Innovation in wedge wire filter designs using Additive Manufacturing (AM)

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Industrial filters are employed to remove particulates from fluids to prevent contamination or damage to downstream industrial processes. Wedge wire filters have strength and can withstand high operational pressures and are widely employed across a range of industries including water management, hydroelectric, food & beverage and manufacturing. Traditionally, wedge wire filter media are manufactured using conventional processes where the wedge profiles are resistance welded to supports to form the overall shape. AM technology has the capability to produce complex shapes, some of which cannot be manufactured conventionally. We have previously utilised AM technology to deliver innovative filtration media designs. The design freedom of layer by layer manufacturing provides the opportunity for the wedge wire to be shaped in a form not usually produced in current manufacturing processes.
Here we developed AM wedge wire (WW) designs for a self-cleaning filter for water catchment in river flow. The first challenge is to design a self cleaning shape that also can withstand water pressure and turbulence and river debris. The second challenge is produce the wedge wire filter to have the required slot size for effective filtration. Three wedge wire catchment filter designs were developed. 1) conical AM WW design traditional arrangement: vertical wedge horizontal support, non uniform slot size. 2) Domed conical filter: wedge was then aligned in a spiralling arrangement with vertical supports. 3) Wedge profiles were arranged vertically with spiralling supports. The wedge/support arrangement produced distortion challenges for the powder bed AM technology. Further design development can eliminate the distortion challenge which delivered further design opportunities for WW. Metal Additive Manufacturing technology has been utilised to produce a novel configuration of wedge wire profiles and support arrangements.

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