# AIRBUS D&S IN FSS: SOWING THE SEEDS FOR IMPROVED OPERATIONAL CAPABILITIES ON CONTAMINATED RUNWAYS

*Airbus D&S has participated in three Work Packages of Project 3, devoted to safety improvements during the landing phase.*

Jointly with NLR, Airbus D&S conducted a test campaign with A400M during 2017. The aim was to characterize the **braking friction** at **tire level,** in contaminated conditions (15 mm standing water).
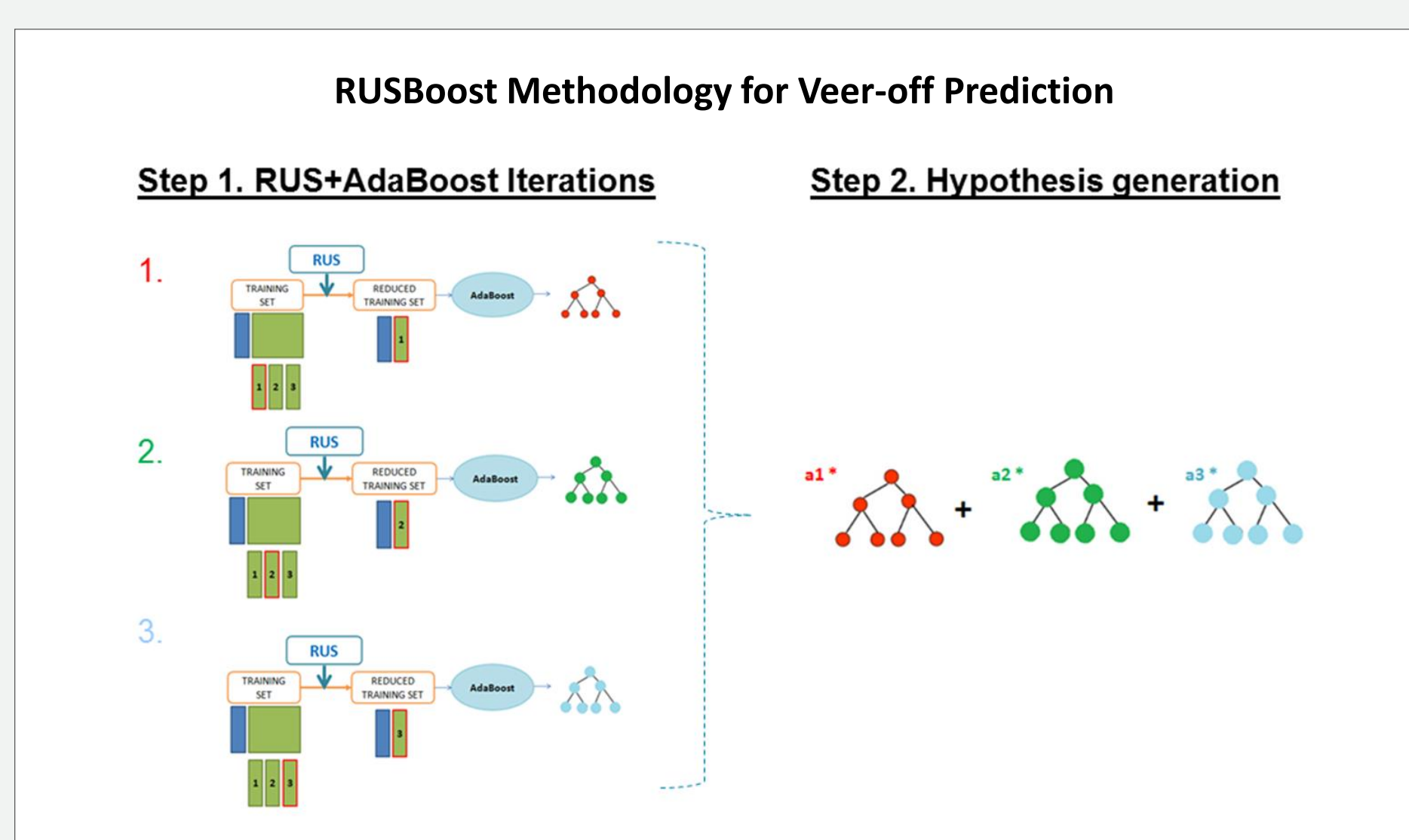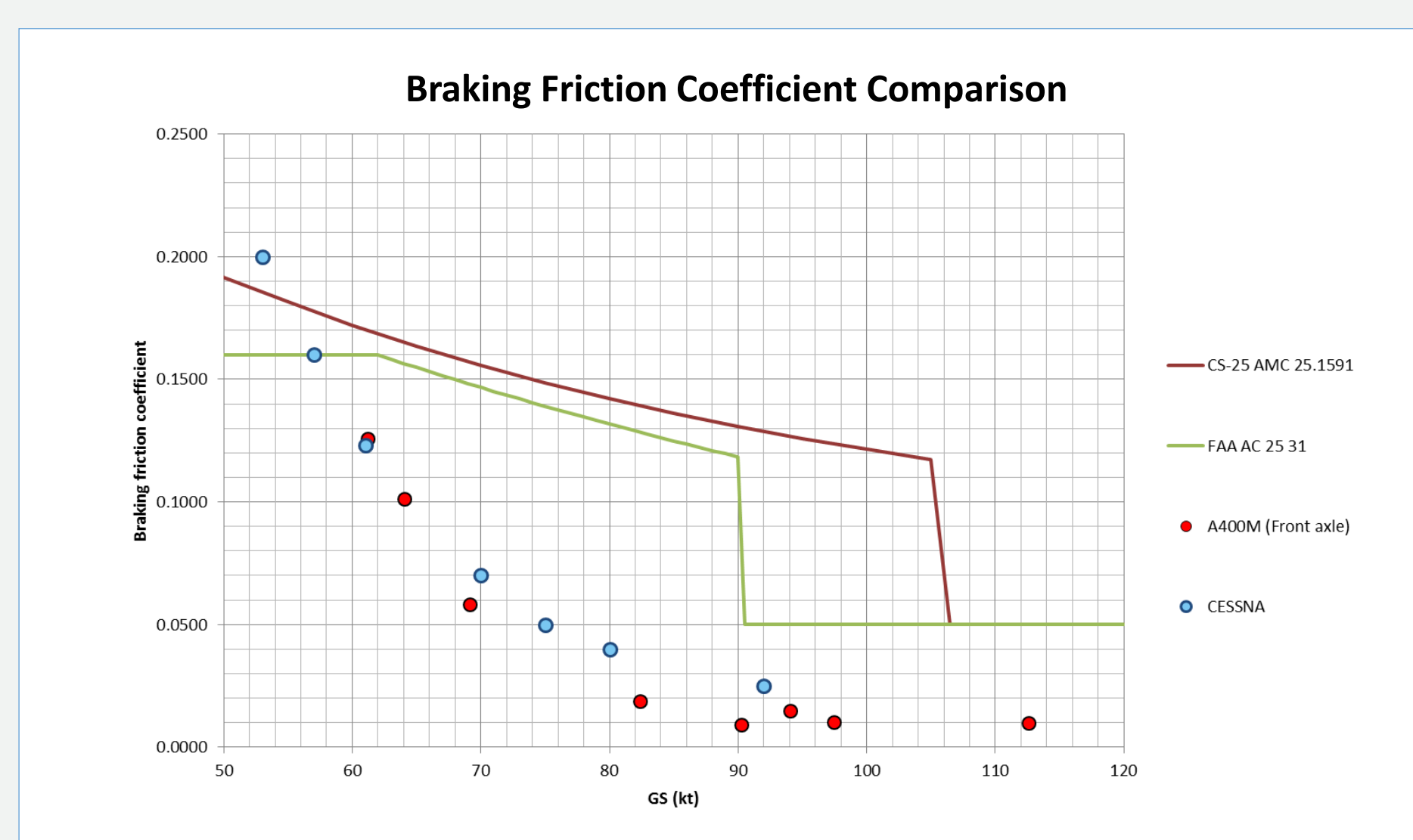Results showed strong correlation with previous Cessna tests, carried out by NLR at the same facilities. Additionally, it was possible to characterize the aquaplaning phenomenon, and to estimate aquaplaning speed.
Both constitute **crucial starting points** for potential refinements of AMC 25.1591 braking friction curves and aquaplaning models.





Braking Friction Coefficient Comparison

The presence of runway contamination is also one of the leading factors in the development of **veer-offs**, particularly during landing.
Despite their risk, the low frequency of such events (less than 1 % of landings) hinders their modelling and, therefore, the ability to predict them.
Airbus D&S has tested the applicability of an innovative machine learning technique, called **RUSBoost**, in the prediction of rare incidents, such as veer-offs. The results achieved with this technique (success rate beyond 70% and training times below 20 s) demonstrate its potential to predict these events, for eventual use in on-board applications.



RUSBoost Methodology for Veer-off Prediction

Step 1. RUS+AdaBoost Iterations    Step 2. Hypothesis generation

Success Rate (Recall) of Veer-off Prediction

| Settings | Recall Right | Recall Left | Training time |
|---|---|---|---|
| **1000 trees + LR=0.1** | 76 % | 76 % | 22 s |
| **10000 trees + LR=0.1** | 70.6 % | 79.9 % | 217 s |
| **1000 trees + LR=0.01** | 73.5 % | 84 % | 23.7 s |
| **10000 trees + LR=0.01** | 76.5 % | 78.9 % | 213 s |

**PARTNERS INVOLVED**
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