DEVELOPMENTS
1. SPORT PERCEPTION
DEVELOPMENTS
CRITICAL SPORTERS
DEVELOPMENTS
2. TRANSITION TOWARDS THE INDOORS
DEVELOPMENTS
2. TRANSITION TOWARDS INDOORS
DEVELOPMENTS
2. TRANSITION TOWARDS INDOORS

- Sun entrance
- "Cold materials"
- Humid indoors
- Changing temperatures
- No insulation
- Mist
DEVELOPMENTS
2. TRANSITION TOWARDS INDOORS

Het is nu heel erg blauw, het lijkt wel een ruimteschip...

Reputation of ‘cold’ appearance
3. SEASON SPECIFIC BUILDING

New building typology  Season specific
DEVELOPMENTS
4. PRODUCTION WASTE HEAT
GLOBAL WARMING

NECESSITY FOR INDOOR ICE RINKS

THE ICE RINK PARADOX

POOR BUILDING PERFORMANCE

WASTE HEAT
An ice rink emphasizes its reason to exist.

GLOBAL WARMING

NECESSITY FOR INDOOR ICE RINKS

THE ICE RINK PARADOX

POOR BUILDING PERFORMANCE

WASTE HEAT
PROBLEM STATEMENT

SUMMARY

DEMANDING SPORTERS  BAD BUILDING REPUTATION  LOW BUILDING OCCUPATION  POOR BUILDING PERFORMANCE
How to make an ice rink (energy) efficient?
TABLE OF CONTENT

RESEARCH
  METHOD
  CONCLUSIONS

DESIGN
  DESIGN ASSIGNMENT
    CITY
    CONTEXT
    BUILDING
    CLIMATE
    CONSTRUCTION

ENERGY STRATEGY

CONCLUSION
  REFLECTION
RESEARCH
How to integrate energy-saving architectural instruments towards a holistic energy neutral ice rink design.
How to integrate energy-saving architectural instruments towards a holistic energy neutral ice rink design.
What is energy neutral?
Strategies to lower energy demand
RESEARCH
SUB QUESTIONS

WHO MAKE USE OF THE BUILDING? → QUESTIONNAIRE

WHAT FUNCTIONS CAN BE APPLIED IN SUMMER? → CASE STUDIES

WHICH SPACES ARE REQUIRED IN AN ICE RINK? → CASE STUDIES

WHAT ARE THE TECHNICAL REQUIREMENTS? → INTERVIEWS

+ LITERATURE

INTRODUCTION
RESEARCH
DESIGN
ENERGY
CONCLUSION
RESEARCH
THREE CATEGORIES

1. OPERATION DESIGN
2. SPATIAL DESIGN
3. TECHNICAL DESIGN
RESEARCH
THREE CATEGORIES

1. OPERATION DESIGN
2. SPATIAL DESIGN
3. TECHNICAL DESIGN

ENERGY EFFICIENCY
**OPERATION DESIGN**

- **Able to completely block day- and sunlight.**
- **Provide acoustic comfort.**
- **A columnless space.**
- **Natural daylight, no direct sunlight.**
- **Homogeneous lighting.**
- **Air temperature of 10 to 15 degrees.**
- **Separate entrance public / private.**
- **Access trucks.**
- **Ceiling can bear light & sound installations.**
Natural daylight, no direct sunlight

A columnless space
RESEARCH
RESULTS

SPATIAL DESIGN

Integration in urban tissue, close to a motorway.

Connected to car roads, public transport and bicycle paths.

Overlook the ice

The restaurant should overlook the ice

Catering facilities close to event space.

Sufficient parking space in/at building

Storage close to the event area.

08. The design should provide spectator seats overlooking the event area.

INTRODUCTION

R E S U L T S

RESEARCH

SPATIAL DESIGN

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Overlook the ice

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DRINKS
RESEARCH
RESULTS

SPATIAL DESIGN

- Sufficient parking space in/at building
- Provides spectator seats
- Close to a motorway.

Main program:
- Beginners
- Shorttrack
- Longtrack
- Ice Hockey
- Figure skating
TECHNICAL DESIGN

- Ventilated elevated foundation
- No radiation towards ice
- Ventilated roof
- Water collection
- Aircurtain: separate airflows
- Foundation: Able to expand
- Use waste heat
- Own micro controllable climate.
- Well insulated
- Aircurtain: separate airflows
- No radiation towards ice
- Ventilated roof
- Water collection
- Foundation: Able to expand
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TECHNICAL DESIGN

VENTILATED ELEVATED FOUNDATION

AIRCURTAIN: SEPARATE AIRFLOWS

WELL INSULATED
DESIGN ASSIGNMENT

A recreational and competitive ice rink in winter

A multifunctional venue in summer
Recognizable icon for modern ice skating

Appearance of natural experience

Promoting the sport
LOCATION
INTRODUCTION
URBAN INTEGRATION

1. Bike Publish
2. Auto Publish

INTRODUCTION | RESEARCH | DESIGN | ENERGY | CONCLUSION
PHASE 4
DETERMINATION FORM
INSULATING GROUND
DETERMINATION FORM
PROTECTION SOLAR RAYS
DETERMINATION FORM
STIMULATE AIRFLOWS
DETERMINATION FORM
BUFFER ROOF AND RING
ROOF AS SERVING OBJECT
DETERMINATION FORM

"SKATE MOVEMENT"
DETERMINATION FORM
SPATIAL SET UP

FOCUS ON 400 METER BUILDING
SPATIAL SET UP
SPATIAL SET UP
SPATIAL SET UP
SPATIAL SET UP
SPATIAL SET UP

Public

Private
SPATIAL SET UP
CONSTRUCTION
CONSTRUCTION
CONSTRUCTION
CONSTRUCTION
CONSTRUCTION
CONSTRUCTION
- Bioplastic chair
- Wooden frame for comfort and water drainage
- Prefab concrete slab
- Rubber

- Wooden lamellae
- Steel flange to attach secondary beam to primary steel beam
- Insulation: Wood fibre
- Ventilation shaft
FACADE CONCEPT
FACADE CONCEPT
ENERGY STRATEGY
CONSUMERS
- Refrigeration plant
- Lighting
- Electrical equipment
- Mechanical ventilation
- Dehumidifying ventilation
- Heat pump

PRODUCERS
- Natural ventilation
- Solar panels
- Heat district network
- Refrigeration plant
- Geothermal storage

THERMAL ENERGY
- Floor heating / cooling
- Heating water
- Resurfacing water heating
- Heating air

ELECTRIC ENERGY
THERMAL ENERGY

INTRODUCTION

ENERGY

RESEARCH

DESIGN

CONCLUSION
ENERGY

INTRODUCTION

HEAT STORAGE

REFRIGERATION PLANT

COLD STORAGE

ICE RESURFACING

SCRAPED SNOW

ICE SHEET

GEOTHERMAL COLD

HEAT DISTRICT

FLOORHEATING / WARM WATER

FLOORCOOLING

Thermal energy strategy
Eline Stubbert
NATURAL AIRFLOWS
WELL INSULATED
MAKING USE OF NATURAL DAYLIGHT
MAKING USE OF NATURAL DAYLIGHT