The INSURAL ATL ladle lining system for aluminium

Energy conservation, metal cleanliness and the working environment are all foremost in the minds of today's foundrymen. More aluminium foundries are now using central melting with transfer ladles moving the metal to individual holding furnaces. After metal treatment, these ladles are moved by crane or fork lift to make multiple casts and it is not uncommon for transfer times of ten minutes to be involved.

Traditionally, dense castable linings have been used. These systems have a high conductivity and thermal capacity. Another method is to use clay-graphite or silicon carbide melting pots, which again have high conductivity. Both these materials, despite offering long life and good erosion resistance, are expensive to operate, difficult to install and lead to oxide build-up which can result in oxide inclusions being transferred into the holding furnace. For foundries to maintain metallurgical quality and reduce operating costs, a superior product was developed known as the INSURAL ATL lining system.

The INSURAL lining is a highly insulating material which is non-wetted by aluminium. Various formulations are available in the INSURAL family of products and INSURAL 140 linings offer a good blend of insulation, thermal cycling and wear resistance. INSURAL 140 preformed ladle linings are designed to be used in conjunction with INSURAL 10 backing material and INSURAL 80 sealing mastic. Together these comprise the INSURAL ATL ladle lining system.

Figure 1, drawings 1-8 show a schematic description of the installation of a ladle. The INSURAL 10 backing material comprises three components, which should be blended in dry form. A suitable level of INSURAL 10 backing is then poured into the bottom of the steel outer and the INSURAL 140 liner placed on top. Further INSURAL 10 material is then poured around the outside and tamped into place. If a pouring spout is required, a range of INSURAL 140 launders are available, one of which could be fitted by cutting a profile from the liner and sealing around the outside of the launder with INSURAL 80 mastic. When the spout is fitted and the INSURAL 10 backing is tamped down firmly, heat is applied to the steel outer using a gas torch. Once the INSURAL 10 reaches 130°C, an exothermic reaction will occur, which will hold the liner under compression. After around 30 minutes heating, the backing will be fully cured and the top

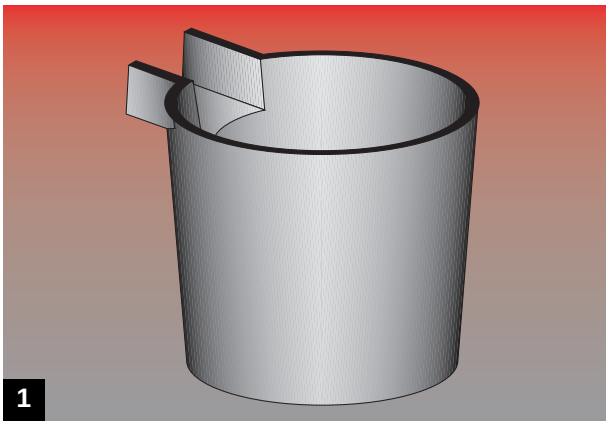
of the ladle can be finished with INSURAL 80 mastic. The ladle is now ready for use with no risk of moisture pick-up from damp refractories.

Figures 2a and 2b show a comparison between the conventional process and the INSURAL ATL lining system. It is common to find a temperature drop of 8°C per minute with traditional ladles whereas only 2.5-3°C per minute is normal using INSURAL ATL lining system.

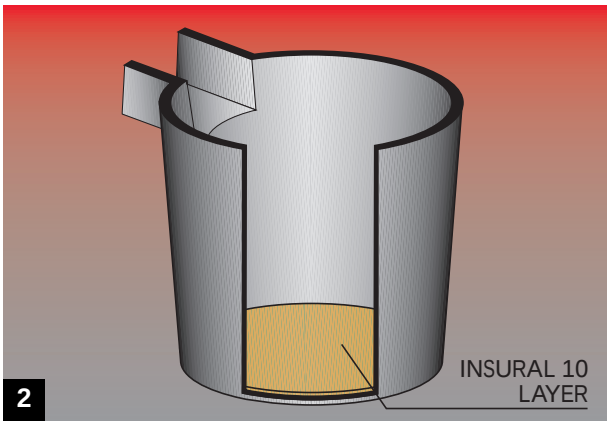
To reduce temperature loss and avoid the possibility of hydrogen pick-up, traditional ladles are heated between transfers. INSURAL ATL ladles do not need pre-heating resulting in energy conservation savings.

Figure 3 shows a case study from a foundry which lined its ladles with refractory concrete and heated with gas continuously. The old style lining gave a life of 12 months. The new practice is now to use

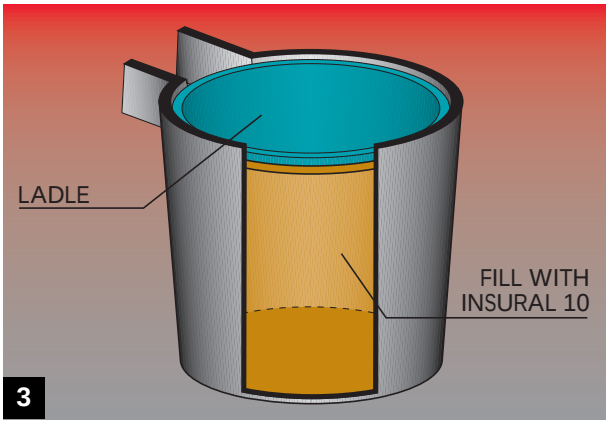
Figure 1, drawings 1-8



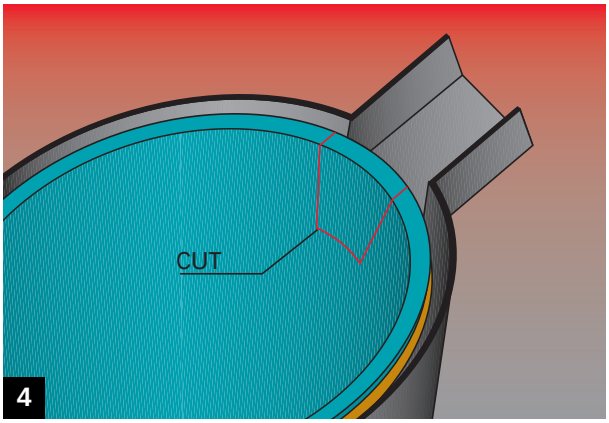
Clean empty steel shell



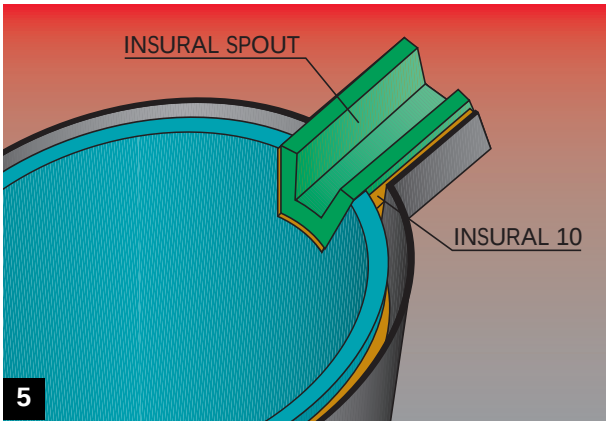
Layer of INSURAL 10 backing in base of steel shell to bring ladle to correct height



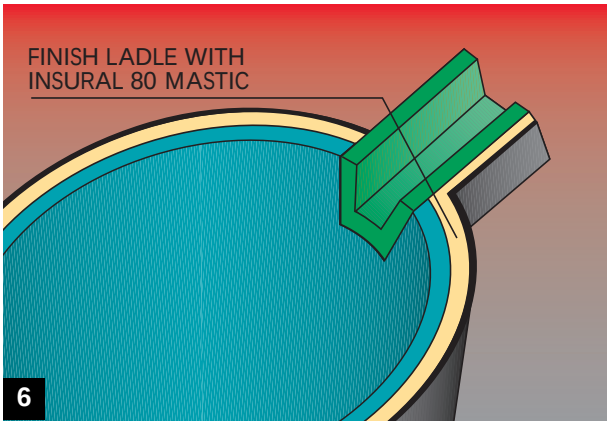
After positioning ladle, fill in space with INSURAL 10 backing



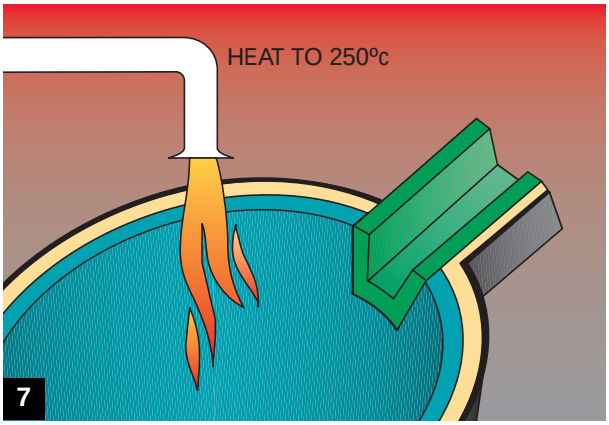
Where necessary cut ladle to accommodate INSURAL spouts



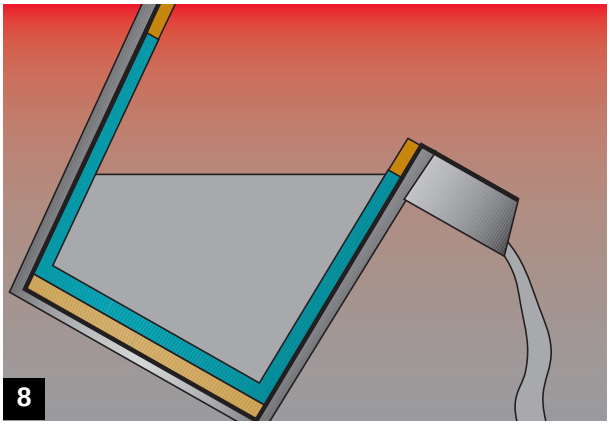
Fit spouts with INSURAL 10 backing



Finish the ladle with INSURAL 80 mastic to cover all INSURAL 10 surfaces and joints



Apply heat to ensure all traces of moisture are removed



Finished ladle

INSURAL ATL linings, changing them every five months. The only pre-heating now required, is that weekly any moisture absorbed over the weekend is removed.

A full range of linings is available from 10 kg to 1000 kg in capacity and when particularly high erosion is found, such as where metal is to be poured from a great height or at a very fast rate, linings can be supplied with reinforced bases made from a FOSCAST material.

Benefits from using the INSURAL ATL ladle lining system for aluminium are:

- Gas consumption is reduced significantly by up to 90% compared to conventional ladle practice which requires pre-heating.
- Lower melting furnace temperatures.
- Clean, oxide-free ladles.

INSURAL ATL linings provide a clean, easily installed system, offering significant energy and cost savings.

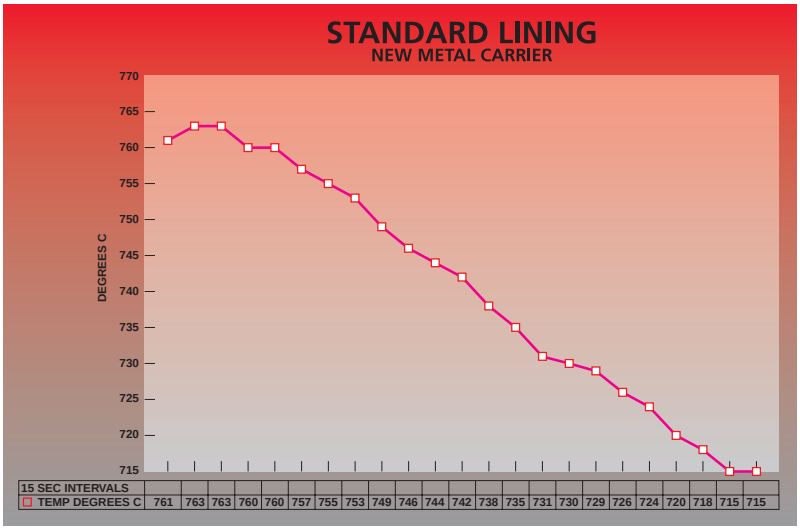


Figure 2a

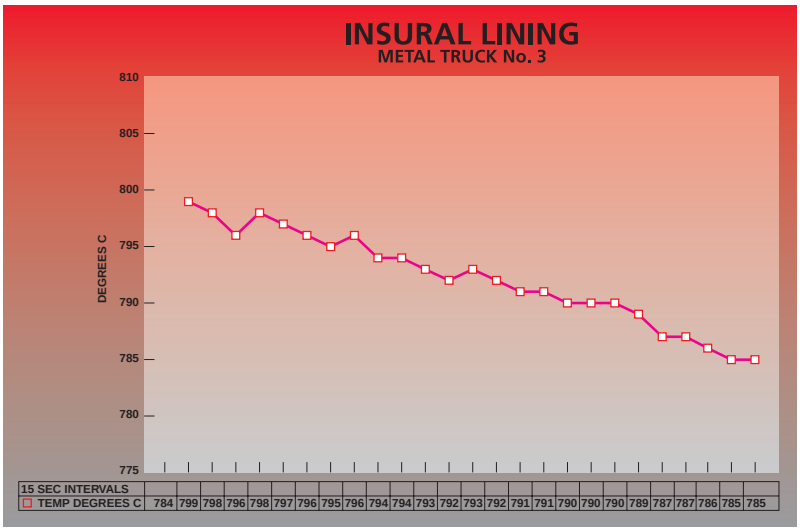


Figure 2b

INSURAL A.T.L. CASE STUDY

GRAVITY DIE FOUNDRY WITH CENTAL MELTING 300 KG CAPACITY TRANSFER LADLE

a) EXISTING GAS HEATED LADLE - LIFE 12 MONTHS

material:12 x 25 kg mouldable	£	185.00
2 x 25 kg wash coat	£	39.00
Labour for reline	£	156.00
Cost for gas heating (100 hrs/week)	£	3,120.00
	£	3,500.00/year

b) INSURAL A.T.L. LADLE - LIFE 5 MONTHS

Insural 140 liner	£	390.00
Insural 50 launder	£	72.00
Insural 80 mastic	£	39.00
Insural 10 backing	£	74.00
Labour for fitting	£	44.00
	£	619.00 x 12 / 5
	£	1,485.60
Cost for gas heating (5 hrs/week)	£	156.00
	£	1,641.60 per year

Saving for each 300 kg ladle £1,858.40 per year