

## **Mechanical Evaluation of a New Sand Control Screen for SAGD Applications**

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Steam assisted gravity drainage (SAGD) wells typically require the deployment of an open hole completion combining sand control with adequate mechanical strength to withstand aggressive installation loads (compression, torque, bending) that are characteristic of shallow horizontal wells, and also severe operational loads (tension, compression, collapse, burst) caused by a combination of high temperature steam injection and formation collapse around the completion.

Historically, slotted liners have been used in Western Canada, primarily because of their low cost relative to wire-wrapped screen (WWS) or premium mesh screens. However, slotting base pipe can significantly weaken its mechanical strength, particularly in torsion and collapse, and the slot width can change as the liner deforms under certain load conditions. Reported incidents of mechanical failure and loss of sand control of slotted liners in SAGD wells have generated interest among operators to investigate alternative technologies.

A new sand screen has been developed that involves flush-mounting and securing 25.4 mm diameter fusion bonded metal laminate (FBML) cartridges/discs directly into the base pipe wall. The open flow area of the screen, which can be as high as 20% (versus 2.5% for slotted liner) is dictated by the number of inserted discs (holes) per foot. For an equivalent open flow area, drilling holes in the base pipe is less detrimental to the mechanical strength of the liner than cutting slots. This new geometry results in a sand screen that is cost competitive to slotted liner on a same-open-flow-area basis, significantly stronger, and comparable to a premium mesh screen in terms of sand retention performance.

To independently quantify the mechanical strength and integrity of this new screen for SAGD, an extensive Finite Element Analysis study was performed on 177.8 mm (7"), 38.7 kg/m (26 lb/ft), L80 base pipe for two different hole densities and various single loads, combined loads and thermal cycling. The results, presented in this paper, demonstrate that inserting FBML discs into base pipes does not significantly weaken it compared to cutting slots. A stand alone screen (SAS) with almost four times the open flow area of a slotted liner has significantly more torsion and collapse strengths.