

## Graduation project

**M** **MOTT**  
**M** **MACDONALD**

in collaboration with **ti DualInventive**  
Ubiquitous Rail

### ERTMS to Beyond ERTMS Protocol-converter

<b>Location</b>	Arnhem HQ and Utrecht office
<b>Level</b>	Master graduation (final year)
<b>Hours</b>	full-time (40 hours weekly)
<b>Contract</b>	5-6 months
<b>Salary</b>	350 euros monthly (gross) + NS Business Card



#### Working at Mott MacDonald

Mott MacDonald is a global multidisciplinary engineering, management and development consultancy, with over 16,000 employees active in 140 countries. Our employees are inspiring, highly-motivated and quality-driven people that collaborate closely with our clients to develop the best possible solutions. For this occasion, Mott MacDonald has joined forces with Dual Inventive to provide you with the best possible support in your graduation project.

#### Project Description

ERTMS (European Rail Traffic Management System) relies on the MA (Movement Authorization = distance to the next danger point with additional information like slopes) to control train movement. For a given MA, ERTMS trains compute their own braking curve to stop before the danger point. TU Delft's new concept Beyond ERTMS, introduces the SA (Speed Authorization = the speed the train is allowed to drive on any location at any point in time). Beyond ERTMS trains merely need a very good 'cruise control' that obeys the SA. To allow both systems to co-exist, for example when migrating from ERTMS to Beyond ERTMS, a protocolconverter is required to translate between MA and SA. Your assignment is to identify the basic design / architecture of the protocolconverter and identify opportunities and drawbacks.

#### What we offer you

- Benefit from the collaboration between Mott MacDonald and Dual Inventive for this project;
- Work at the front of ERTMS development and innovation, investigating unexplored concepts;
- Gain lots of wider knowledge and experience from experts nationally and internationally;
- A dynamic and inspiring team to enjoy working with and learning from.

#### Interested?

For more information please contact Dr. Eelco Schrik at [eelco.schrik@mottmac.com](mailto:eelco.schrik@mottmac.com) or 06 12 50 08 43.

This challenging graduation project can be adapted to the requirements of each faculty and further personalised in consultation with Professor Rolf Dollevoet (Railway Engineering) and your department.