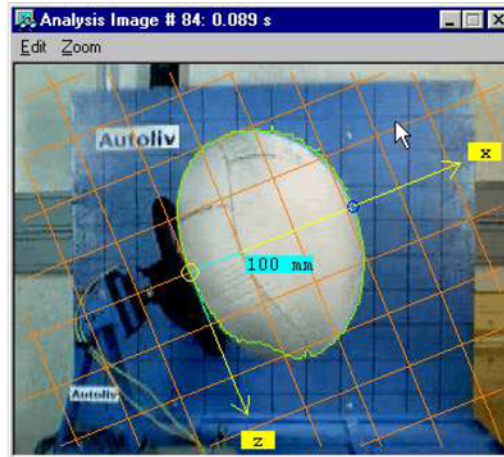# FalCon eXtra MovBag

Analysis of Airbag Image Sequences

The analysis program FalCon e**X**tra **MovBag** extracts outlines and corresponding measurement values from airbag test scenes.

Main features:

- Evaluation of specific measurement values:
  - maximum expansion
  - area
  - min. amplitude and distances x/y/Res to reference marker
  - center of gravity (output and display accordingly to analysis system e**X**tra MovXact)
  - perimeter
- Automatic measurement of time-variant contour graphs.
- Edit incl. filtering of graphs
- Display in the image overlay and diagram
- Measurement of discrete points, markers or areas/patches
  Max. size in abscissa or ordinate
- Calibration of results with free selection of the coordinate system
  Analysis of "moment of contact" of an airbag contour to centre of reference
- Detection of contour curves with „moving" search area
- Static reference image for evaluation of moving airbag
- Post-processing with „Erasure" (cut) and interactive „Add" of areas with the help of a polygon brush
- Geometrical averaging of contour graphs from test series
  Detection and display of a corridor with minimum and maximum limit curve
- Freezing of overlay graphic
- Extension to several search areas: application=slot masks in case of head airbags.
- Measure within a sequence interval using an adaptable step width
- Greenscreen method: masking of background using a specific hue value = "chroma key".
- Inverting of analysis image
- App ""Airbag Elongation". extended by automatic mode (special documentation)
  App "Airbag Unfolding"
- Export into Multi-D format, DIAdem etc.
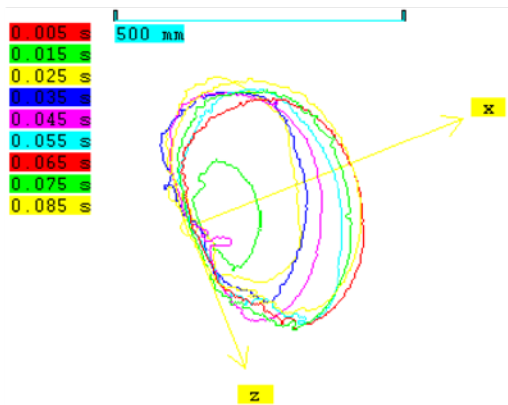
The analysis program **eXtra MovBag** offers automatic measurements of airbag outlines as contour graphs = f(t).

The available image processing tools are designed principally for blow-ups in a test environment; measurement methods detect differences regarding brightness and color saturation (absolute and relative to a reference image).

All thresholds and parameters are adjustable.

A mainly **automatic measurement** requires the following **boundary conditions**:
- The airbag surface is illuminated appropriately and is "bright" (in relation to the near environment).
- A white balance according to the color of the bag, e.g. silver, ensures a "non-colored" appearance of the airbag, i.e. the color saturation is low.
- The background of the scene should show a pattern helping to separate the airbag surface. Thus a (relatively) "dark" and "colored" (as possible homogeneous) curtain is recommendable. Measuring within a monochrome image sequence, the brightness gradient between background and airbag should be considerable.
- Bright or even white labels, bars etc. in the region of interest should be avoided. Nevertheless the user may select a detection area to mask-off non-relevant regions in the scene, e.g. visible spotlights.
- The image background is assumed to be static. To measure within dynamic tests (= moving sleds) the module allows with help of trajectories (as a result of eXtra MovXact) a reference to a "running" background.

Components:

- Several airbags or objects in the same view can be measured separately.
- The outlines are displayed in the image overlay: options are e.g. color, filling, background mask, coordinate system with axes and grid.
- An overview sketch with legends helps to log the temporal course of the expansion: options are sequence interval, increment and background mask.
- Calibrated graphs can be displayed as x-y diagrams or exported into table or standard files (DIAdem). X Diagrams - Contour(t) - **Type Outline**
- A new Multi-D data format enables a visualization as temporal sequence of 2D diagrams. Several of these diagram sequences can be displayed synchronized to AVIs, thus a comparison of different tests is possible. Of course the modules eXtra Quick View and Customer Viewer support this data format too.
- Specific measurement values are extracted from the contour graphs: maximum expansion, area and center of gravity (extendable on demand). These measurement values are calibrated and post-processed according to the extensive features of the analysis system MovXact. Results are output numerically and as time diagrams.
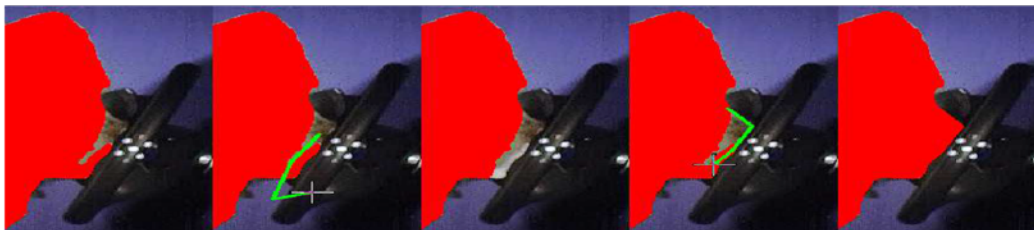
Technical Framework:

- Program system for computer platforms under WIN Server 2012/2016/2019/2022, WIN 8.1 / 10 /11
- User interface compliant to MS-Windows.
- You can order **MovBag** as a stand-alone program or as extension to the analysis system **MovXact**.
- **Technical specifications are subject to change.**