



POLYMER INJECTION TECHNOLOGY



- World first Australian Technology
- Win-Win for the Environment and Steelmaking Operations
- Strong collaboration between OneSteel and UNSW
- Partnered with More S.r.l to promote Polymer Injection Technology globally

INTRODUCTION

Polymer Injection Technology (PIT) is a ground breaking Australian development that uses recycled polymers (such as car tyres) as an alternate carbon injectant to produce foaming slag in the Electric Arc Furnace (EAF) steel making process.

Close collaboration between OneSteel and the University of New South Wales (UNSW) has turned an innovative idea into a manufacturing reality. OneSteel and the UNSW have worked closely together to develop PIT. The technology has evolved from initial laboratory testing and plant trials into a full scale industrial process. Polymer Injection Technology is now standard operating practice at OneSteel's major EAF facilities in Sydney and Melbourne, and has been licensed by steelmakers in Thailand, South Korea, Norway and the United Kingdom.

HOW IT WORKS

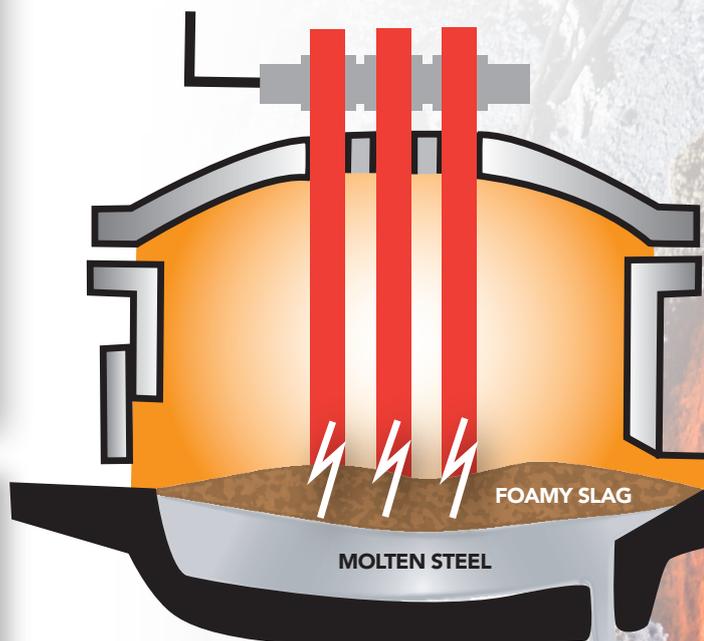
In conventional EAF steelmaking injection of coke or anthracite produces a foamy slag, which acts as a blanket over the molten steel during the steelmaking process. Polymer Injection Technology provides benefits to EAF steelmakers by improving the foaming properties of the slag, using a blend of polymer and coke/anthracite.

Benefits of increasing the volume and foaminess of the slag include:

- **improved electrical energy efficiency** due to a longer arc
- **improved heat transfer from the arc to the steel,**
- **decreased heat loss through the slag and sidewalls.**

As a result, electricity consumption can be reduced by approximately 2.5%, which is significant given that electricity costs can represent over 20% of the cost of a tonne of steel.

EAF steelmakers using PIT can expect to see improvements in **productivity, yield, inject oxygen consumption, refractory and electrode consumption, and injection system wear.**



PIT has the potential to play a large role in reducing the number of tyres sent to landfill each year, a significant environmental issue globally.

In Europe alone, over 3.4 million tonnes of end of life (ELT) tyres are generated each year.

Significant savings on inject carbon costs can be made as the PIT process has been shown to **reduce the total amount of inject carbon required per heat by around 10%** depending on the quality of the coke used.



ESTABLISHED PROCESS

Polymer Injection Technology is now standard practice at OneSteel's Sydney and Melbourne EAF facilities, and the technology has also been successfully implemented overseas. In Australia alone, OneSteel has employed PIT for over 84,000 heats, consuming the equivalent of over 2.5 million end of life passenger tyres which may otherwise have been sent to landfill.

OneSteel has conducted extensive testing that shows that the use of PIT has no adverse effect on steel quality or the environment. The environmental benefits associated with the diversion of used tyres from landfill and the reduction in CO₂ emissions due to lower electrical consumption have been recognised.

GLOBAL OPPORTUNITY

OneSteel has signed a global licensing deal with UNSW's commercialisation arm, New South Innovations (Nsi), which grants OneSteel world-wide rights to sub-license the technology.

Polymer Injection Technology is an exciting opportunity to further "green" the EAF steelmaking industry and OneSteel looks forward to using its steelmaking expertise to export this technology worldwide.

PARTNERSHIP WITH INJECTION EQUIPMENT EXPERT

OneSteel has partnered with More S.r.l to combine their extensive steelmaking and injection technology expertise to promote Polymer Injection Technology to leading steelmakers around the world. More S.r.l is a world-leading supplier of injection equipment to the EAF steel industry.

CONTINUING INNOVATION

OneSteel is continuing to work closely with the UNSW to identify and develop new processes in which recycled polymers can be used to improve conventional steelmaking practices.

OneSteel is proud to be able to take this Australian innovation to the world. With global steel production of 1.6 billion tonnes in 2015 and over a quarter of this made using the EAF process there is an opportunity to significantly reduce the number of tyres sent to landfill or illegally dumped, while at the same time reducing electricity consumption and manufacturing costs for steelmakers.

For further details on OneSteel's Polymer Injection Technology contact:

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"I see the future having a 'materials loop' where we think of materials as basic elements. In this world, all products will be recycled so that they lose their memory and are given a new life, without compromise."

Professor Veena Sahajwalla

Director, Centre for Sustainable Materials Research & Technology (SMART@UNSW)

