

Characteristics, Silanization Mechanism and Mixing Process of Silica

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Abstract: The characteristics of silica and silane coupling agent, the chemical reaction mechanism and reaction kinetics between them, and the characteristics of the mixing process of silica compound were reviewed. The surface area of silica was an important factor that determined its reinforcing ability, and the structure degree of silica determined the free volume between its aggregates. The ratio of small aggregates of high-dispersible silica was higher, which was more conducive to dispersion. The silica flocculation had an adverse effect on the performance and processing of the final product, and increasing the silanization efficiency of silica was an effective method to reduce flocculation. The large number of polar hydroxyl groups on the surface of silica resulted in poor compatibility with non-polar rubber, but the coupling effect of the silane coupling agent significantly enhanced the reinforcing effect of silica. The adsorption capacity of the silane was the decisive factor for the rate of silanization reaction. The steric hindrance effect of the alkyl chain played an important role in the silanization and vulcanization reaction. Use of new coupling agents containing long-chain substituents and mercaptosilanes could improve silica dispersion. By Using intermeshing mixer, increasing discharge temperature, reducing cooling temperature and filling factor, and utilizing air injection, the silanization efficiency of silica was improved.

Key words: silica; characteristic; silanization; reaction mechanism; mixing process

橡胶工业设备声纹库创建

日前,赛轮集团股份有限公司(简称赛轮集团)与科大讯飞全资子公司签署战略合作协议。轮胎行业与人工智能行业的龙头企业将携手共建橡胶行业人工智能联合创新中心,通过联合创建橡胶工业设备声纹库,探索人工智能在橡胶行业的新应用。

赛轮集团副总裁朱小兵解释道:“橡胶工业设备声纹库是一套让沉默的机器说话的系统。以前通过人工才能检查出的问题,有了声纹库以后,机器自己就能进行检查,查出问题后自己‘说’出来,甚至还能通过设备运转声音的细微变化预测故障和使用寿命。”

橡胶轮胎行业生产模式复杂,存在生产设备种类多、数据采集点多、控制系统差异大、通讯协议复杂、不通用等难题。通过此次合作,赛轮集团将借助科大讯飞20年积淀的声学核心技术,全方位采集设备运转的声音,建立健康的声纹模型,通

过声音等多种综合手段对生产设备的健康状况进行智能化监测,助力生产设备在健康状态下以最高效率、最优工艺、最稳定工况,生产出更高质量的产品,实现生产设备预知维护及智能巡检、工艺参数自优化等。

据了解,橡胶工业设备声纹库是科大讯飞青岛人工智能产业加速中心落地西海岸后的首个人工智能和工业制造深度融合项目,也是科大讯飞在青岛布局大企业联合创新的一次试水。

赛轮集团2020年6月正式对外发布了“橡链云”工业互联网平台。该平台已经能够实现99%以上设备的互联互通,采集点数量为百万级,年数据采集增长量达45亿条以上。

未来,赛轮集团和科大讯飞将在设备健康管理、质量工艺优化、安全生产监测预警等方面开展深度合作,为“橡链云”的长期发展提供强有力的技术支持。

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