REVIEW OF EXISTING DEVICES FOR EROSION-CORROSION TESTING OF MATERIALS

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Tallinn University of Technology periodically participates in research and development of boiler steels intended for oil shale (OS) thermal power plants firing. OS still is the main source (90 %) for electricity production in Estonia [1]. Durability and efficiency increase of OS-fired circulating fluidised bed (CFB) is one of the main tasks to reduce the expenses. Material exchange, repair, downtime and OS combustion efficiency are major reasons for increased total expenses of power plant operation. Flue gas is highly aggressive to steels in CFB boiler system. Flue gas is causing boiler steel high- and low – temperature oxidation and various chemical corrosions on surface of boiler steel: sulfidation, carbonization, dusting and nitriding. A presence of solid particles (ashes) in flue gas is causing erosion of boiler steels at different velocities and impingement angles [2]. J. Priss in her PhD thesis [3] have separately made corrosion and solid particle erosion tests. Corrosion tests of ash coated boilers steels have been performed at 500 and 600 ^{o}C in HCl gas flow (HCl environment) and in synthetic air atmosphere (O_2~20 % and N_2~80 %). High temperature erosion tests of boiler steels have been performed at 500 and 600 ^{o}C in natural environmental atmosphere with silica sand as erodent. Impact velocity has been 80 m/s and impact angles have been 30^{o} and 90^{o}.

Authors of this review are analysing solutions for combined low and high temperature erosion and corrosion testers. Result of this review is a new tribotester design to perform tests more close to real conditions and to allow foreseeing a remaining service life of boiler steels installed in CFB. It was found that gas jet solution can ensure a possibility using fly ash as erodent, but centrifugal particle accelerator can provide more precisely determinable influence of impact angle to wear rate.

References

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