**APC project meeting – March 15, 2013**

Teleconference call: 1:00 – 2:00 pm

**Meeting participants:**

Amino: Trent Maki

ArcelorMittal: Isadora van Riemsdijk

CANMET: Kevin Boyle, Mark Kozdras

Ford: Sergey Golovashchenko, John Bonnen

Novelis: Rajeev Kamat, Leo Colley

U Waterloo: Michael Worswick, Jose Imbert

U Windsor: Daniel Green

**Meeting minutes:**

Rajeev and Leo from Novelis in Kennesaw, Georgia were introduced to the partnership. Since the Novelis R&D Centre in Kingston will be closing in June, Mark Gallerneault has kindly handed over this project to his colleagues in Kennesaw.

Daniel gave an overview and an update on the current status of the APC project: DP600 and TRIP780 were supplied by ArcelorMittal in summer 2012 and AA5182 was received from Novelis in Nov/Dec 2012 and blanks were laser trimmed to size and shipped to Amino in StThomas. The lower die insert for the dash panel was shipped to SuperiorCam in MI, USA in Fall 2012 for re-machining so as to improve the hydromechanical drawing process; the die is still being modified.

Michael gave a description of the work at Waterloo. Due to difficulties in retaining MASc students, Mike has hired coop students to help on the project. Sheet materials were shipped to Waterloo early in 2013 and sample preparation for the tensile testing is underway: tests at moderate strain rates will start next week and the Split Hopkinson Bar specimens are currently being machined. It was pointed out that R-values above 100 s-1 will not be reliable. The electromagnetic ring expansion (EMRE) tests have been attempted with an exploding wire rather than a coil: AA5182 rings have been tested to fracture but DP600 rings did not fracture. Tests were attempted with a urethane driver but it is not sufficiently hard and wraps around the ring specimen. Rings are currently being made from the flat sheet and have a square cross-section.

Daniel described work on-going at Windsor: a series of rolling tests have been conducted on aluminum and steel strips to determine the fracture strain for a negative value of the stress triaxiality. Numerical simulations of the EHF tests have been conducted successfully, but experimental data of the APC sheet materials is required to go further. Microstructural characterization work has started for the DP600 and AA5182 sheet materials. Two students are focusing on micromechanical modelling of the DP steel in order to predict the onset of failure, first under quasi-static forming conditions, and ultimately at high strain rates.

Kevin described the FLD work that CANMET is doing on TRIP780 steels: they are using the Marciniak test which is characterized by linear strain paths compared to the Nakazima test. There was some discussion about the method to use to determine the experimental FLC. CANMET typically uses the DIC method, and this will need to be correlated with the circle grid method used by Ford and Windsor. Marciniak tests on DP600 are expected to start in April and the hydraulic bulge tests are expected to start in August or September of this year. Two PhD students from the University of Windsor, Iman Sarraf and Arash Jenab, are going through security clearance so they can work at CANMET; once they get clearance, they will move to Hamilton and work at CANMET on a semi-permanent basis.

Sergey and Trent presented the status of the industrial trials on the dash panel: the enhanced tool (i.e. with a 3-piece punch) is still being machined by SuperiorCam (MI) and it is anticipated that this will be completed in May. The tool will then be shipped to Amino in St Thomas and the second series of trials will be able to start, but likely not before June. The dash panels that are hydromechanically drawn will be shipped to Dearborn for EHF. Ford is currently building a large EHF die for this purpose: this die has 6 pairs of electrodes that can be used to EHF the deeper pockets and form the part into its final CAD shape.

Discussion continued till about 2:00 pm at which time the conference call was ended.