

Messtechnik GmbH

Specific volume gives objective insight into foam generation

- Calculation of specific volume and density curve from rise height, container geometry, and mass data
- Comparability of rise profile data for different amounts of chemistry, different test volumes, and different test containers



Fig. 1: Different test containers are available for the Foam Qualification System FOAMAT[®]. The new calculation method of the specific volume and the density allows one to compare measurement results of different test containers and different amounts of chemistry.

New Methods of Analysis for Foam Rise Data

analysis. The specific volume is calculated from the For measuring the rise process of PU and PIR foam formulations, contactless distance sensors (Fig. 1) may foam volume and the foam mass (Figs. 4, 5). The specific volume is the reciprocal of the density. The time be used for a continuous measurement of the foam dependant specific volume is an expansion related height. During the test preparation, the foam curve independent of the amount of chemistry and the formulation is usually mixed in a mixing cup and is then poured into the test container which is then placed test container dimensions. Both curves are more or less under the contactless distance sensor. Due to fast independent of the amount of chemistry used, as well as of the test container geometry. This makes them a cream times, different viscosities, and the mixture remaining on the stirrer, the amount of chemistry filled good tool for analyzing the expansion as well as the into the test container can vary causing differences in shrinkage process of the foam. Due to the insulation the foam rise. The foam rise is also strongly affected by properties of the foam, there are limitations of the methods. The foam volumes, therefore shouldn't differ different amounts of raw material (Fig. 2) or different too much. The new methods of analysis are both test container geometries. This can cause misinterpretations (Fig. 3) in the analysis and problems implemented into the new software FOAM V4.0. They can be used in quality control as well as in development in sharing the foam rise data. To overcome this, Format of PU and PIR foam formulations. Messtechnik GmbH has developed new methods of

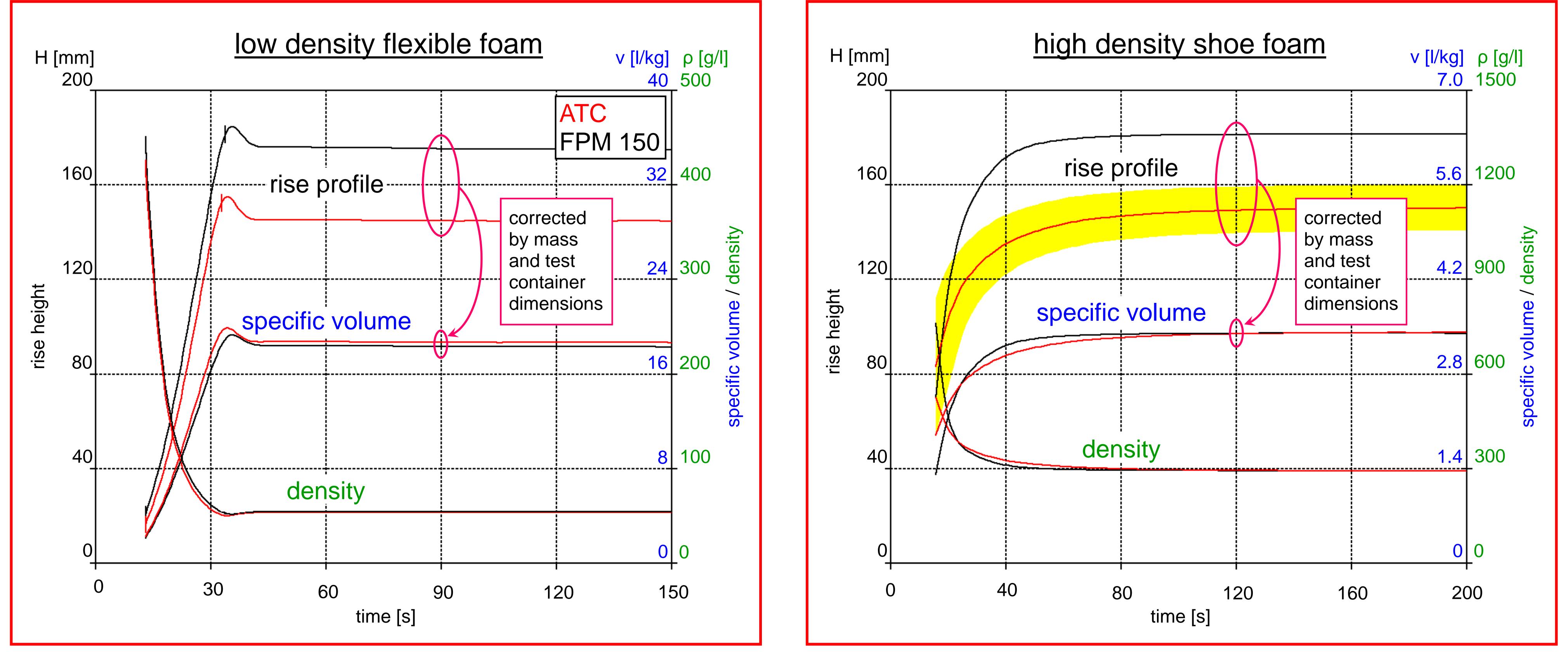
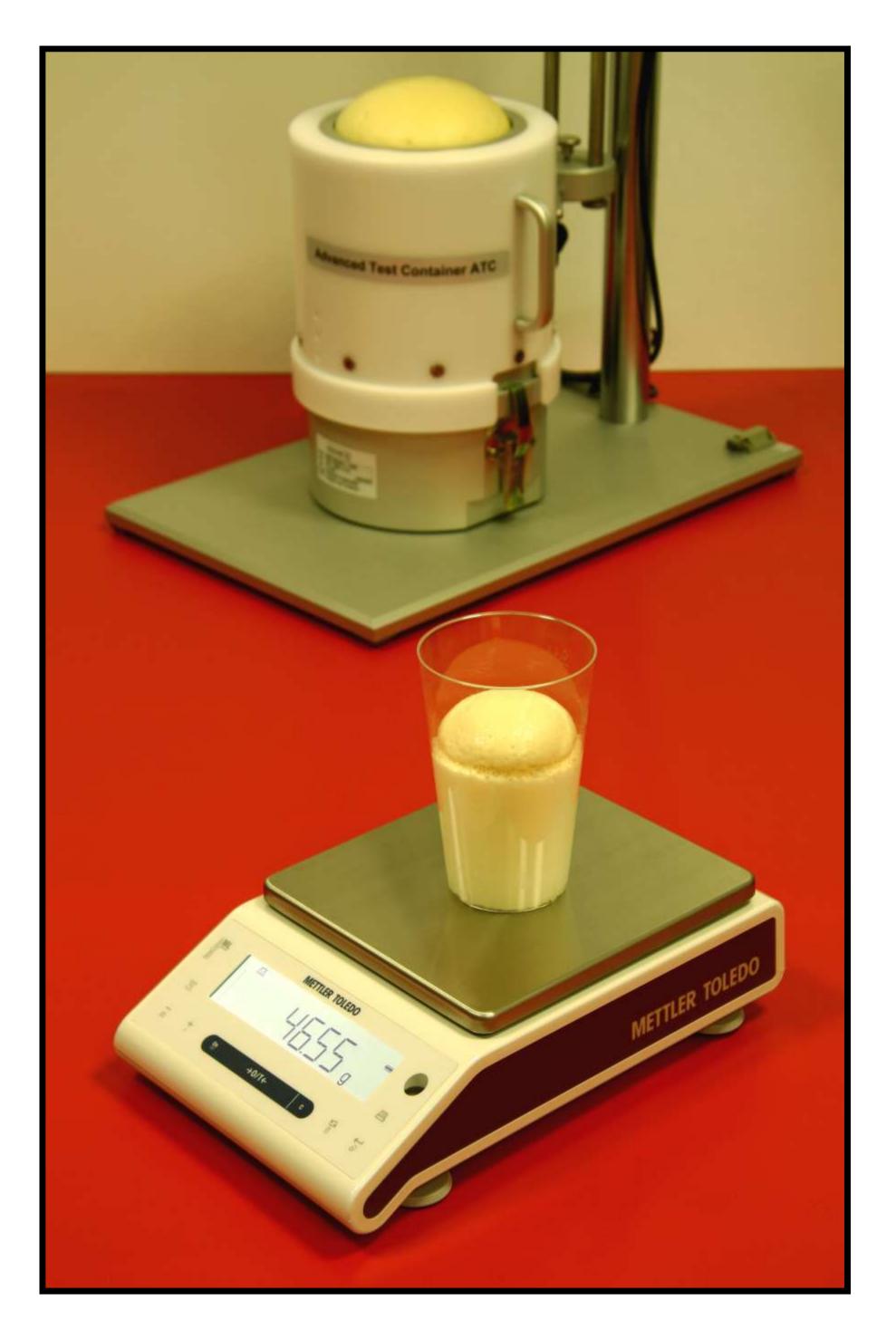


Fig. 2: Rise height (H), specific volume (v) and density (p) vs. Fig. 3: Measurement results of a high density shoe foam time of a low density flexible foam formulation, measured in formulation. The two tests were carried out with different two different test containers and with different mass. In amounts of chemistry. Whereas the rise profile shows strong differences, the specific volume and the density are similar, contrast to the rise profile, the specific volume and the density indicating that it is the same formulation. show that the expansion properties are similar.

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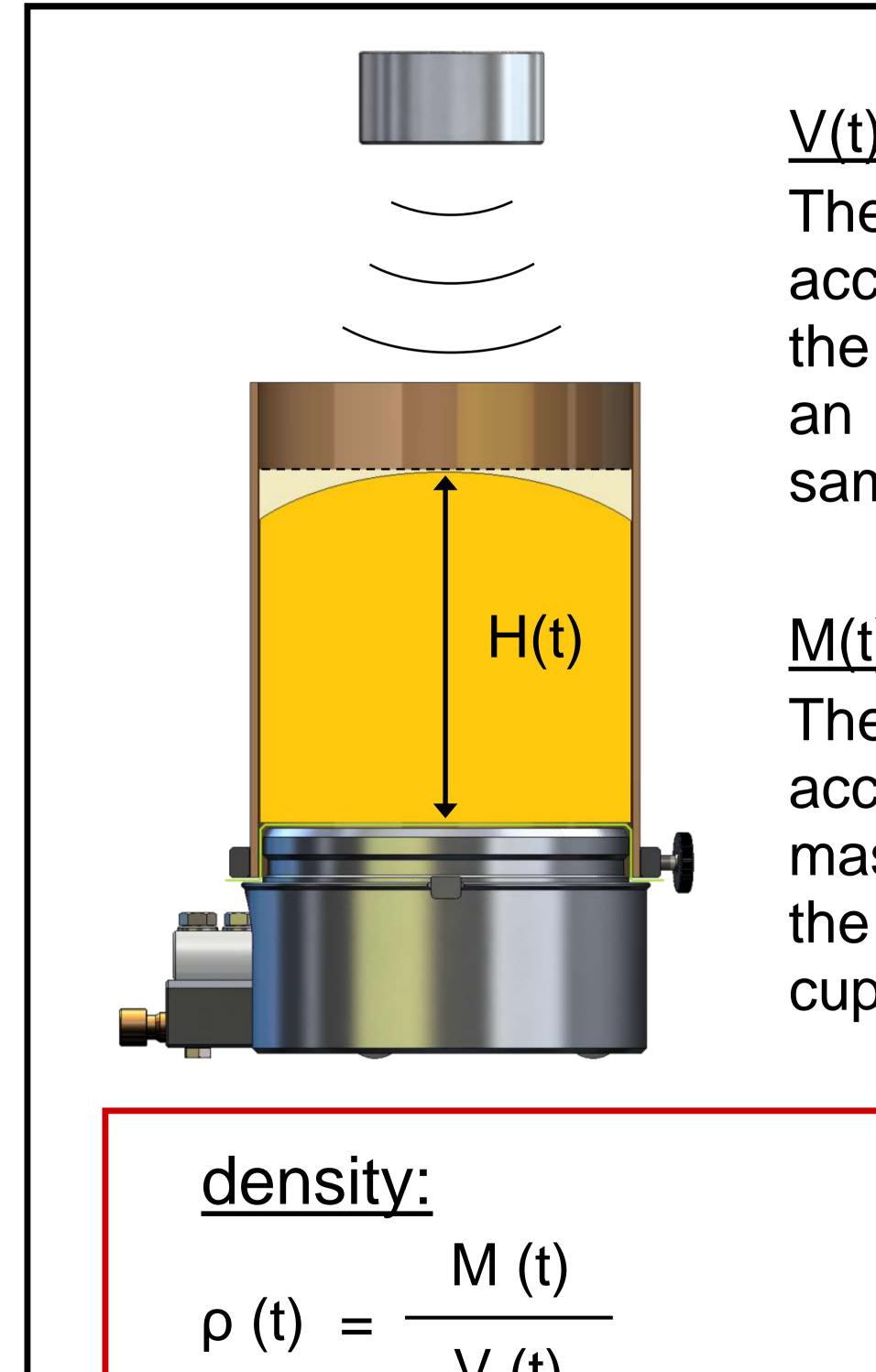
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Fig. 5: The loss of mass is measured by a laboratory balance integrated into the FOAMAT[®] system. The foam residue left in the mixing cup is used for this purpose. After the test the foam sample is placed onto the balance to measure the final mass of the foam sample.



V(t): volume vs. time

The volume vs. time is calculated according to the rise height data, the test container dimensions and an estimation function for the sample shape.

M(t): mass vs. time

The mass vs. time is calculated according to the final sample mass and the loss of mass data of the foam residue left in the mixing cup.

> specific volume: v(t) =M (t) ρ(

Fig. 4: The specific volume is calculated from the foam volume and the foam mass. The specific volume is the reciprocal of the density. The time dependant specific volume is an expansion related curve independent of the amount of chemistry and the test container dimensions.