STUDY ON THE HEAT-RESISTANT PROPERTIES OF HEAT-RESISTANT COMPACTED GRAPHITE CAST IRON

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ABSTRACT

THE OBJECTIVE OF THIS STUDY IS TO INVESTIGATE THE HIGH TEMPERATURE OXIDATION AND THERMAL FATIGUE PHENOMENA OF THE HEAT-RESISTANT COMPACTED GRAPHITE CAST IRONS(CGI). THE EFFECTS OF MATRIX STRUCTURES (FERRITE AND PEARLITE) AND VARIOUS ALLOYING ELEMENTS ADDITIONS (C, SI, CR, NI, CU AND MO) ON THE OXIDATION-RESISTANT AND THERMAL FATIGUE-RESISTANT AT THE DIFFERENT TEMPERATURES (673K, 873K AND 1073K) OF COMPACTED GRAPHITE CAST IRONS HAVE BEEN EVALUATED IN THIS STUDY BY USING THE SPECIMENS OFΨ20MM×30MM FOR THE OXIDATION TEST AND 10MM×20MM× 6MM FOR THE THERMAL FATIGUE TEST. IN ADDITION, THE OBSERVATION OF MICROSTRUCTURAL CHANGES CAUSED BY THE HIGH TEMPERATURE OXIDATION WAS PERFORMED BY USING THE OPTICAL MICROSCOPE, SEM+EDS AND XRD TO IDENTIFY THE COMPOSITIONS OF THE OXIDATION LAYERS. ACCORDING TO THE RESULTS OF STUDY, THE ADDITIONS OF ALLOYING ELEMENTS HAD NO OBVIOUS EFFECT ON OXIDATION-RESISTANT CAPABILITY FOR THE SPECIMENS TESTED AT 673K. BUT FOR ANY ALLOYING ELEMENT ADDITION, THE OXIDATION-RESISTANT CAPABILITY AT 873K WOULD BE IMPROVED. THE SPECIMENS ADDED WITH SI OR CR WOULD INCREASE THE OXIDATION-RESISTANT CAPABILITY AT 1073K BESIDES THOSE ADDED WITH CR, NI AND CU. AS FOR THE OXIDATION-RESISTANT CAPABILITY OF THE MATRIX STRUCTURE, THE FERRITE IS SUPERIOR TO THE PEARLITE AT ANY TEMPERATURE. COMPARE THE EFFECT ON THE INCREASE IN THE THERMAL FATIGUE-RESISTANT CAPABILITY OF CGI SPECIMENS BY ADDING DIFFERENT ALLOYING ELEMENT, THOSE ADDED WITH NI, CR AND CU SHOW THE BEST EFFECT. NEXT FOLLOWED IN ORDER ARE THOSE ADDED WITH MO, CU AND SN, THOSE ADDED WITH MO, AND THOSE ADDED NO ALLOYING ELEMENT SHOW THE WORST EFFECT.

Keywords : HEAT-RESISTANT COMPACTED GRAPHITE CAST IRON, OXIDATION-RESISTANT, THERMAL FATIGUE-RESISTANT

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