

## STEAM NET SIMULATION AT BOREALIS' CRACKER SITE IN STENUNGSUND

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### 1. INTRODUCTION

As a new polyethylene site (LD5) is built at Borealis in Stenungsund, the steam net at the cracker site will be drastically affected. In order to investigate how the steam balances will be affected dynamically, especially at a trip of LD5, Solvina has made a dynamic simulation of the steam net. The simulations have led to restrictions on the LD5 plant as well as control recommendations for the cracker steam net.

### 2. SYSTEM DESCRIPTION

The steam net at Borealis' cracker in Stenungsund consists of three pressure levels. See Fig. 1 for the main principles of the steam net. Steam of high pressure is produced during the normal operation of the cracker. At this high pressure level (HP) steam is also produced in boilers and this steam flow from the boilers is controllable.

Steam from the HP net is used at the polyethylene site and in some processes at the cracker site. The remaining steam is reduced through turbines and valves to a mid pressure level (MP). Steam at mid pressure is used in important processes at the cracker site. From the MP level the steam is there further reduced to a low pressure level (LP) where more consumers are connected.

As the LD5 plant is running an extra amount of steam is added directly to the LP net. This extra steam will result in an excess of steam at the LP level and the pressure will be controlled by dumping steam. At trip of LD5 the extra steam at the LP net will be lost. In addition to this loss of steam, the LD5 plant will use an extra amount of steam from the HP net.

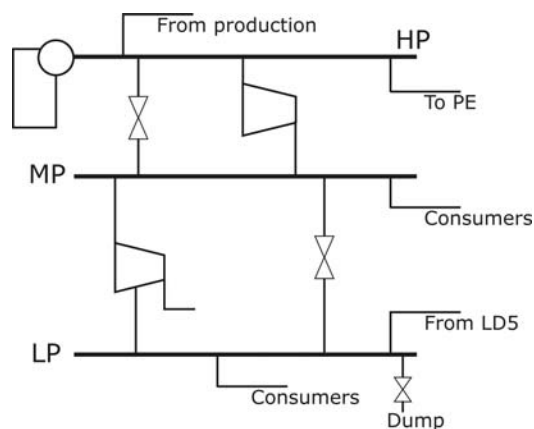


Fig. 1. Main principles of the cracker steam net.

### 3. SIMULATION RESULTS

The effects on the cracker steam net at trip of LD5 has been simulated dynamically given specifications for the trip.

The first and most important result from these dynamic simulations was that given the first design specifications, the steam net at the cracker site would not be able to handle the transients from a trip of LD5. This result led to restrictions on the LD5 site and the specifications of the trip were able to be changed.

New simulations using these new specifications were conducted and they showed that the steam net would be able to handle the transients of a trip of LD5 if some control loops were to be redesigned. From these simulations recommendations for the control of pressure at the LP net as well as control of the steam production in the boilers have been made.