

**TALAT Lecture 3805**

**Combination of Superplastic Forming and  
Diffusion Bonding**

6 pages, 6 figures

Basic Level

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**Objectives:**

- to review briefly the principles of diffusion bonding in combination with superplastic forming of aluminium alloys

**Prerequisites:**

- General background in production engineering and material science

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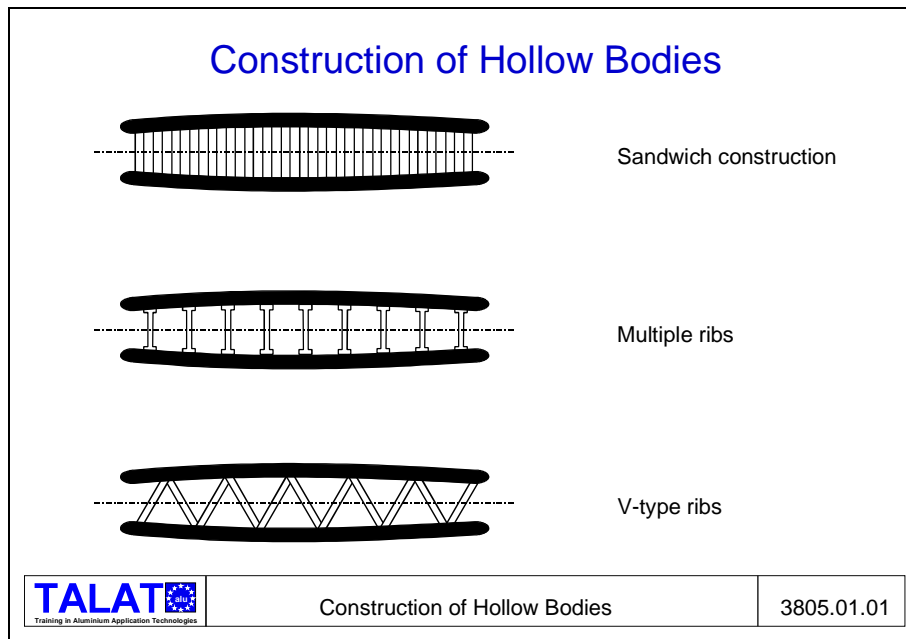
# 3805 Combination of Superplastic Forming and Diffusion Bonding

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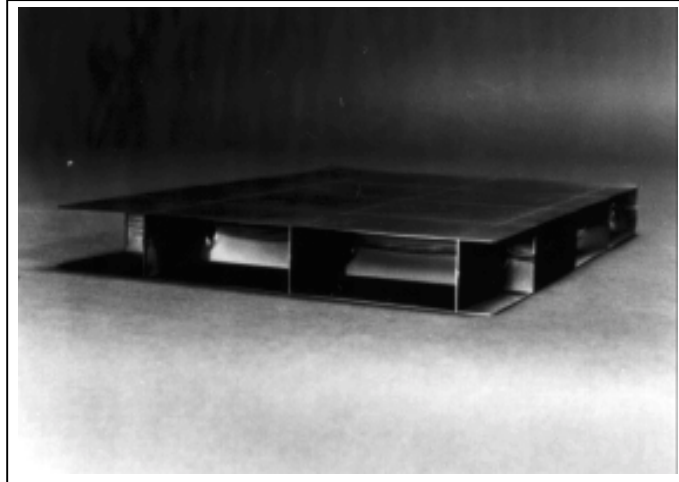
### 3805.01 Design of Hollow Bodies and SPF/DB Example

Using a combination of superplastic forming (SPF) and diffusion bonding (DB), it is possible to fabricate hollow bodies with a sandwich construction, with multiple ribs and V-type ribs, see **Figure 3805.00.01** in a *single* processing sequence.



As an example for this combination of SPF and DB processes **Figure 3805.01.02** shows a hollow box profile with closed chambers.

## SPF / DB Formed Component



Source: Domier Luftfahrt GmbH



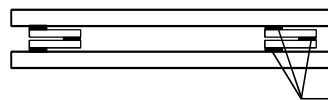
SPF / DB Formed Component

3805.01.02

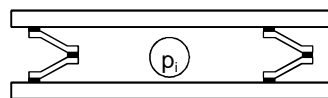
## 3805.02 Principles of the SPF/DB Processing Steps

Figure 3805.02.01 shows the process steps of diffusion bonding and superplastic forming in the manufacture of a box profile.

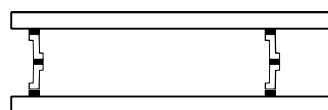
### Principles of the Process Steps in Diffusion Bonding and Superplastic Forming



Diffusion bonded regions



Box form being created by increasing internal pressure



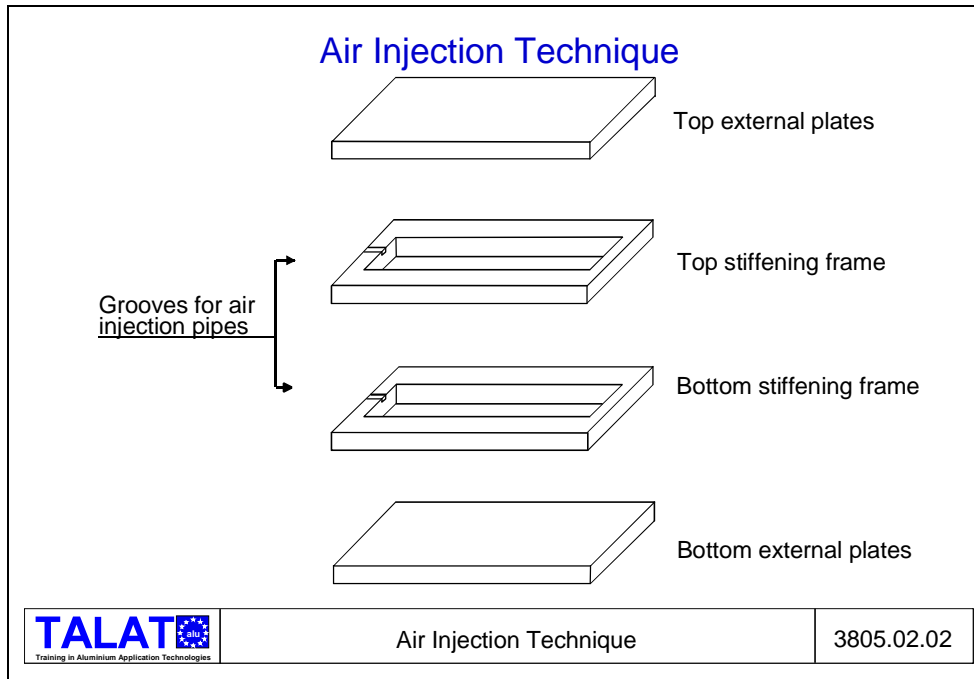
Final box form



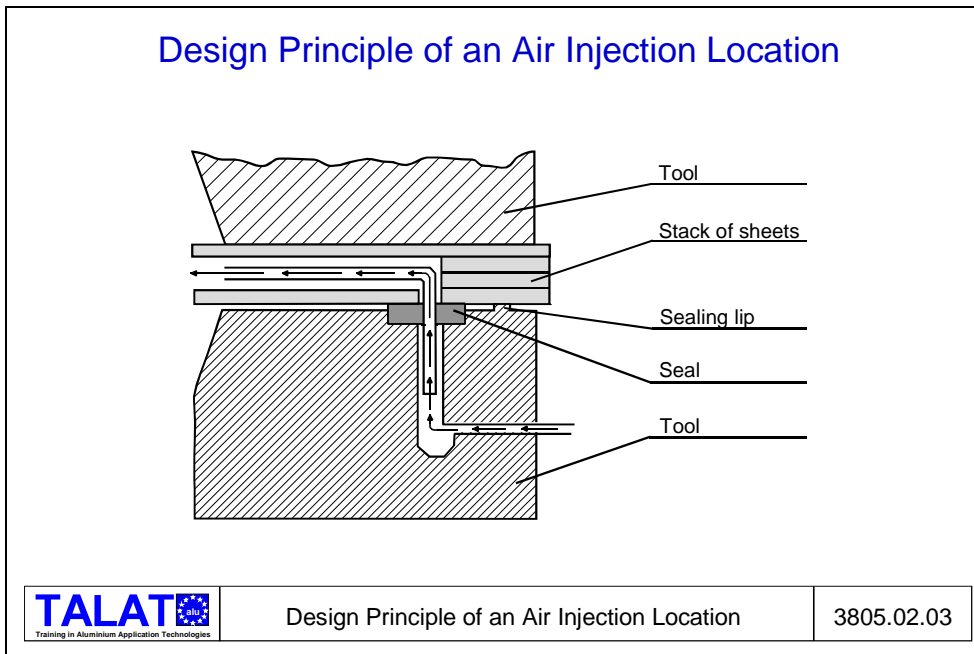
Principles of the Process Steps in Diffusion Bonding and Superplastic Forming

3805.02.01

**Figure 3805.02.02** gives a schematic view of the tool set using the air injection technique. for blowing up sheets which have been diffusion bonded to hollow bodies.



**Figure 3805.02.03** illustrates schematically the construction of an injection point.



Typical diffusion bonding parameters for aluminium alloys are listed in **Figure 3805.02.04**.

## Typical Diffusion Bonding Parameters for Aluminium Alloys

Temperature:	500 - 540 °C
Contact pressure:	2 MPa
Bonding atmosphere:	Vacuum / Argon gas shielding
Holding time:	1 - 3 h

### 3805.03 Literature

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