APTS Pressure Sensor Integration
Report to GRSP IG Meeting #47 Paris
Abdominal Sensor integration

Humanetics planned efforts

1. Updated mold design
   - include cavities, cable exist and means for fixation of two sensors
   - Assumed sensor diameter of 50 mm
   - Included spacing for Kevlar sock to minimize friction between sensor and skin

2. Produce prototype abdomens
   - Need for mass balance as sensors itself have higher density than foam
   - Produced prototypes with different foam types
   - This will also facilitate stiffness tuning to meet certification requirements

3. Evaluation testing
   - Thorax certification tests, static flexion tests, abdomen certification tests
   - The static flexion tests or any other new tests would need development of special fixtures
   - This task was originally planned for end 2013 / early 2014

4. All activities are supported by FE modelling
   - Investigations into contributions from shoulder belt, thorax, etc.
   - Studying possible risks for interactions with other dummy parts
   - Studying influence of foam density

5. Originally it was planned to have the Q10 abdomen tested and completed for product release early 2014
   - Other Q dummies to follow in 2014
Challenges encountered

- Mass of sensor set is ~560 grams while mass of equivalent foam volume is ~280 grams
  - Lighter foams have to be applied which appear to suffer from post-curing and degradation of mechanical properties
  - Post curing results in smaller diameter of hole
- External diameter of sensor increases due to initial filling pressure
  - Nominal diameter of 50, actual diameter around 51.5 mm
- The above result in tolerance issues
  - Redesign of molds was needed introducing cavity with larger diameter (55 mm hole diameter for 50 mm sensor)
  - Updated molds available and two Q10 abdomens produced for testing at ADAC
Fit study

- Humanetics can integrate the APTS sensor in the Q dummy abdomens but
  - Mass specification to be redefined (adding ~500 grams)
  - Q3 and Q6 only allow for sensor of 40 mm instead of 50 mm

- Two Q10 abdomens using current foam will be delivered to ADAC for evaluation testing
  - Using original foam (hence resulting in heavier abdomen)
Recommendation

- Install sensors according to procedures as used in CHILD and CASPER
  - To be described in an Annex to draft regulation (IFSTTAR)
  - Meanwhile LIER, IFSTTAR and Humanetics will continue integration efforts (reporting during Phase III)

- Mass increase needs to be listed in the annex added