



# Additive Manufacturing Task Group

International Aircraft Materials Fire Test Forum  
Savannah, March 5th 2019

T. Krause, Fire Safety Engineering & Fire Test

**AIRBUS**

# Additive Manufacturing Task Group

- FSTG-like approach to Additive Manufacturing
- Identify key variables affecting fire safety requirements
- Simplify methodology of compliance demonstration to account for these key variables
- Final goal may be approved guidance material like the PS

# Grouping the parameters

## Part design

- “Replica” of conventional part
- Bio-inspired (bone-like) complex structures

## Post processing

- For the specimen: e.g. removal of support, or for the part: e.g. grinding/sanding to certain surface quality
- Spatula, fillers, topcoats

## Build

- Printing directions
- Raster angle
- Layer thickness
- Thickness
- Infill (%)
- Single specimens vs. cut from bigger plate

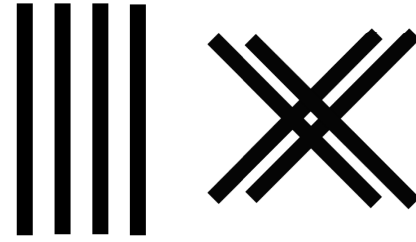
## Manufacturing technology

- Fused Filament, laser sintering, powder bed etc.
- Printer manufacturer and type
- Layer thickness
- Print speed and temperature

## Material

- Material itself is a variable
- ALM type vs. standard type of same material
- Filament thickness

# Build parameters

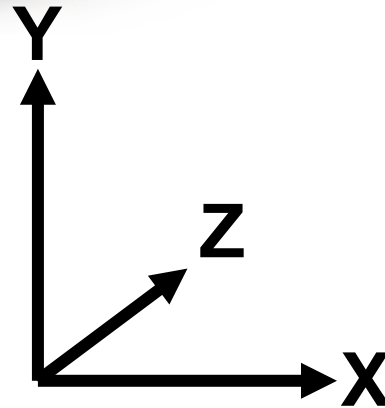
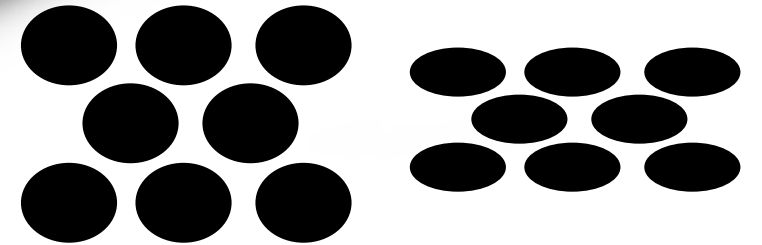


## Build

1. Printing direction
2. Raster angle
3. Layer thickness
4. Thickness
5. Infill (%)
6. Single specimens vs. cut from bigger plate

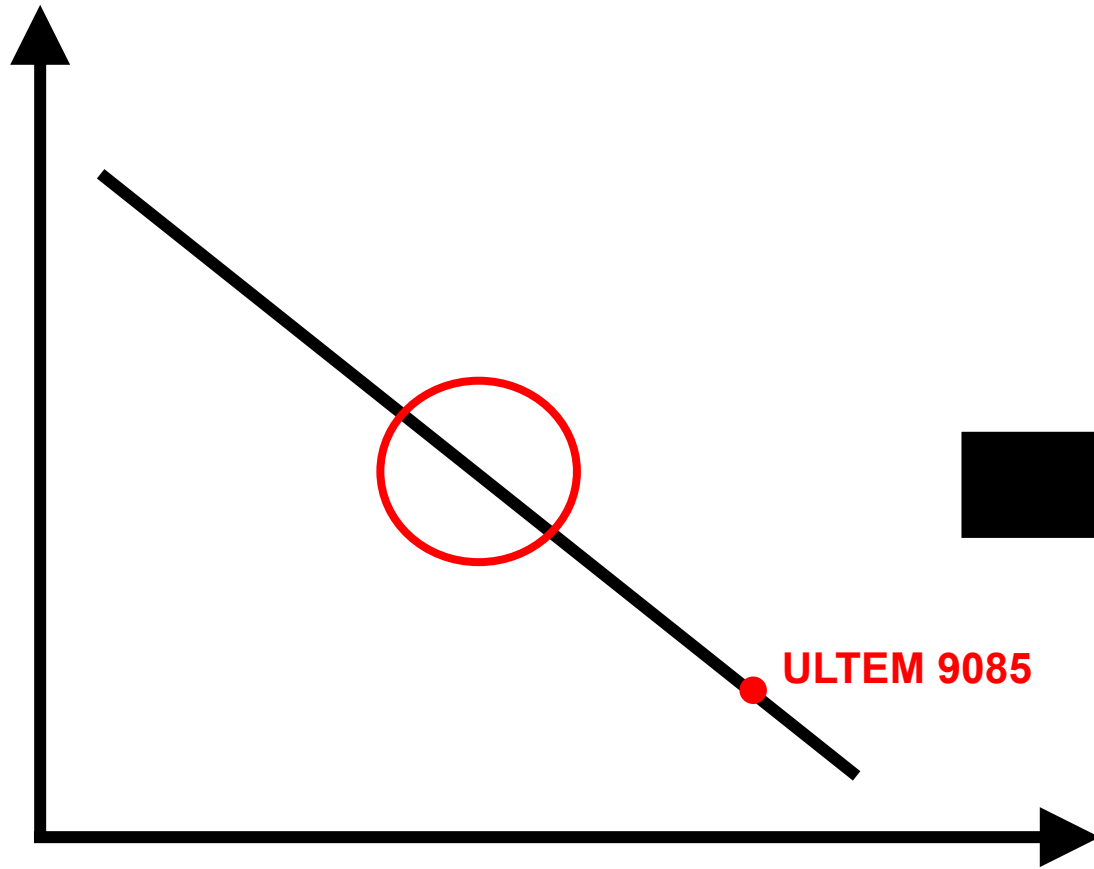


© Stratasys



# Material selection

# / severity of  
influencing  
factors



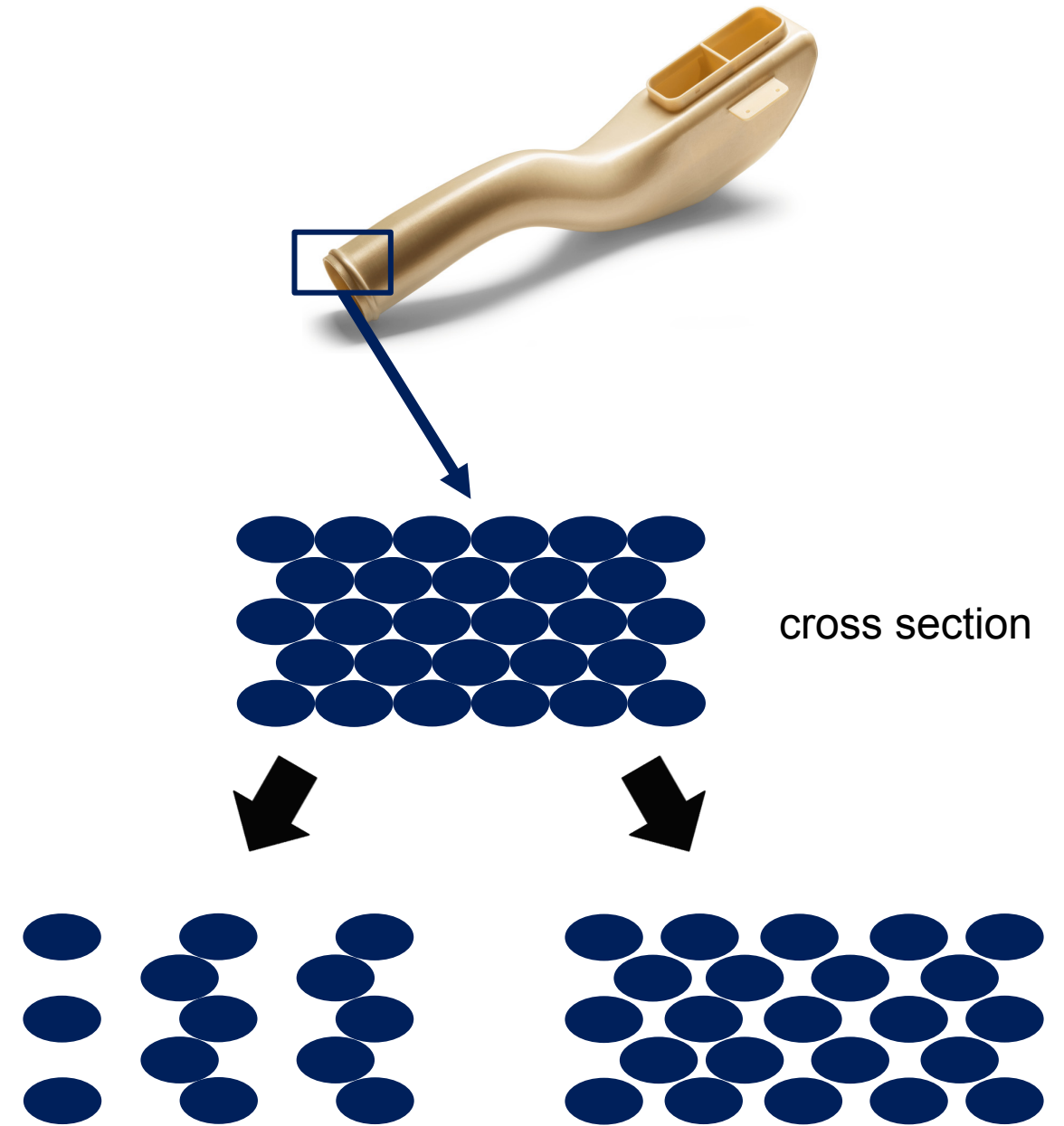
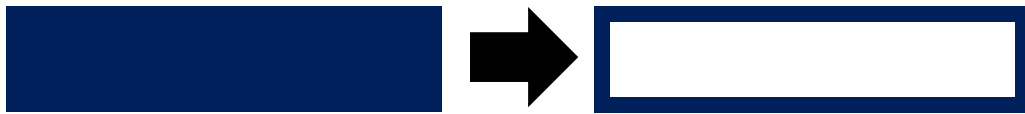
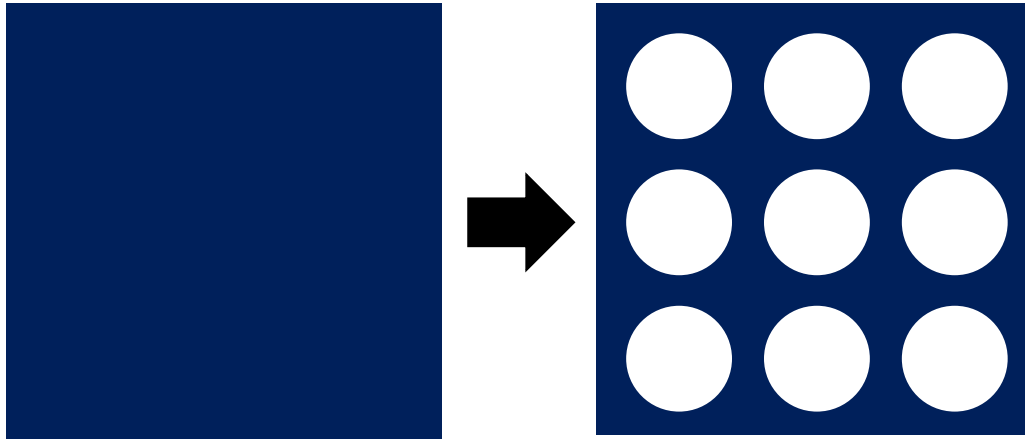
Intrinsic Fire Safety  
performance of a  
material



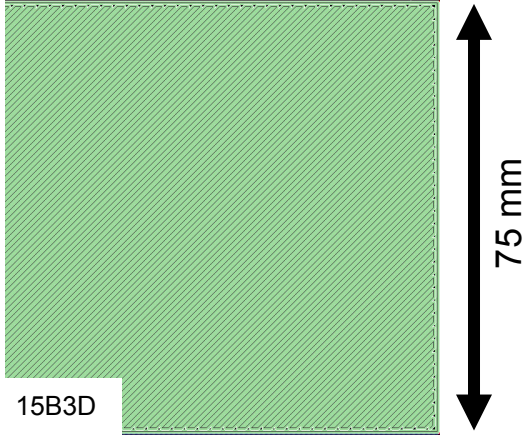
Tests at FAATC  
with different  
materials in  
different directions

# Infill

Reduction of weight by maintaining outer form

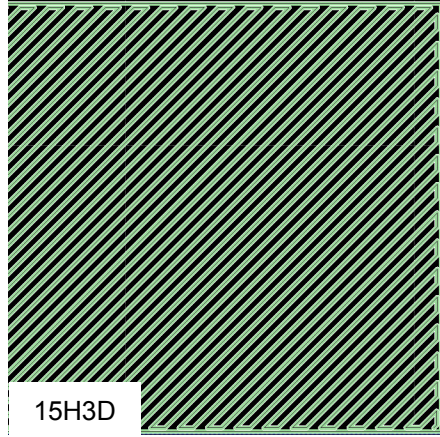
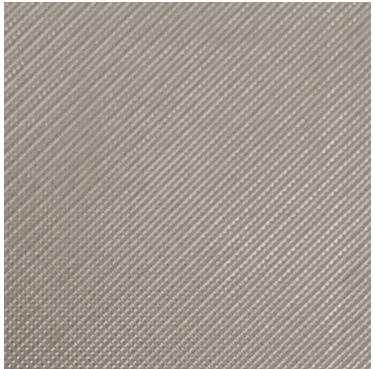


# Infill



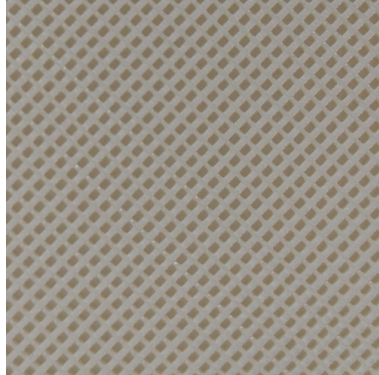
Standard  $\pm 45^\circ$  pattern, XY

37 g / sample incl. seam



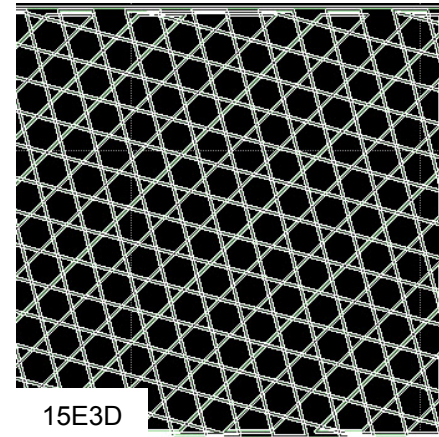
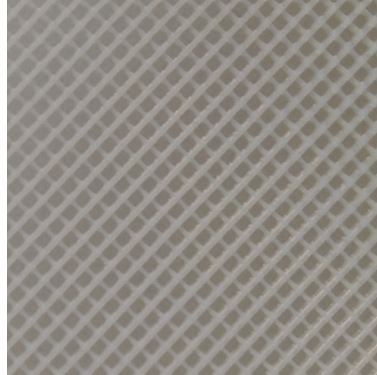
Standard  $\pm 45^\circ$  pattern  
Increase distance by  
one filament width

19 g



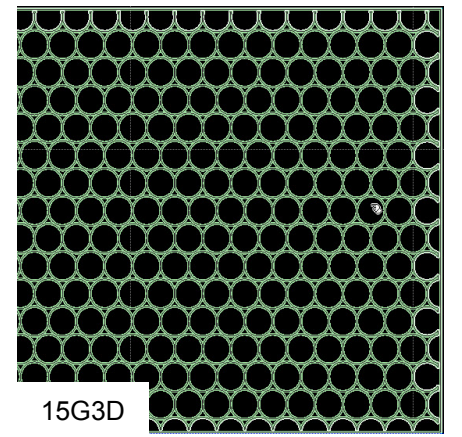
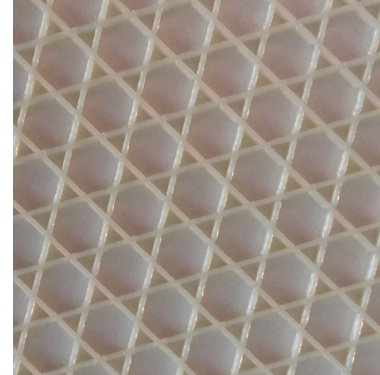
Standard  $\pm 45^\circ$  pattern  
Increase distance by  
two filament widths

12 g



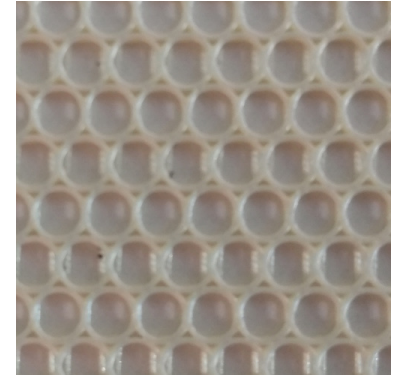
Triangle pattern, three  
different directions

11 g



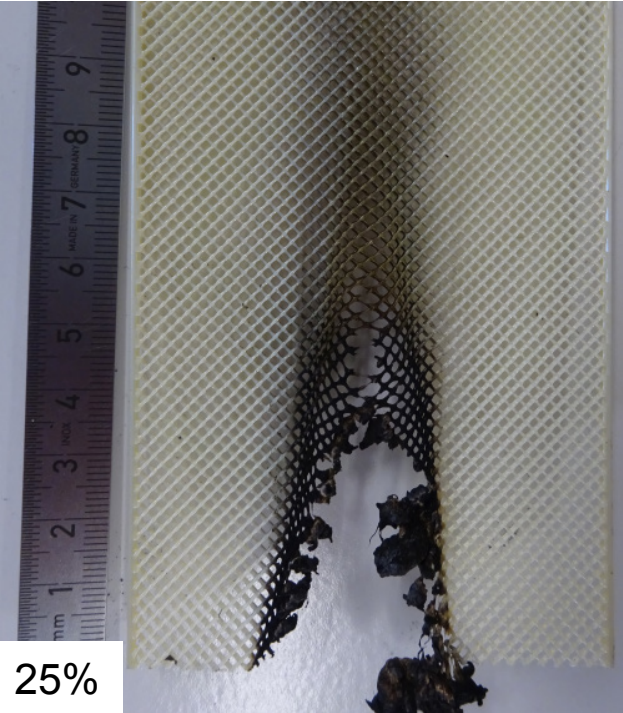
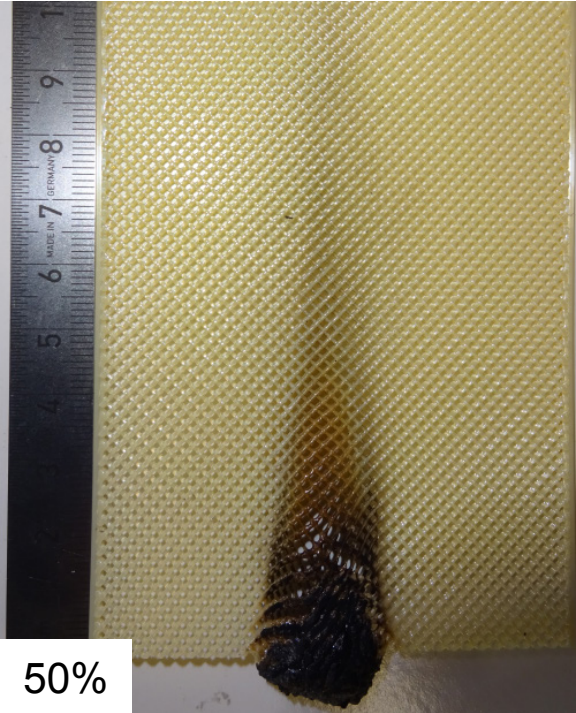
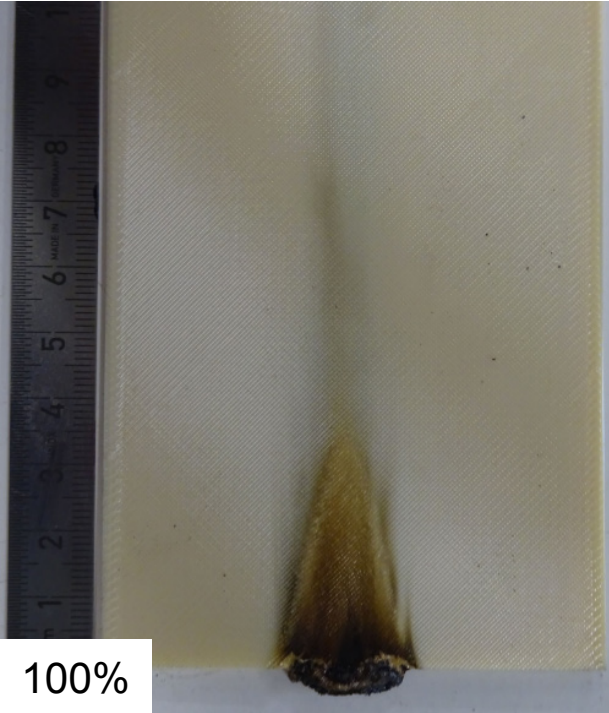
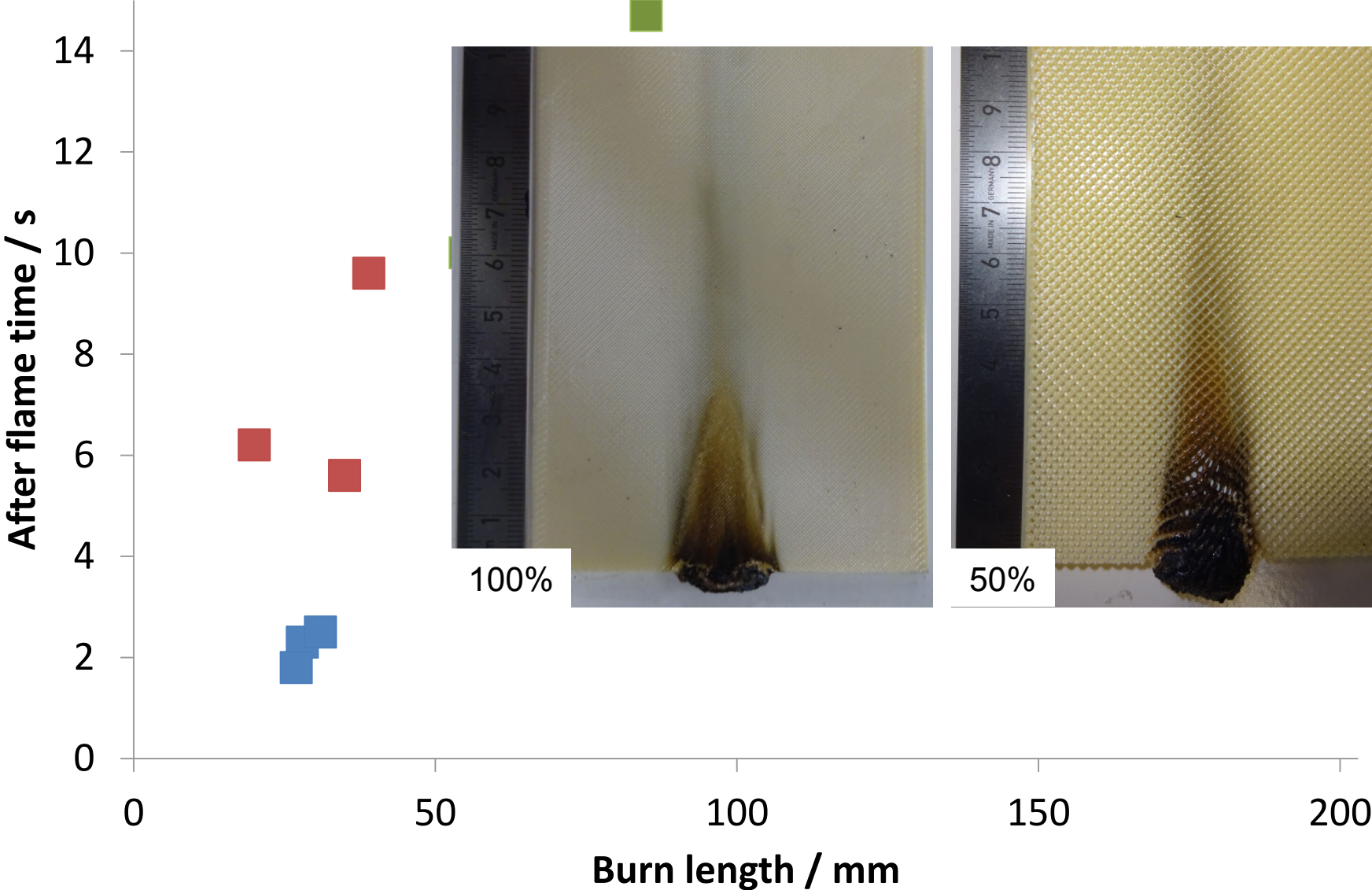
Tubular pattern

12 g



# Infill

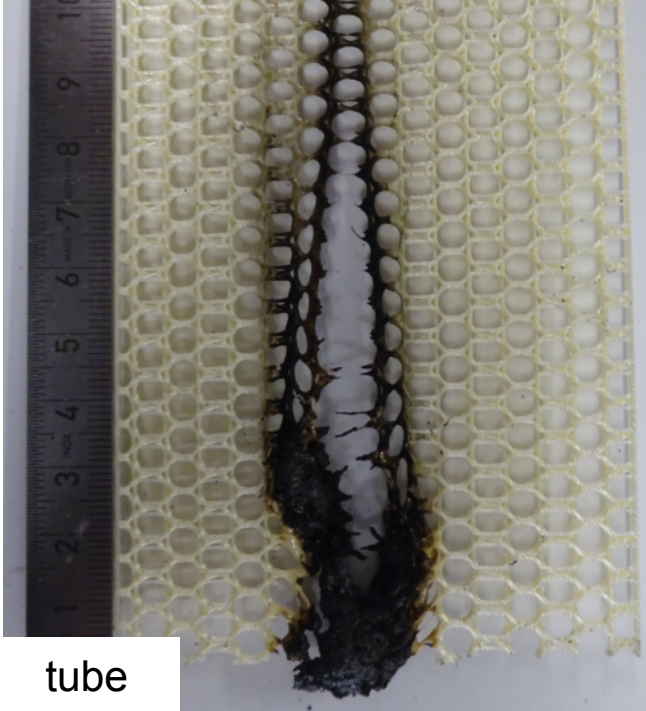
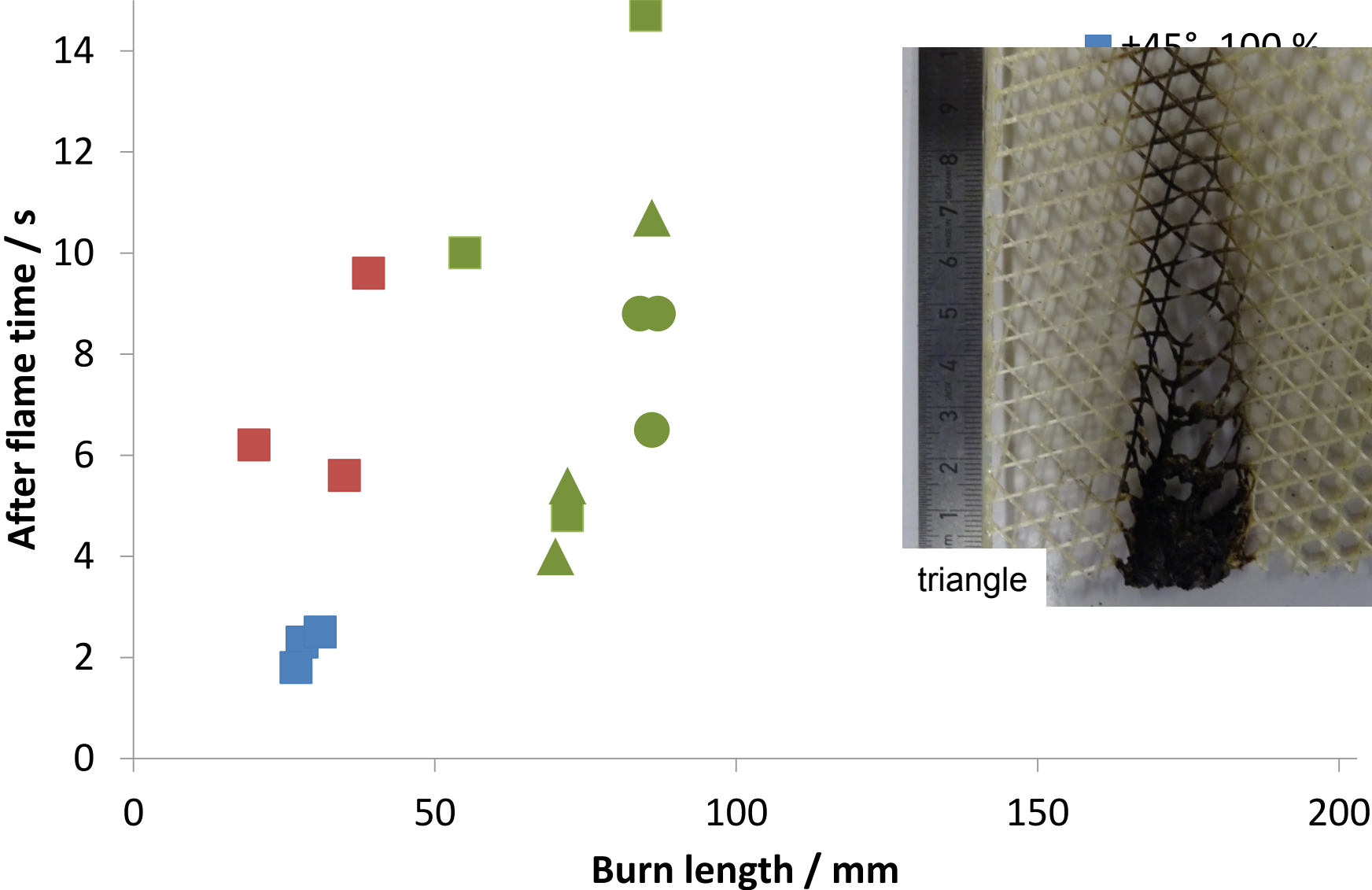
## 12 s VBB



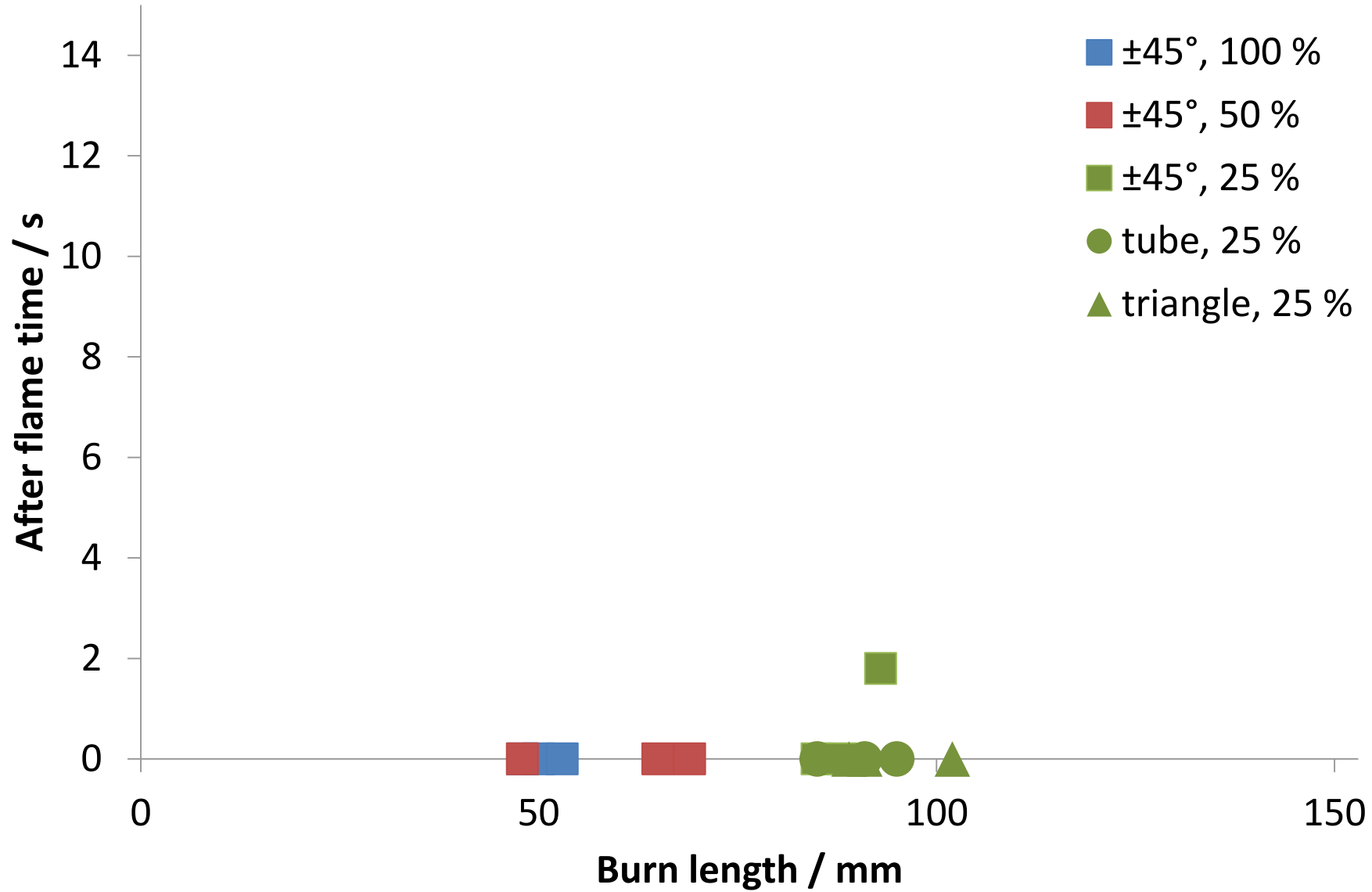


# Infill

## 12 s VBB



## 60 s VBB



# Task Group

- Wednesday, 08.30 h, Auditorium
- We got ~~COOKIES~~
  - Keynote C. Applegren (Gulfstream):  
Industry Task Group for Mechanical Testing
  - 3D printer manufacturer support:  
J. Feldmiller, Stratasys

# Exam

Which competition of the 1996 Atlanta Olympics was hosted by Savannah?

SAVANNAH  
1996



AIRBUS

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Thank you