

GOLD ROASTING TECHNOLOGY ADVANCES AND HOW TO HANDLE COMPLEX CONCENTRATES MORE SUSTAINABLY

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ABSTRACT

Roasting is a key pyro-metallurgical technology for a vast number of ores and concentrates. Over the past years considerable research and development efforts have focused on expanding the application window of roasting. Materials that previously needed to be separated from roasting feeds can nowadays be blended with roaster feed after special feed pre-treatment. This applies particularly to extremely fine concentrates, by-products or residues as well as material with a high content of low melting impurities.

Refractory gold-ores are characterized by low gold recoveries in direct cyanide leaching. The reasons for low recovery are sulphides, carbon or arsenic due to encapsulation or absorption effects. Oxidizing roasting of such ores prior to leaching is an effective step to increase gold recovery typically to levels well above 90%. To achieve the required gold recoveries in the subsequent leaching steps, the majority of the sulphur and carbon has to be oxidized to SO₂ and CO₂. Circulating fluidized bed furnaces are most suitable for accurate control of the roasting temperature as gold ores are well known for their temperature sensitivity. The process conditions therefore are specifically designed for each feed material to achieve the maximum gold recovery in subsequent cyanide leaching.

Off gas treatment, together with SO₂ abatement, is an important supplement to roasting technology. High impurity freights can be efficiently removed in off gas treatment in order to produce tradeable high quality sulphuric acid. Gas cleaning and acid plant concept must be designed for each case/project individually, with respect to impurities in the feed material and SO₂ emission permits.

This paper will also discuss the performance and environmental benefits from these advances with illustrations from several latest projects.