COLD SHUT OR COLD LAP

A linear discontinuity with rounded edges. The defect has a characteristic appearance and may vary in depth, extending either partially or entirely through the section of the casting. In the mildest case, it may consist merely of a shallow groove with rounded edges. This defect may be accompanied by the presence of rounded edges and corners on the casting itself (see defects E 111 and E 121 - mirum).

Cold shut occurs on wide surfaces of the casting, in thin sections which are difficult to fill, or where two streams of metal converge in the mold because of sequence of filling.

Possible Causes
- Insufficient fluidity; oxidized metal.
- Slow or interrupted pouring.
- Insufficient venting.
- In diecasting: incomplete fusion of two streams of metal (the two often showing different structures due to differences in cooling rates).

Remedies
- Pour at higher temperatures.
- Increase the fluidity of the alloy.
- Increase mold filling rate by changes in gating.
- Improve venting of the mold.

For metallic molds:
• Adjust mold and metal temperatures (increase, usually).
• Heat the mold wall selectively or improve temperature control of the mold at the defect location.
• Refine the gating system.
• Check the mold wash in terms of insulating qualities.

C 311 - Steel, Cement Molding

Ni-Cr-Mo steel casting made in a cement mold with an oil-sand core; weight about 3.5 kg (7.7 lb). Cold shut resulted from pouring too cold.

C 311 - Cast Iron, Green Sand

Fragment of a bathtub casting showing a cold shut. The casting was bottom-gated; insufficient filling velocity and restricted escape of gases from the mold.

First trial castings showed open blows. Increased metal pressure eliminated the blows but failed to achieve complete fusion.
C 311 - Ductile Iron, Green Sand

Ductile iron support bracket; unit weight 1.35 kg (2.97 lb).

The spherical portion of the casting in the left foreground shows a pronounced cold shut (C 311).

Principal cause: Reduction in filling rate due to sprue being cut through off-center (visible at right).

Remedy: Provide enlargement base below sprue to eliminate chances of sprue misalignment. Use venting above the sphere to eliminate back-pressure of mold gases during filling.
C 311 - Aluminum Alloy, Die Cast
Aluminum alloy die casting with cold shut partially covered by chrome plating.

Photomicrograph of casting shown above.

Figure 120

Figure 121

C 311 - Aluminum Alloy, Die Cast
Light metal diecasting showing a cold shut.

(x 5)

C 311 - Aluminum Alloy, Die Cast
Demonstrating the difference in microstructures between rapidly-cooled metal and that of the surrounding metal which cooled more slowly (Al-Si-Cu alloy diecasting).

(x 250)
C 311 - Aluminum Alloy, Die Cast

Light alloy diecasting containing a cold shut.

Figure 124

C 311 - Aluminum Alloy, Die Cast

Light alloy diecasting containing a cold shut.

Figure 126

C 311 - Aluminum Alloy, Die Cast

Aluminum alloy diecasting with a cold shut which appeared only after ball-
burnishing (mild peening). The defect appears as a thin layer of metal, resembling a
flake, which is poorly fused to the surface of the casting.

Figure 125