparison was carried out among CTRC\_I, CTRC\_II and New Holland knotter driving pulleys indoor. The results showed that the stable knotting rate of CTRC\_I pulley (90.0%) was significant higher than that of New Holland (83.5%) and CTRC\_II (65.0%) types of pulleys. The best stable knotting rate was obtained under three combinations: New Holland with sisal twine, CTRC\_I with polypropylene twine and CTRC\_I with sisal twine and was 22.7%~53.5% higher than the other three combinations. During the experiments, mean maximum pull tension was got by the CTRC\_II type pulley, while the minimum pull tension was got by the CTRC\_I type pulley. At last, the knot quality was the highest for CTRC\_I pulley while the twine dosage was also largest for it in comparison with the CTRC\_II and New Holland pulleys. Meanwhile, the twine dosage was the largest at 70 r/min (99.5 mm) and smallest at 40 r/min (94.8 mm). Finally, the knotting performance of CTRC\_I and New Holland pulleys were proved to be better than CTRC\_II pulley by comprehensive benefit analysis through combining the methods of analytic hierarchy process and effect coefficient. Combination of the CTRC\_I pulley and polypropylene rope was the best operating mode among the six different combinations.

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