Aircraft interiors EXPO 2003

Rapid Innovation

through an evolutionary design process

Robert Edson Swain
aircraft intelligence

aircraft intelligence™

partners in innovation

global cooperation

cross-disciplinary

systemic solutions

practical results

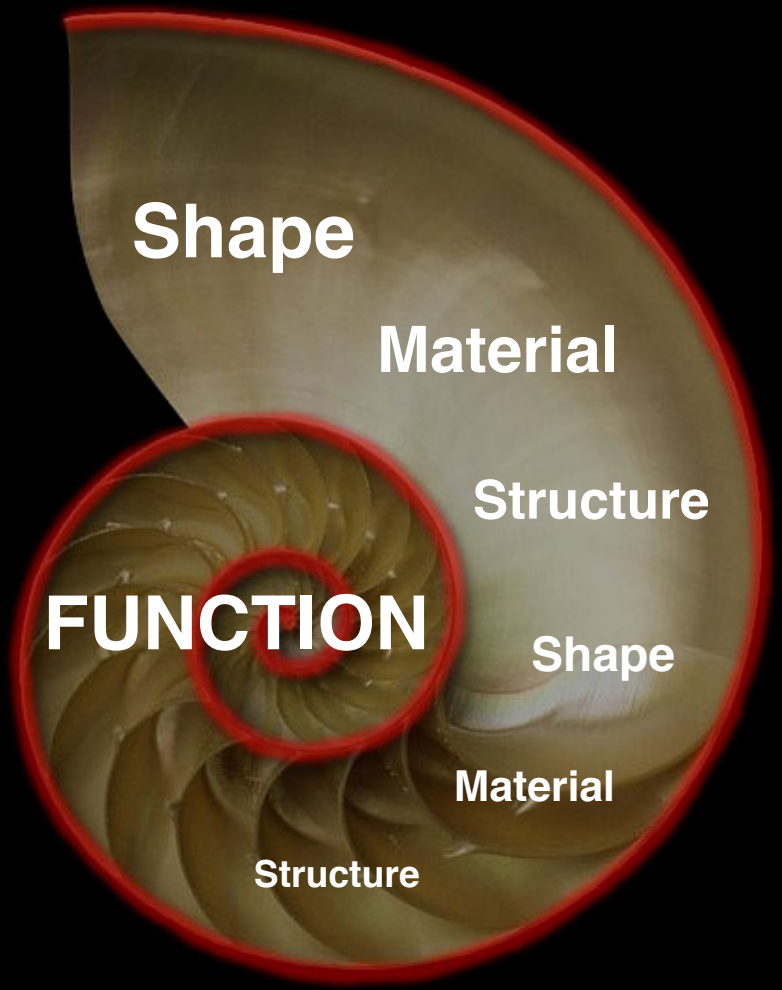
discovery is to see
what everybody has seen
and think what nobody has thought
Albert Szent-Gyorgyi

www.airintel.com

Evolution

Non-linear

Nature-Inspired



SYSTEMIC OPTIMIZATION

photos by domus magazine

TEAM BUILDING

domus bbj design competition

photos by domus magazine

DESIGN INTEGRITY AND PERMANENCE

francois burkhardt

TEAM BUILDING

domus bbj design competition

photos by domus magazine

DESIGN INTEGRITY AND PERMANENCE

MANUFACTURING EXCELLENCE AND INTEREST IN PERFECTION

toyo ito

francois burkhardt

TEAM BUILDING

domus bbj design competition

photos by domus magazine

DESIGN INTEGRITY AND PERMANENCE

MANUFACTURING EXCELLENCE AND INTEREST IN PERFECTION

ENTREPRENEURIAL APPROACH AND INNOVATION

toyo ito

francois burkhardt

bob swain

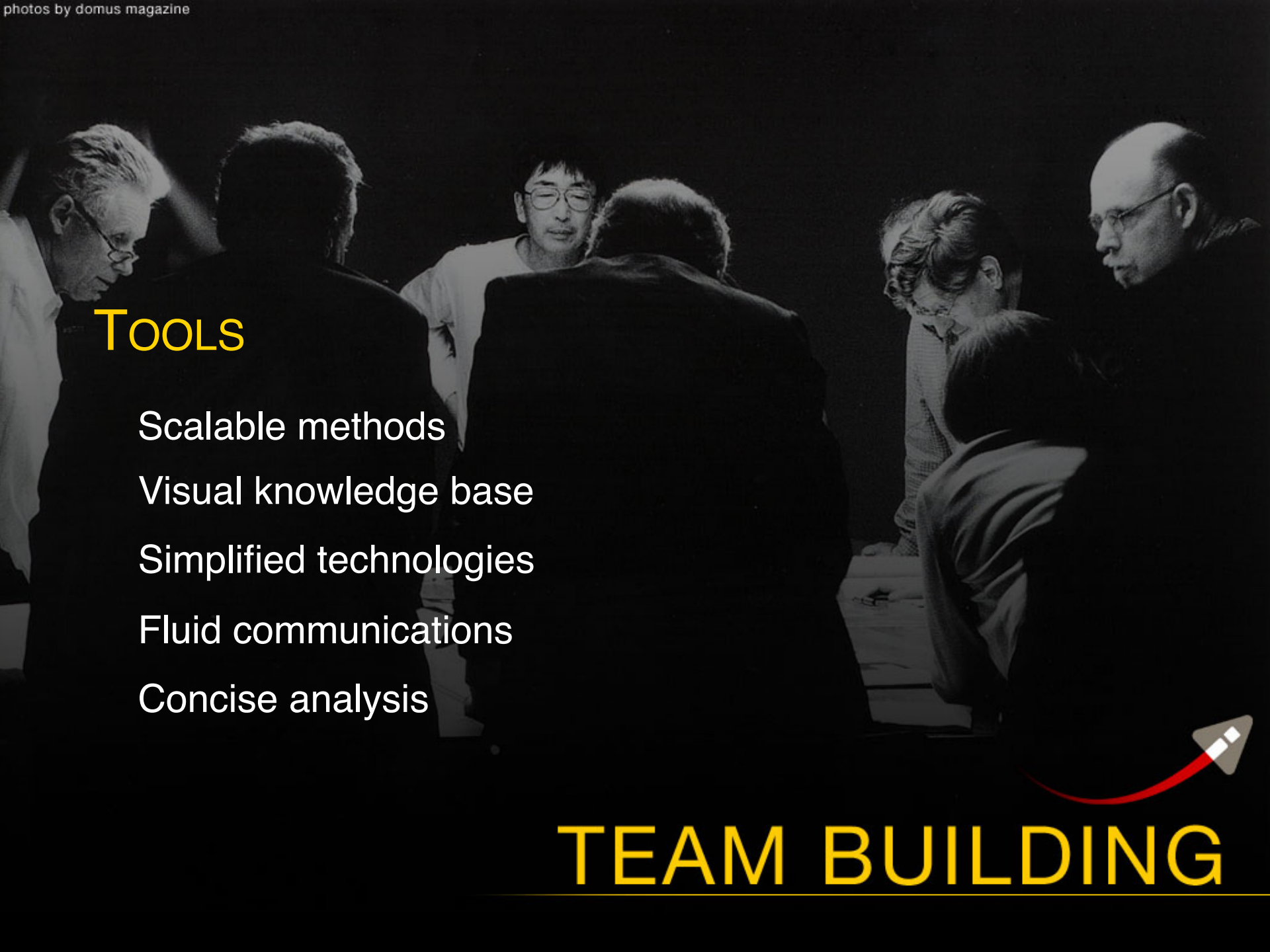
TEAM BUILDING

domus bbj design competition

TEAM

- Culture
- Size
- Alignment
- Vision
- Depth

TEAM BUILDING



TOOLS

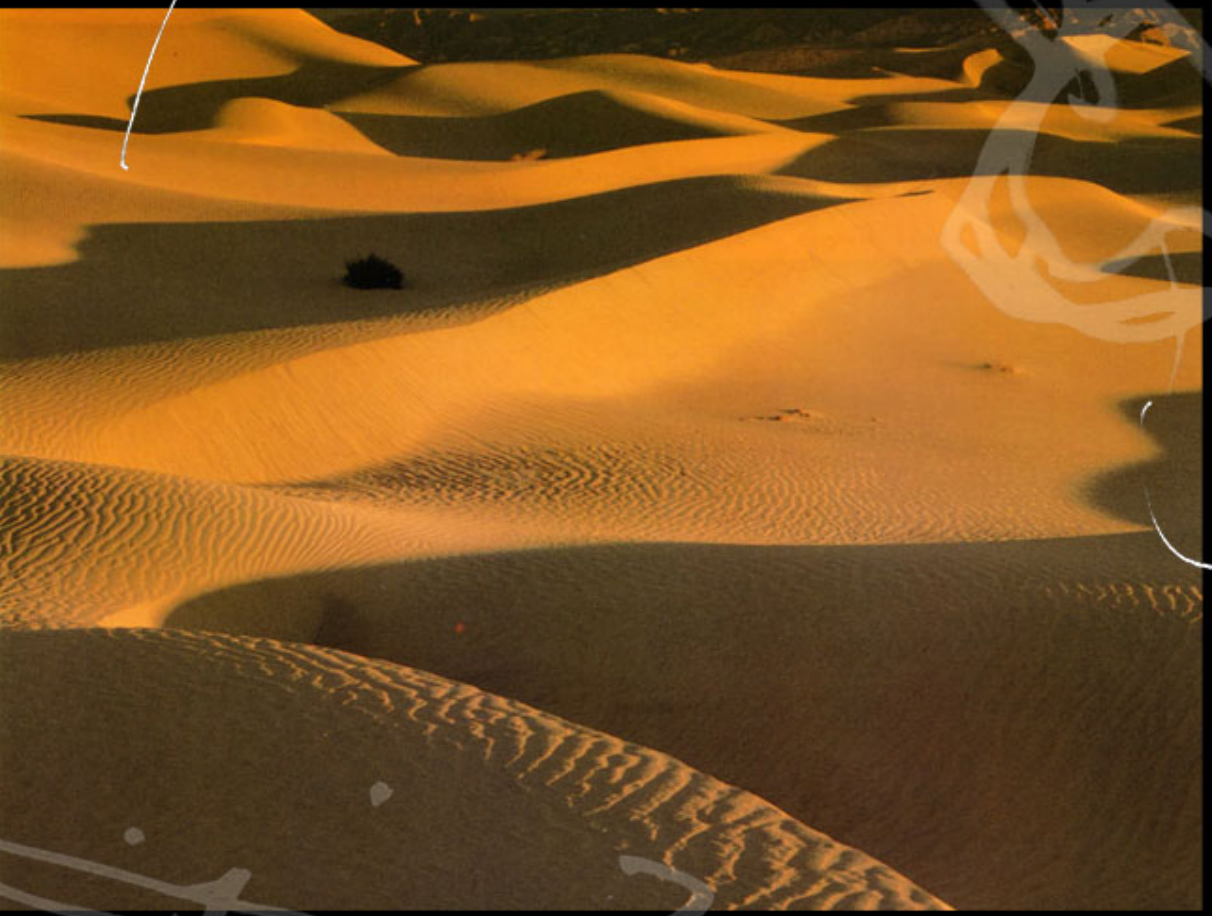
- Scalable methods
- Visual knowledge base
- Simplified technologies
- Fluid communications
- Concise analysis

TEAM BUILDING

BREAKTHROUGH SOLUTIONS

Sand dunes

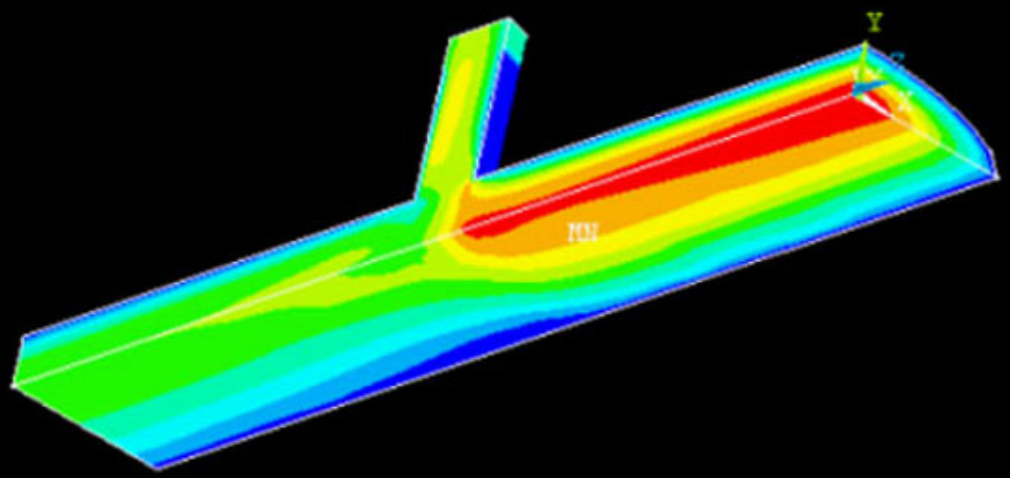
FUNCTION : carry air, reduce noise		
SHAPE	MATERIAL	STRUCTURE



natural airflow management

NOISE ATTENUATION

Velocity distribution inside a pipe with elliptical section



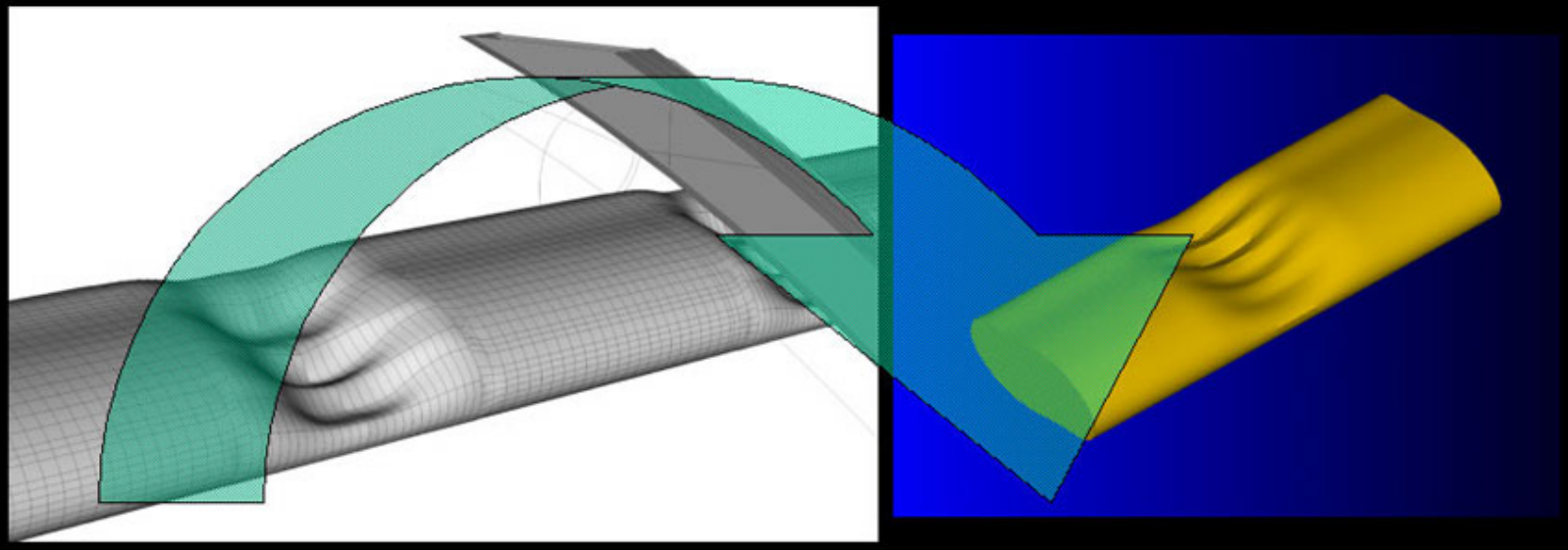
NODAL SOLUTION
STEP=7
SUB =1
VSUM (AVG)
RSYS=0
PowerGraphics
EFACET=1
AVRES=Mat
SMX =.724324

0
.08048
.160961
.241441
.321922
.402402
.482883
.563363
.643844
.724324

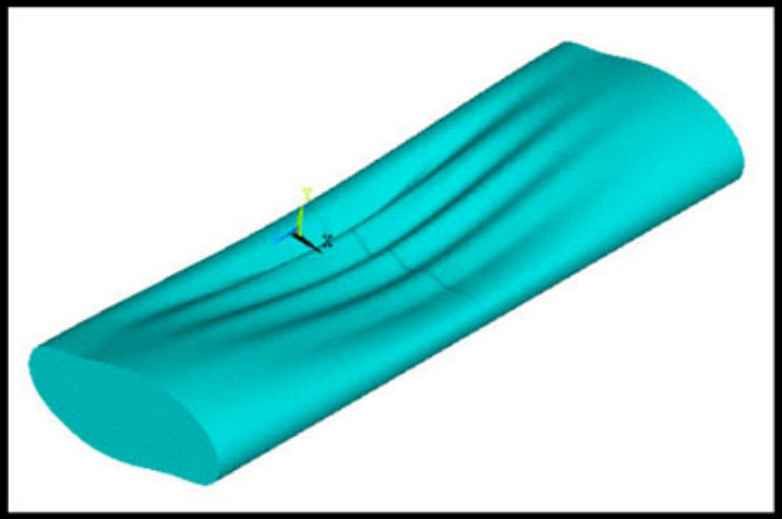
Different colors represent different velocity inside the pipe

The velocity scale is in m/s

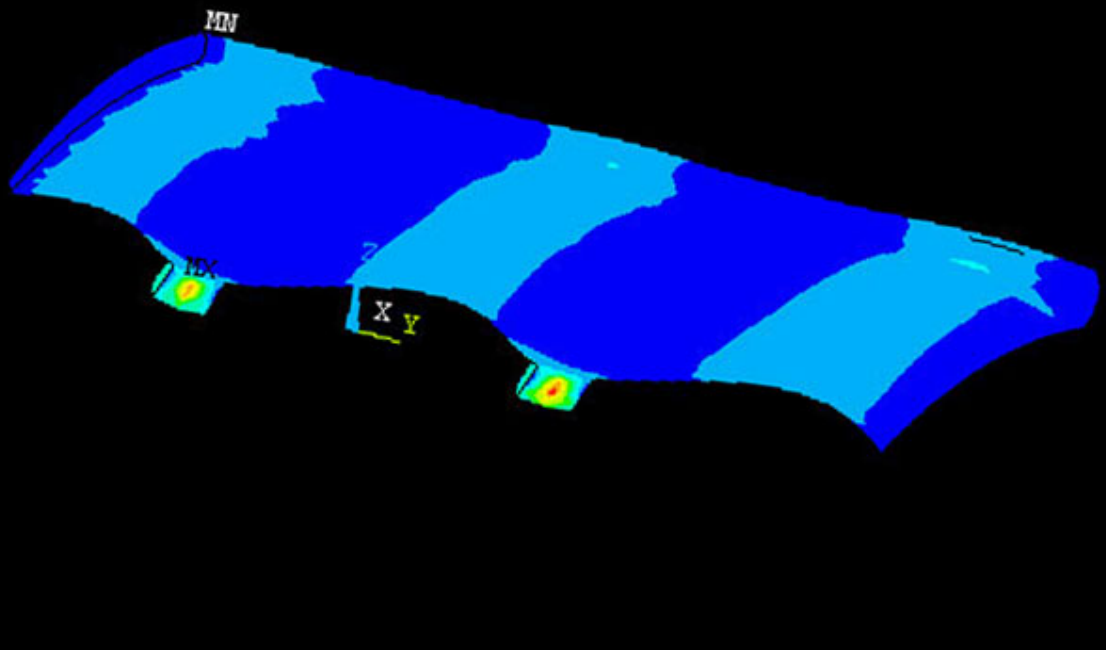
NOISE ATTENUATION



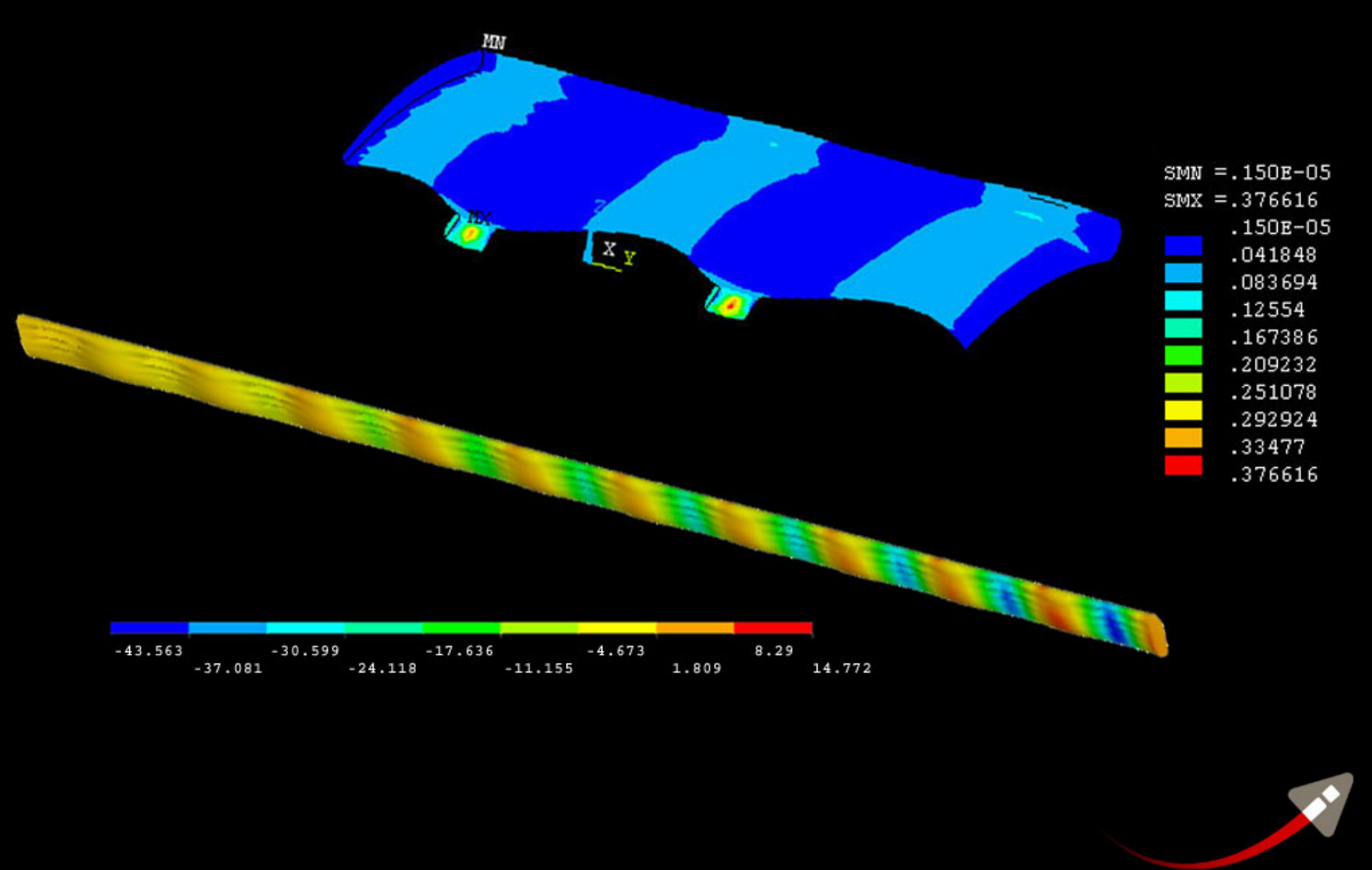
Evolution of shape: optimized for uniform flow



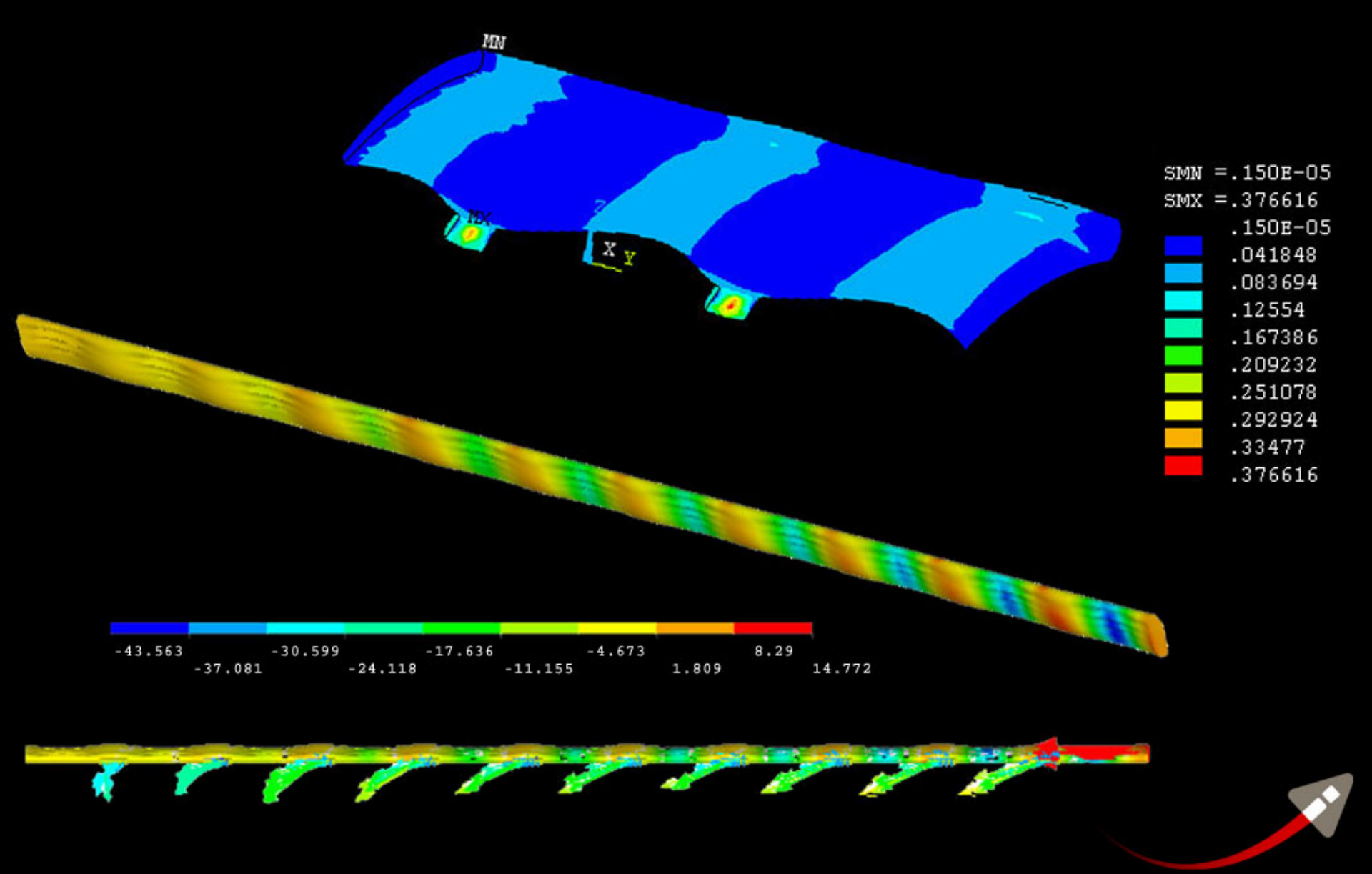
NOISE ATTENUATION



NOISE ATTENUATION

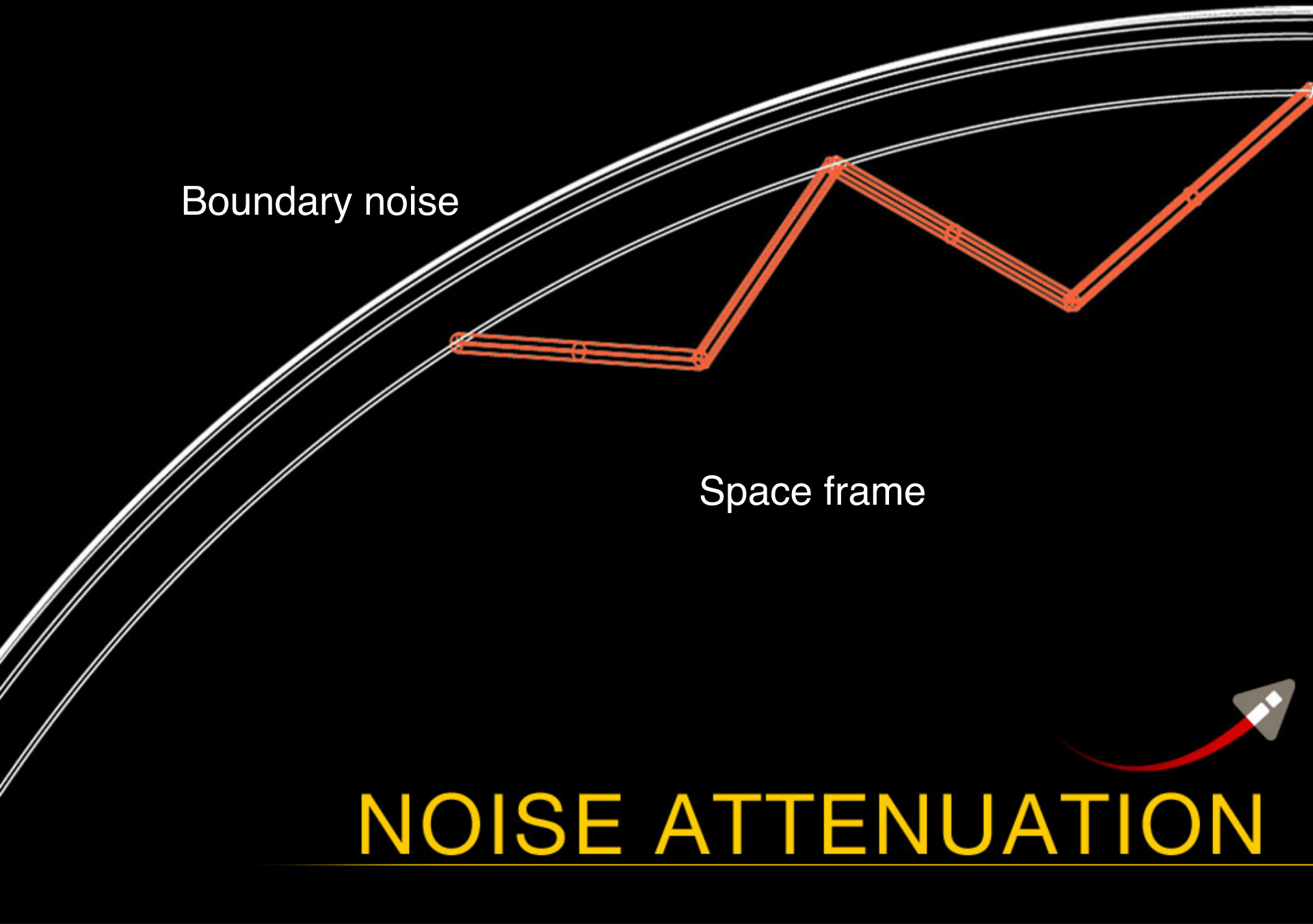


NOISE ATTENUATION

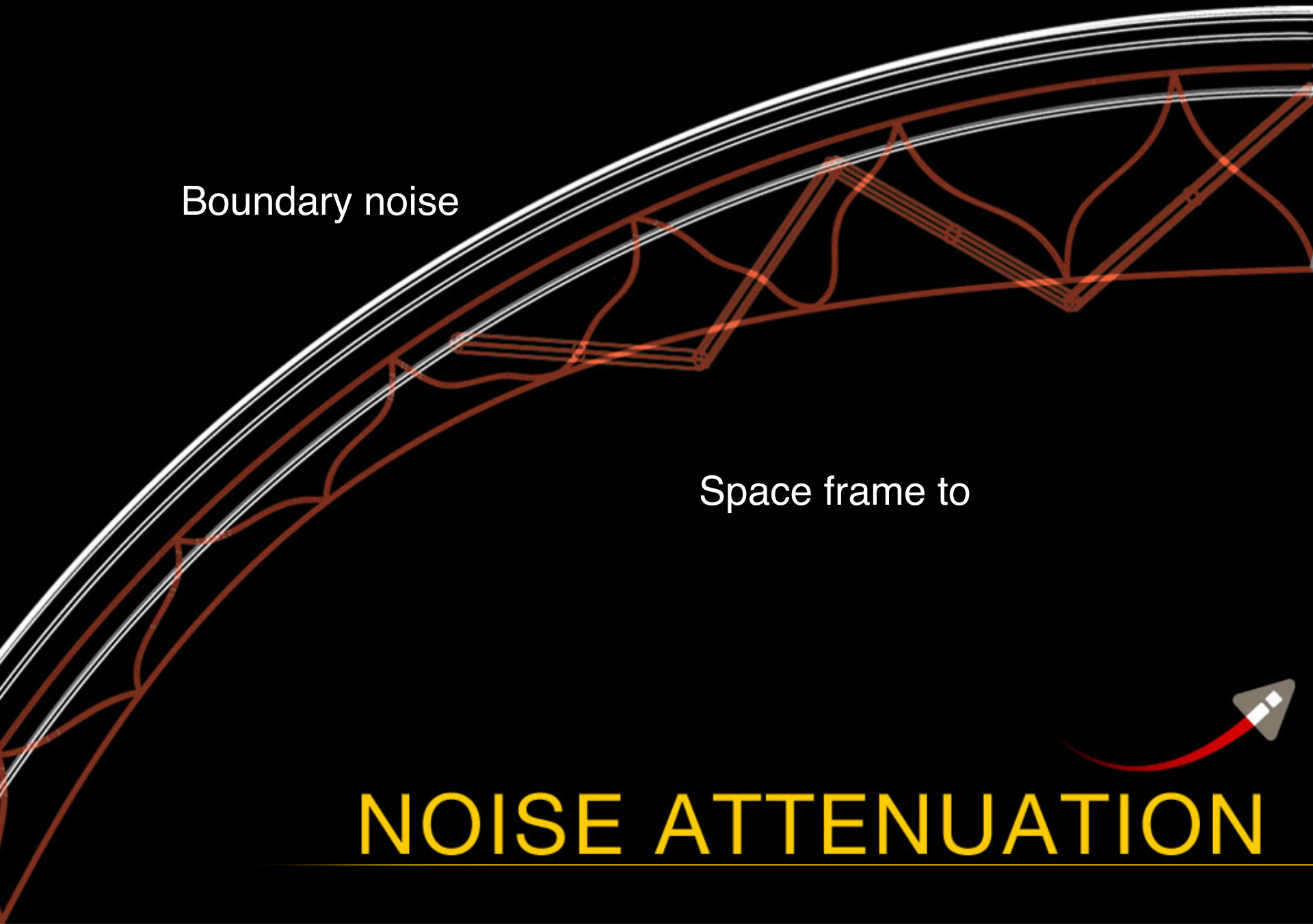


NOISE ATTENUATION

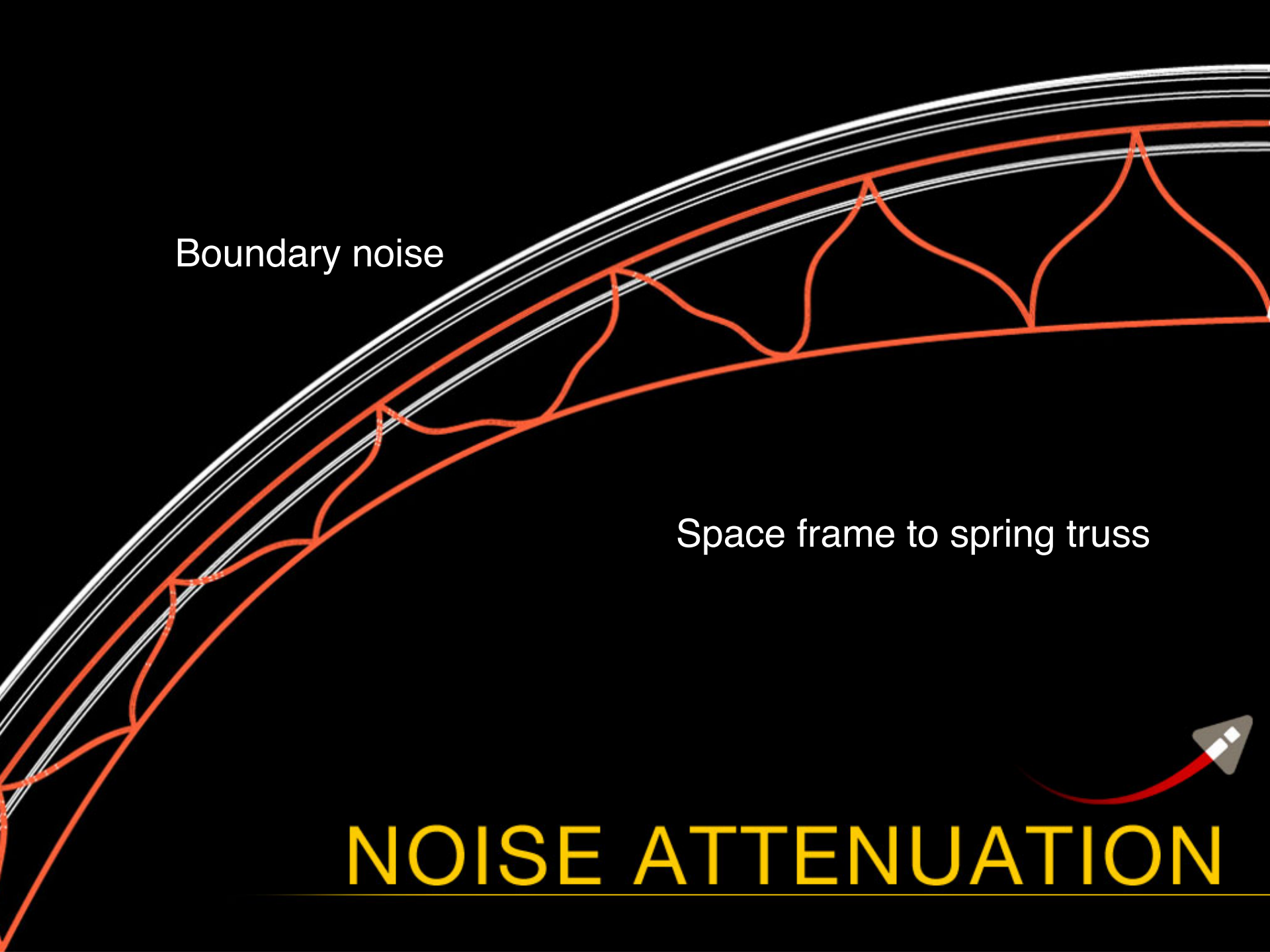
NOISE ATTENUATION



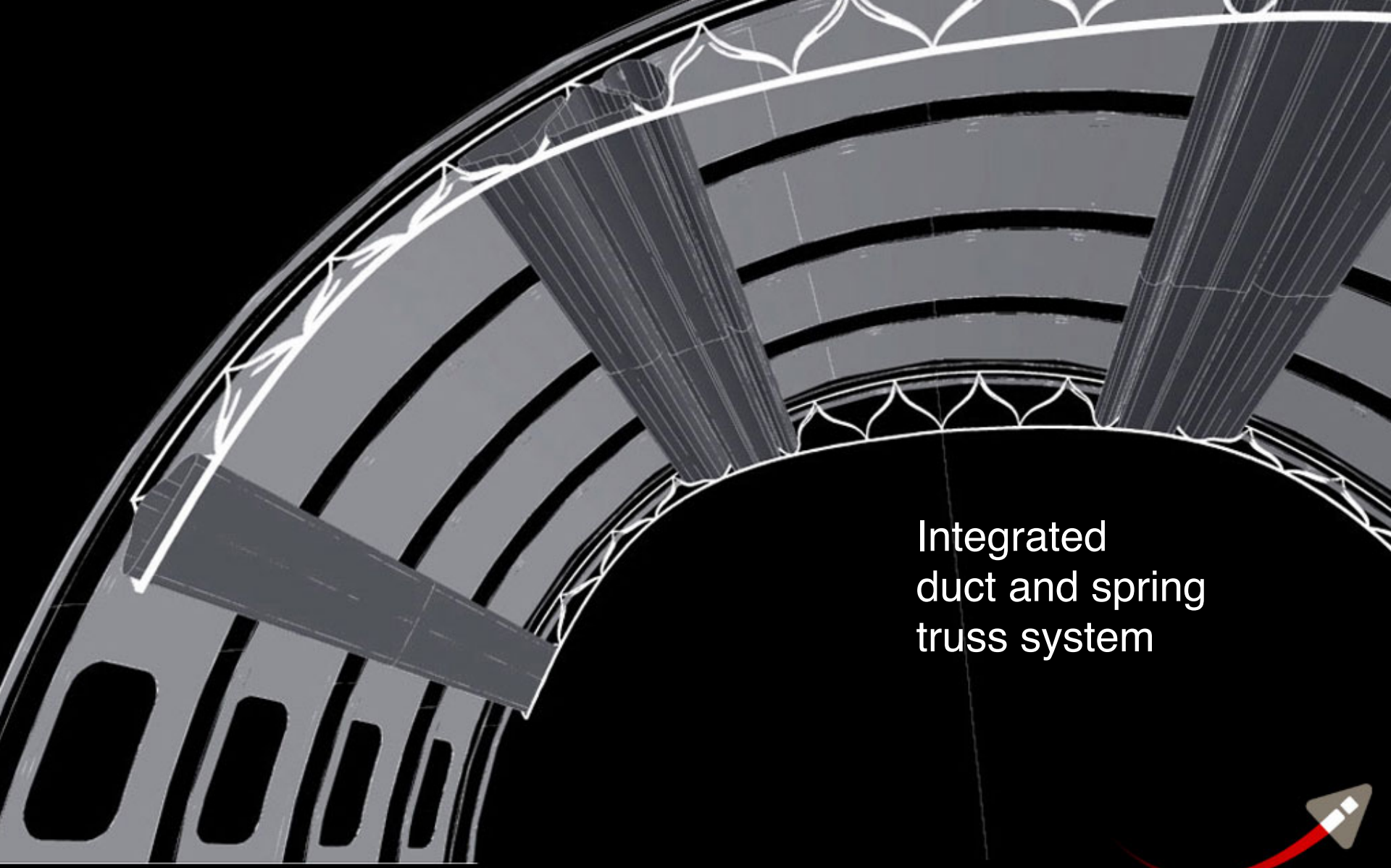
NOISE ATTENUATION



NOISE ATTENUATION

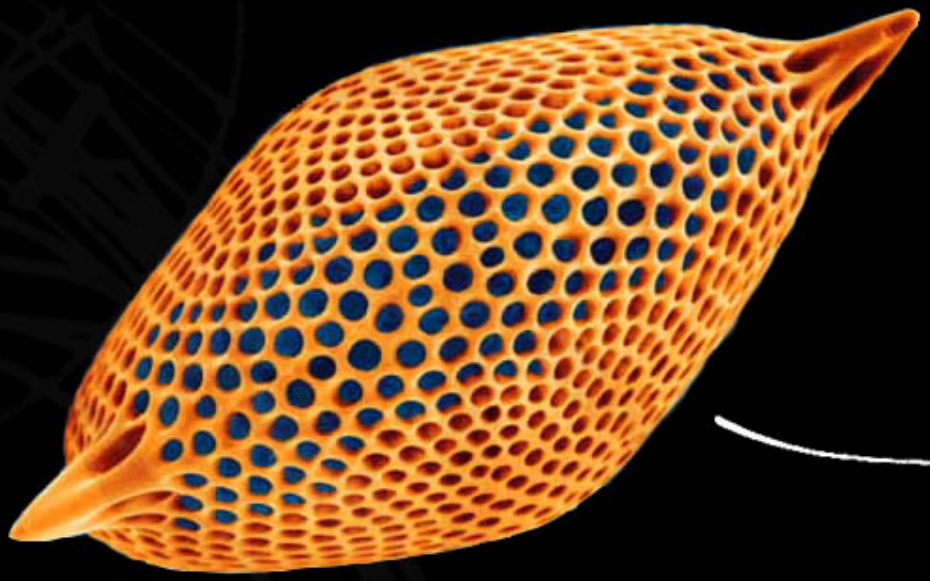


NOISE ATTENUATION



NOISE ATTENUATION

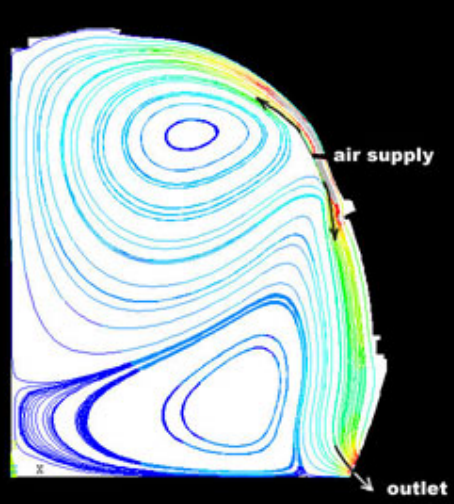
FUNCTION : control climate		
SHAPE	MATERIAL	STRUCTURE

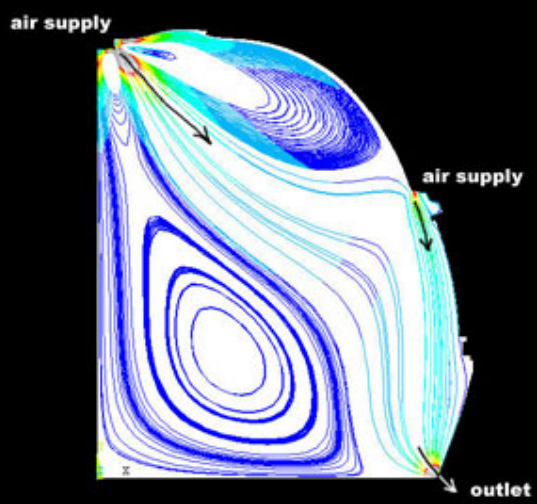


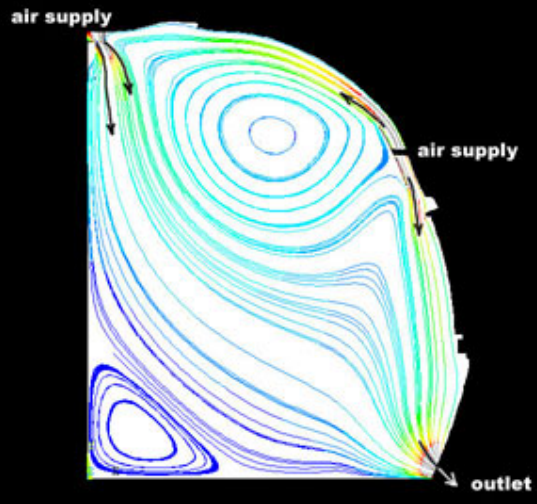
Radiolarian micro organism

MICRO-CLIMATE

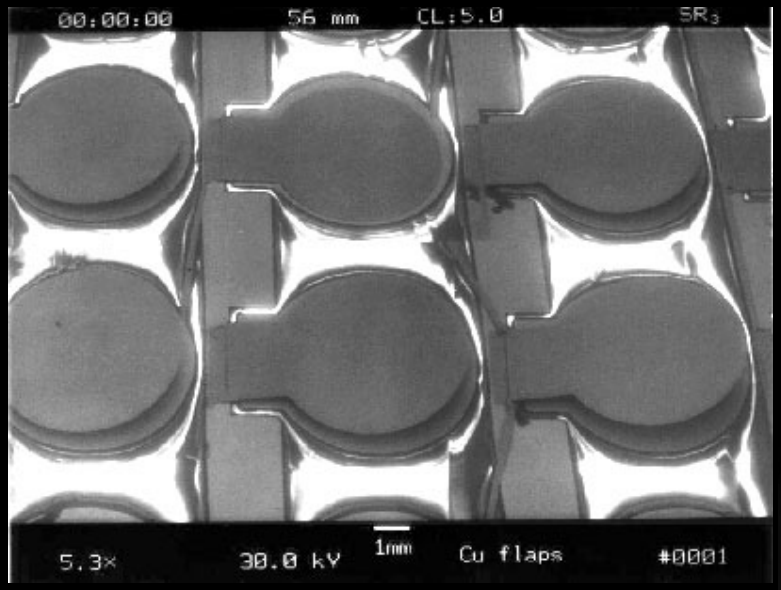
Cabin air temperature distribution



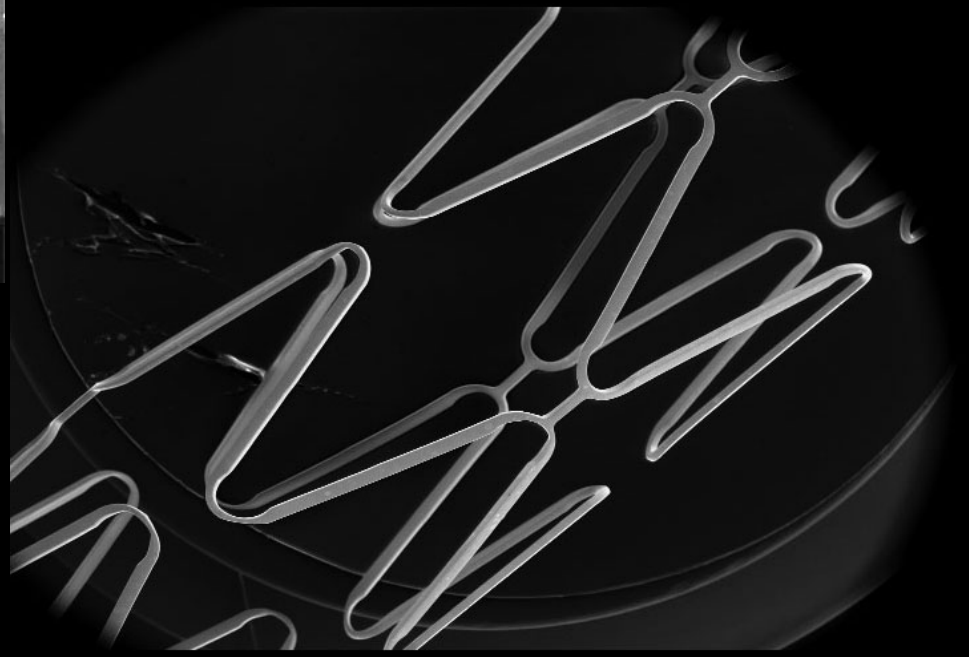




MICRO-CLIMATE

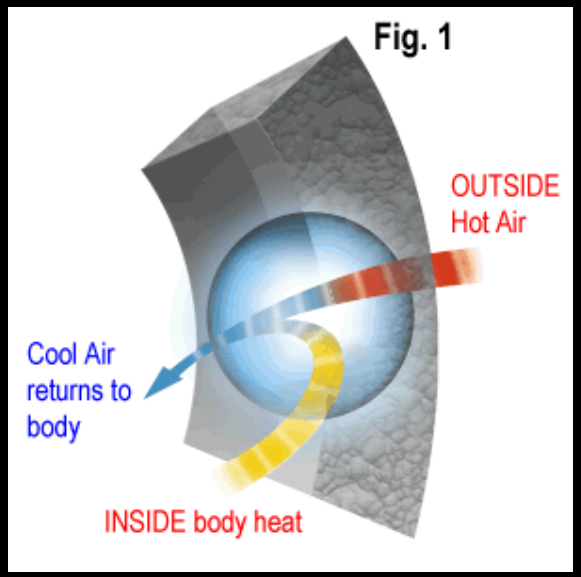


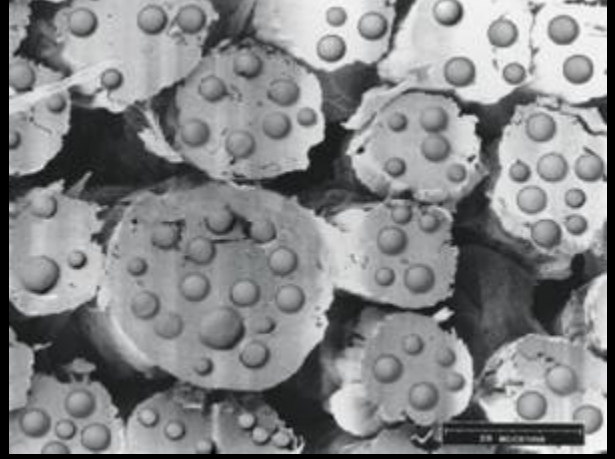
Micro-electro mechanical



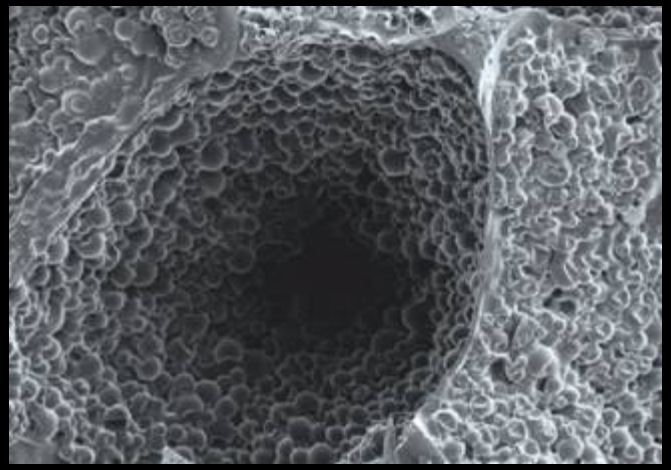
Smart wire (Nitinol)

MICRO-CLIMATE

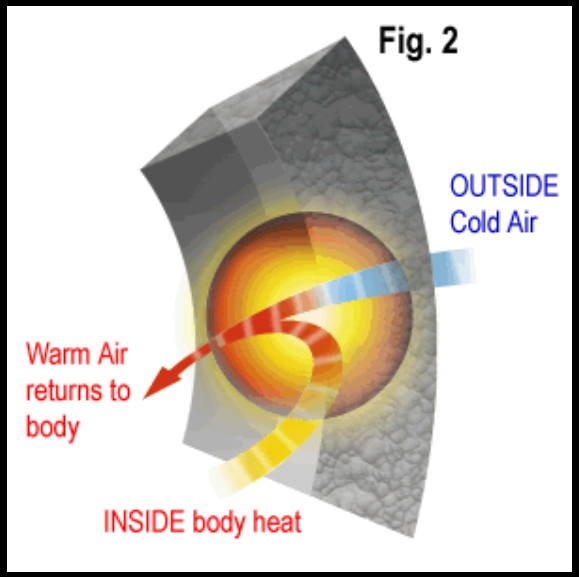


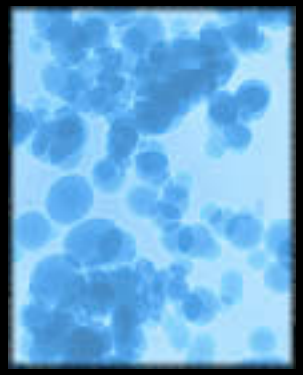


FIBER + thermo-active filler



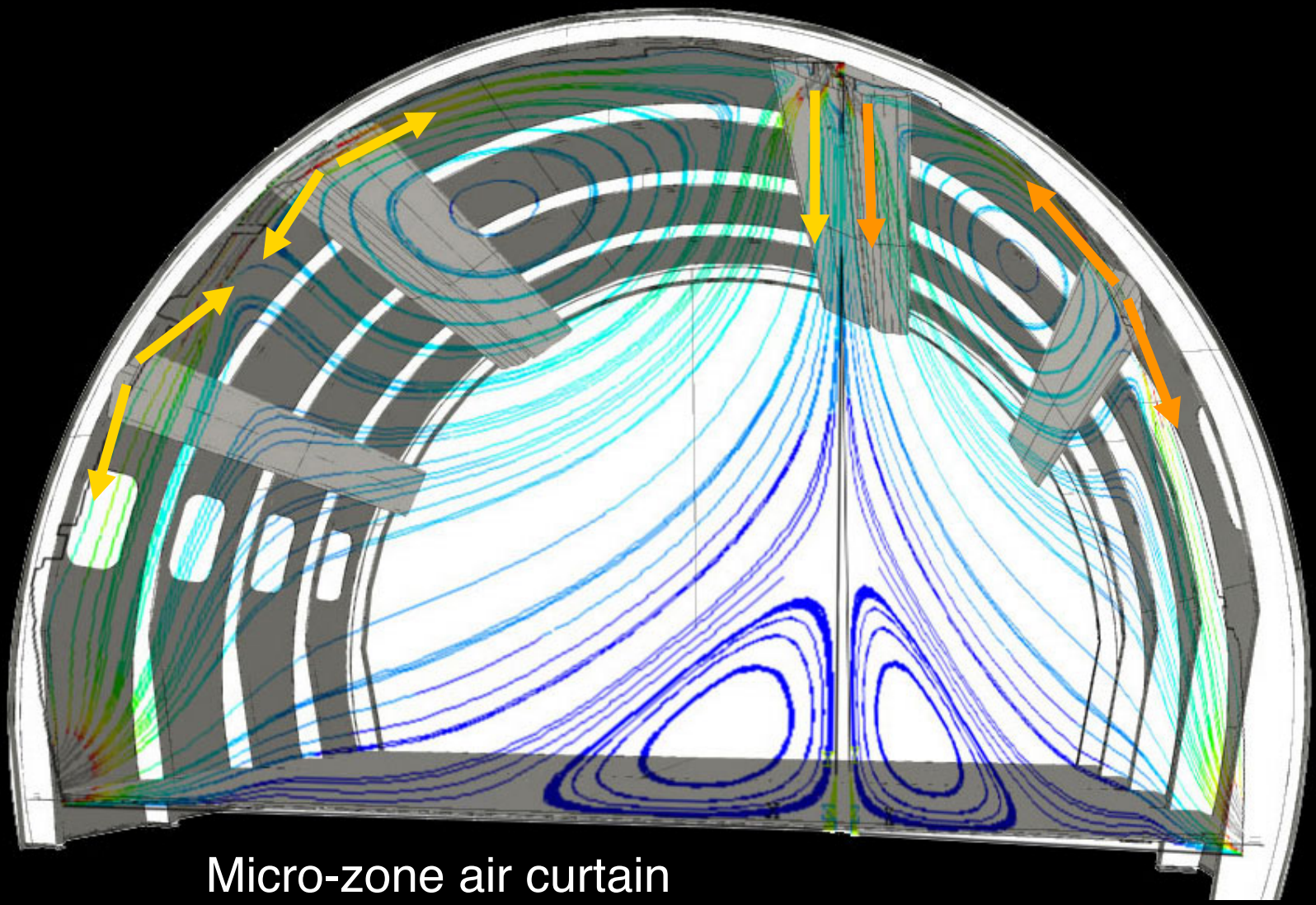
FOAM + thermo-active filler





Nano-silica

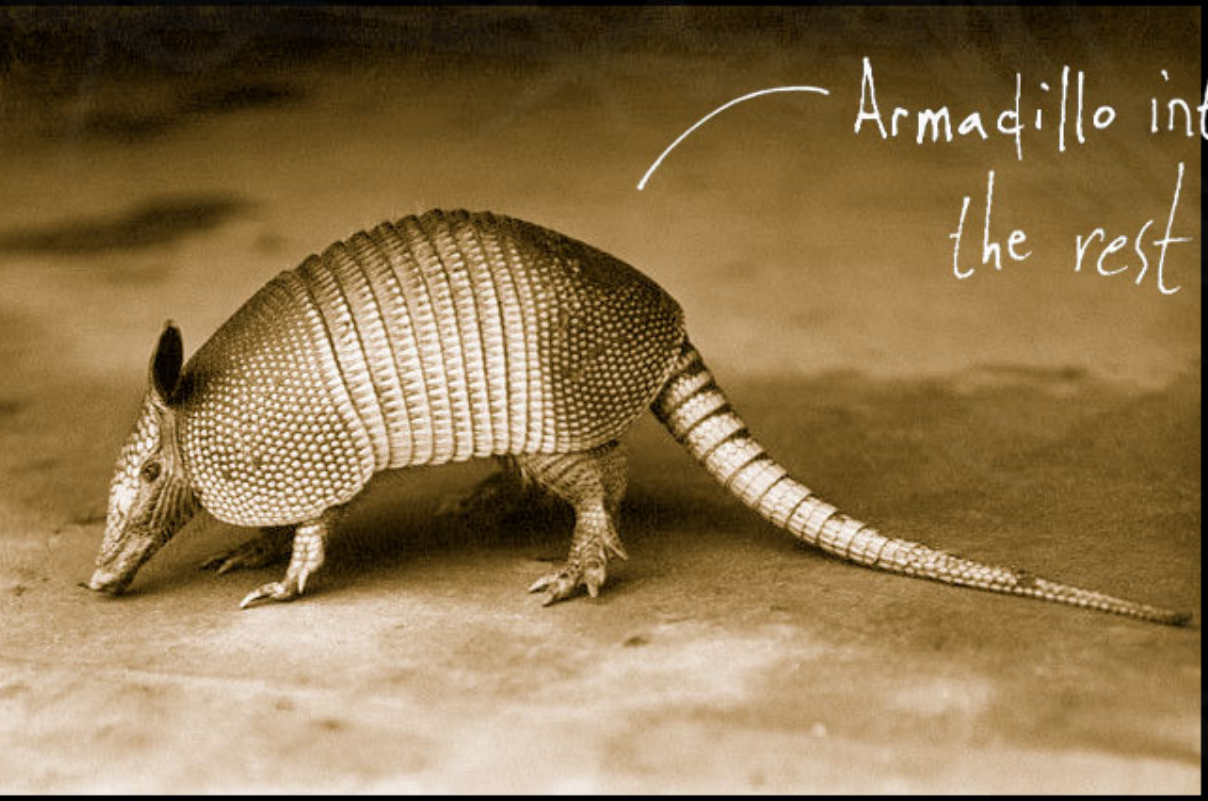
MICRO-CLIMATE



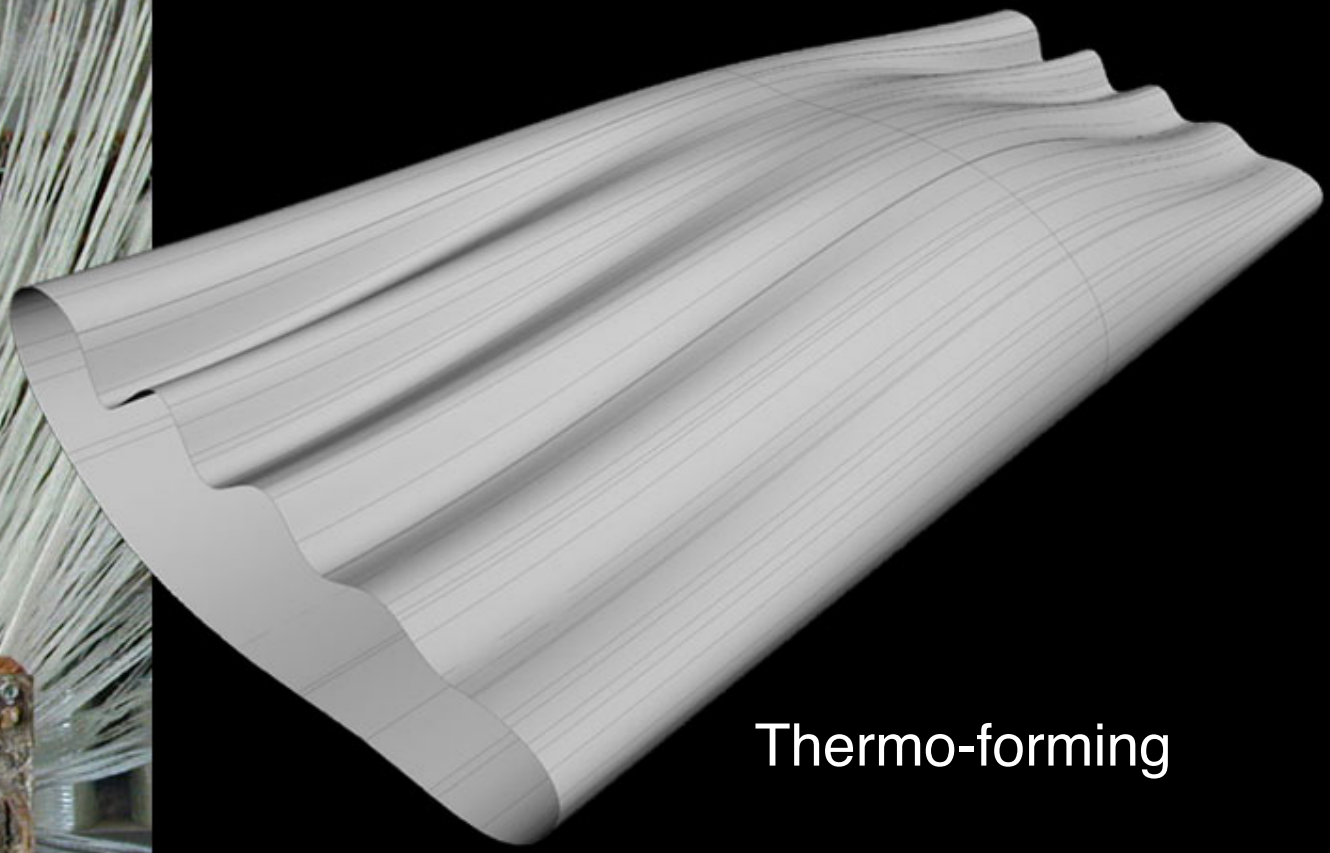
Micro-zone air curtain

MICRO-CLIMATE

FUNCTION : provide flexible panels		
SHAPE	MATERIAL	STRUCTURE



FLEXIBLE SYSTEMS

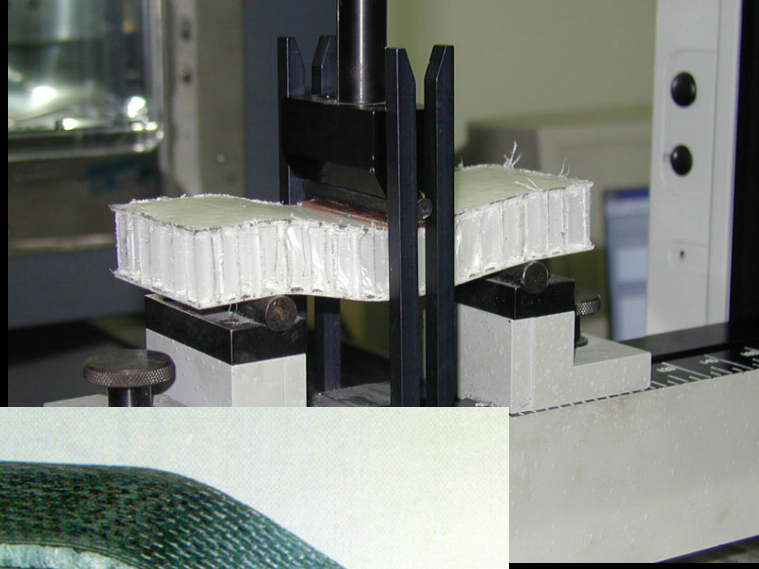


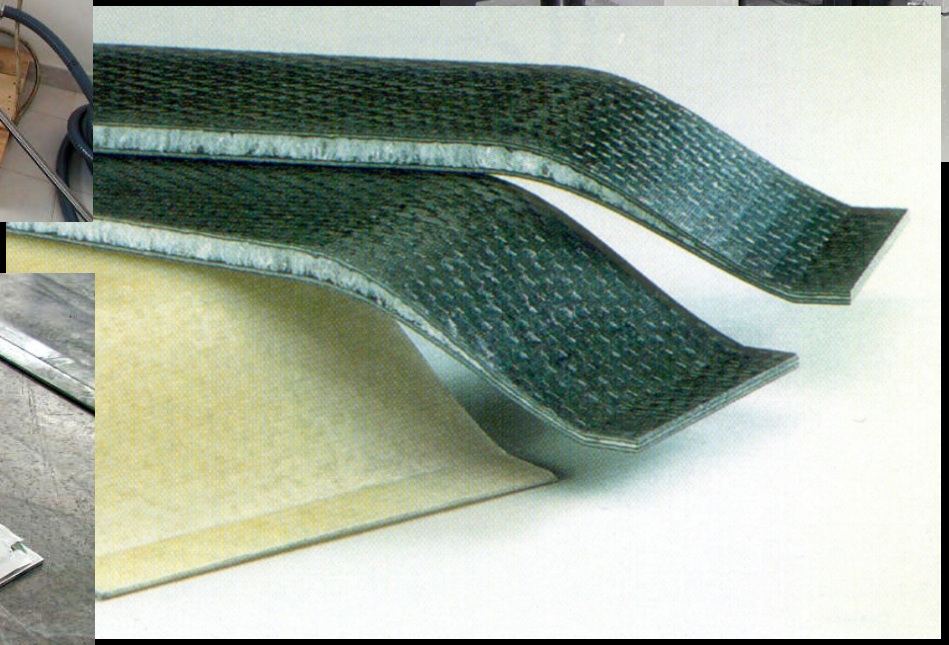
Thermo-forming

Continuous process manufacturing

FLEXIBLE SYSTEMS

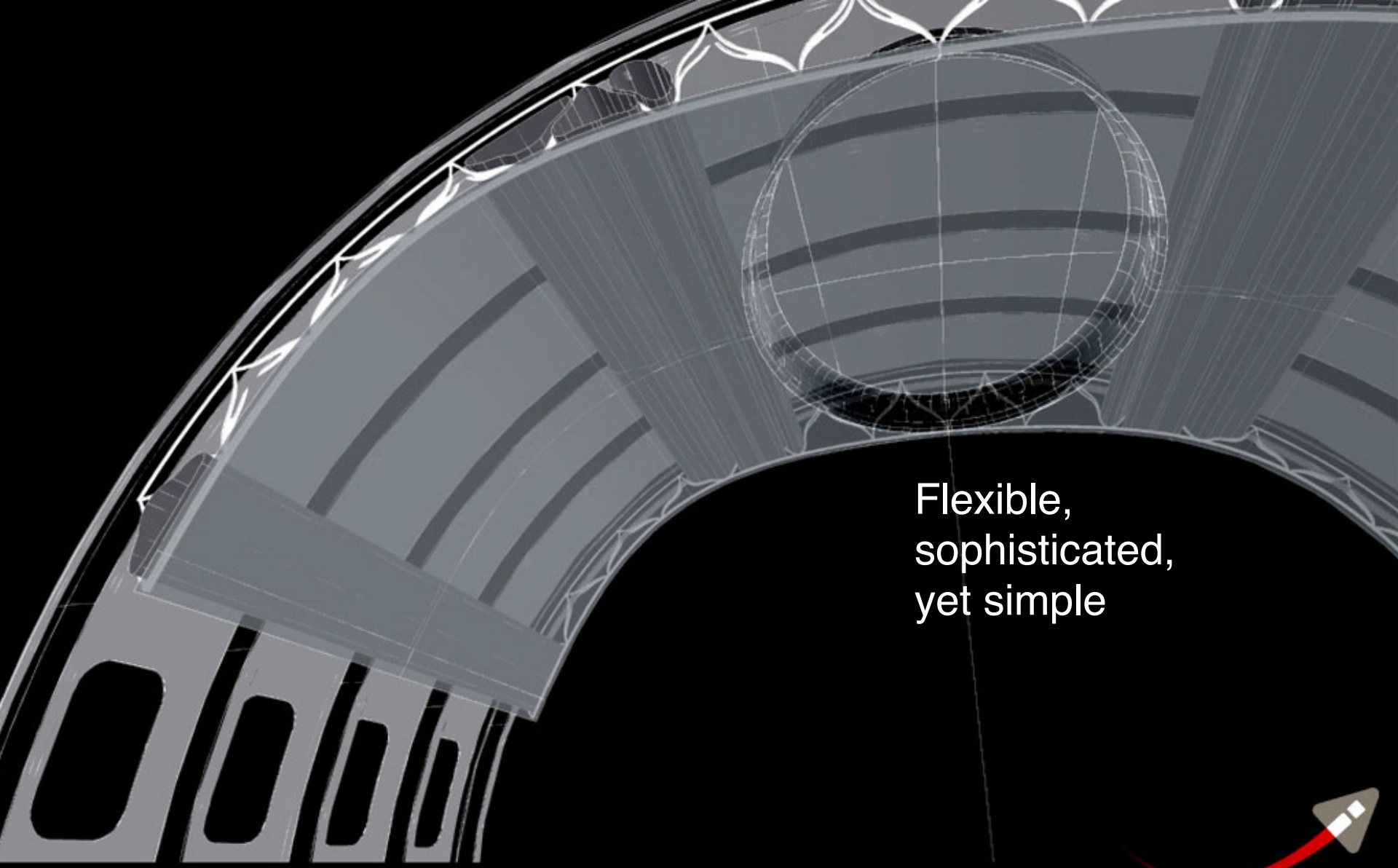
Resilient strength





On-site fabrication

FLEXIBLE SYSTEMS



Flexible,
sophisticated,
yet simple

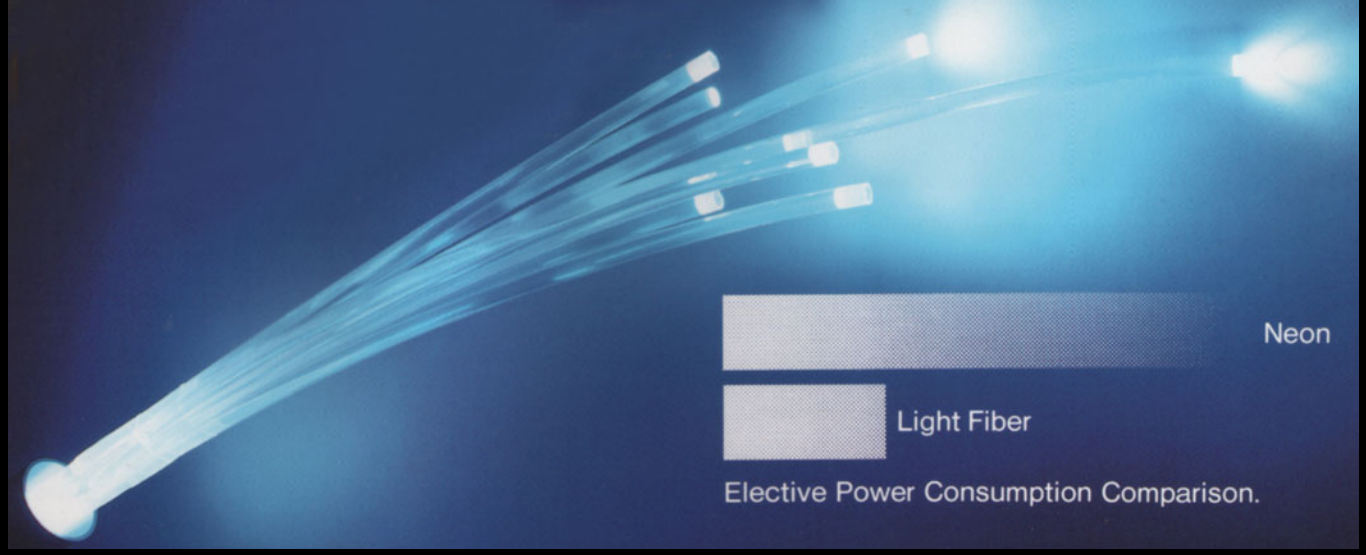
FLEXIBLE SYSTEMS

FUNCTION : carry light		
SHAPE	MATERIAL	STRUCTURE

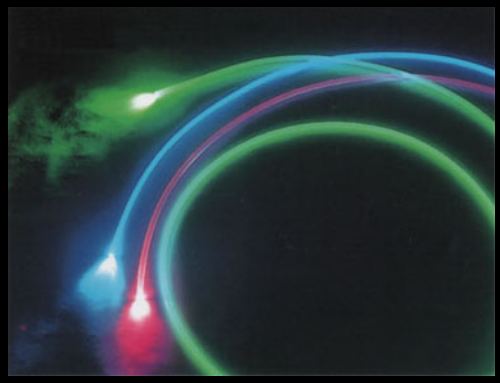
Ancient Rome

light sources found where they're least expected

LIGHT SYSTEMS



Fiber optic lighting



Computer-controlled
color management

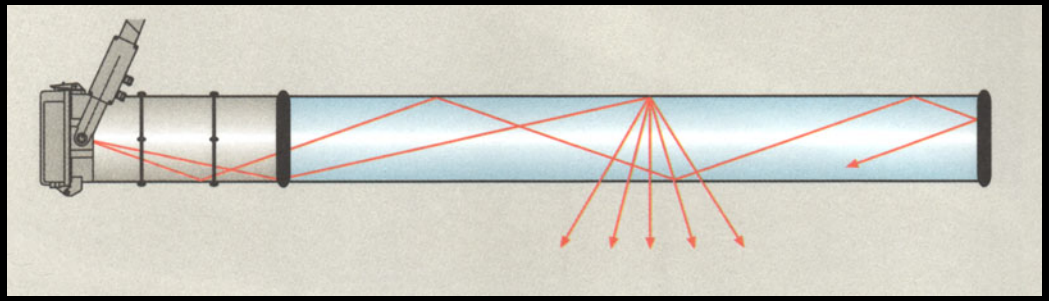
LED
light source

LIGHT SYSTEMS

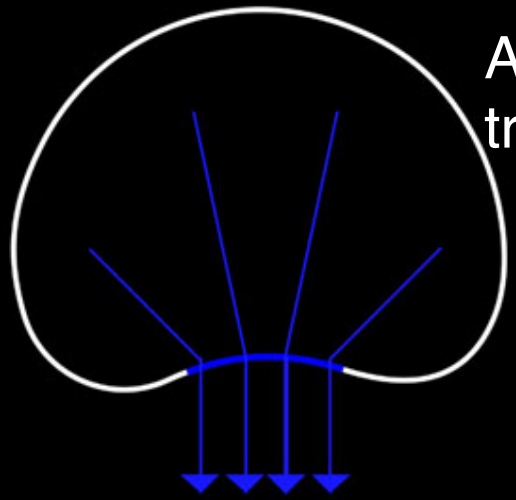
Reflected,
ducted
daylighting

A river of light from an external source

LIGHT SYSTEMS



Light projected through tubes



Air ducts:
transmitting light

Radiant mirror film

LIGHT SYSTEMS

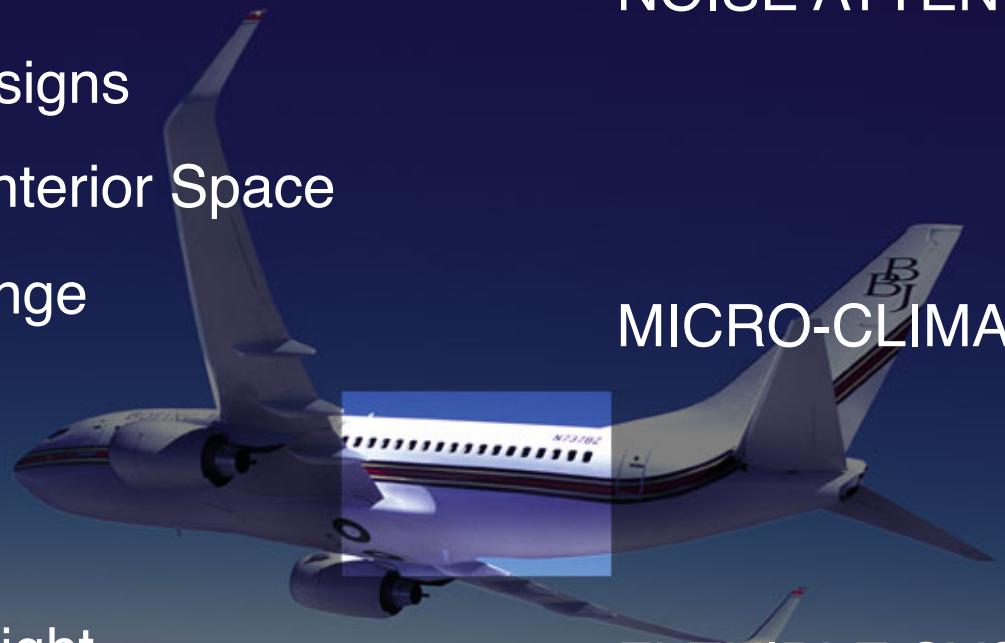
Passenger Comfort

Flexible Designs

Maximum Interior Space

Greater Range

NOISE ATTENUATION



MICRO-CLIMATE

Reduce Weight

Reduce Installation Time

Speed Maintenance

Simplify Manufacturing

FLEXIBLE SYSTEMS

LIGHT SYSTEMS

TRANSFORMING TRAVEL

Second University of Naples, Italy

Industrial Design • Research • Industrial Integration

Full Professors:

Antonio Apicella, Material Engineering

Robert Edson Swain, Sustainable Mobility

aircraft intelligence™

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Napoli	Antonio Apicella		Mimmo Ianello
Frankfurt			Lutz Pankow
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