Surface Ablation for Improved Lubrication and Elimination of Surface Defects

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Surface Ablation for Improved Lubrication and Elimination of Surface Defects

[0001] Cast metal products, such as ingots, slabs, or plates, may have surface deformities due to contracting metal or otherwise. Surface deformities impact downstream processing of the cast metal products, such as in further rolling processes. Said cast metal products are typically scalped of an outer shell to eliminate surface deformities. However, scalping results in material lost and a lower resultant yield.

[0002] Disclosed is a method of surface ablation for cast metal products using high-pressure water jets. Such ablation can change depth and pressure of the water jets to vary the depth of surface ablation. By controlling the pressure and time of ablation, the depth of removal can be controlled. This may improve lubrication, the surface finish, and color uniformity of cast metal products prior to downstream, subsequent processing. Such a process may eliminate the need for scalping of metal before downstream processing, reducing material loss.

[0003] The method can use different water jet shapes, patterns, or overlaps to accomplish a desired ablation. For example, this may include greater depths of removal, elimination of notable or outstanding deformities or a targeted surface texture. In a tested sample, the water jets were able to remove up to 1mm of metal or more, while achieving a uniform surface roughness, in a reasonable period of time.

[0004] In continuous cast processes and products, use of the disclosed method may give the cast metal product an improved microstructure and surface texture, similar or better to what would be observed in a direct chill cast product, and may enable the continuous casting of thinner products than traditional DC ingots. Use of such water jets may also prove helpful as a supplemental quench mechanism throughout the casting process.

[0005] Different combinations, components, and uses of the above method, including those not described, are possible.