“DIGITAL CONCRETE: THE INTEGRATION OF PRODUCTION PROCESS IN THE INDUSTRY 4.0 ERA”

1.1 Once upon a time in the middle of 2050’s…

Once upon a time in the middle of the 2050’s there was a young truck mixer, named TM63X, nicknamed “BETTY”, living in a large community of digital equipment for constructions along the fjords of Oslo. It was a fully digital born machine, equipped with the latest state of the art set up for any task service, capable to deliver any kind of concrete within a radius of 100 km around its community.

Its life was very happy since it was surrounded with many good friends: most of the other truck mixers in the fleet were very young and all of them self-driving and fully digitalized; also the group of pumps in the community were very young and pretty, so that nearly every day the washing shift, at the end of the deliveries, was a kind of party, playing with a lot of water and rubber balls until the time of refuelling and recovering into the garages.

All of them were driving continuously between a network of batching stations, where they could meet many interesting vehicles such us big muscles loaders and large aggregates trucks.

The scheduling centres were also very good and patients, providing each machine with a lot of instructions and detailed suggestions to plan the logistics according to the weather and the traffic, making life easy and sending on time corrections to those facing problems.

One day it was called for a special duty within the project for the construction of a large spherical water reservoir: the BIM instructions for the concreting were very tight, referring to light-weight self-compacting concrete to be placed continuously for more than 5000 cubic meters in a row. Betty was loaded at the nearest batching station with the right formula and arrived on site according to the detailed schedule for its shift. When approaching the pump and the drone which were completing the placement of the previous truck-mixer, Betty control system received suddenly an emergency stop, through the connection of an old iPhone 25…. Surprisingly there was a human being on the jobsite interfering through his smartphone with the ongoing pouring sequence because he was claiming about the slump of the concrete carried by Betty. This was very strange because none of the sensors on board of Betty drum were alerting any problem and the load was perfectly matching the remote control at the batching station all along the road…

The old man moved on his drone nearby Betty wheels, disactivated the self-driving mode with its phone and then flew on top of the drum cone where the slump detecting main sensors was installed; smoothly he removed a green leaf which was mysteriously covering the entire surface of the sensor and suddenly a list of alarms started warning the whole system, from Betty board, to the batching station, up to the scheduler and the engineering firm, detecting a much drier concrete than the specifications…

The next day a General Summit of the Construction Digital Equipment Community was called in Oslo and the main Control System, in agreement with the Scheduler, proposed to request the local Agricultural Digital Equipment Community to cut all the trees which were planted in the surrounding of all the Batching Stations of the City. The only representative of Human Intelligence attending, by law, the Summit raised his veto and locked the meeting, requesting a revision of the Artificial Intelligence routines to refine the code for the respect and the preservation of natural resources, even when interfering with the Community scheduled activities…