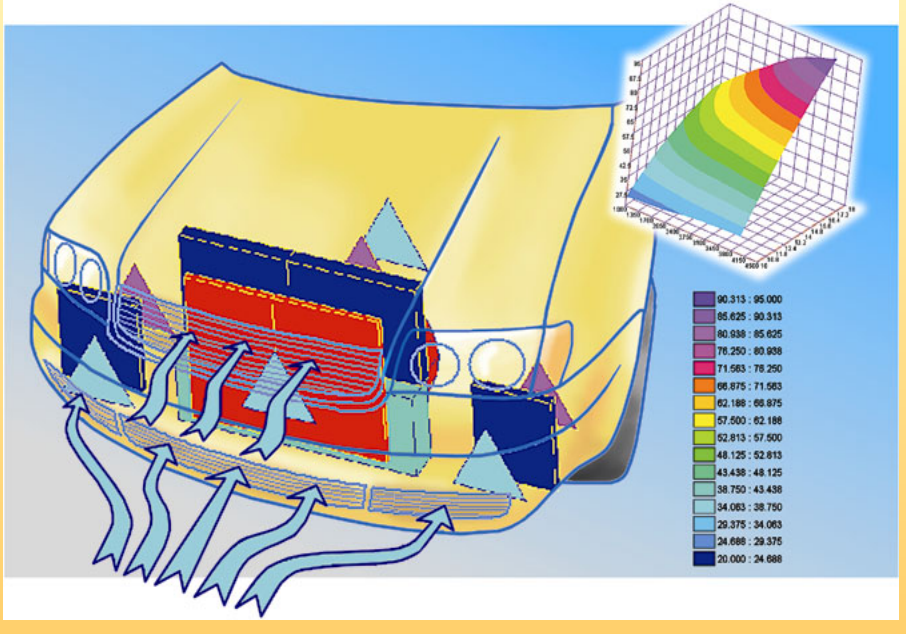
KULI Optimization



Cooling System Variants

Influence of Ambient Conditions

Simplifying Analysis of Variants

Dipl.-Ing. Franz Pointner
Engineering Center Steyr

Overview

- KULI State of Art
- KULI New Feature Optimization
  - Parameter Variation
  - Adjustment of Built-In Resistance
  - Optimization of Fan Speed
- Conclusion

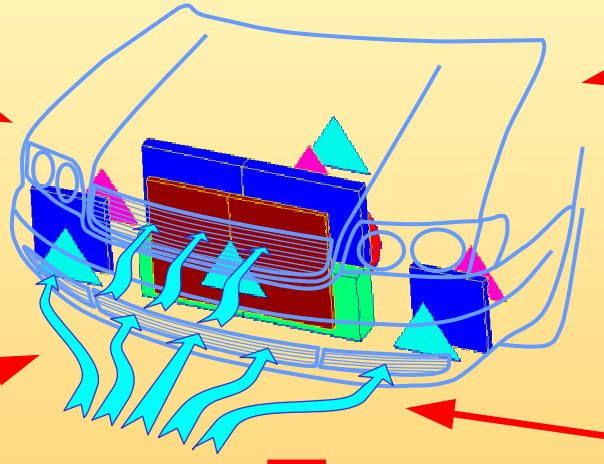
KULI State of the Art

Influence on a cooling system

Fan Stages

Geometry

Driving Speed



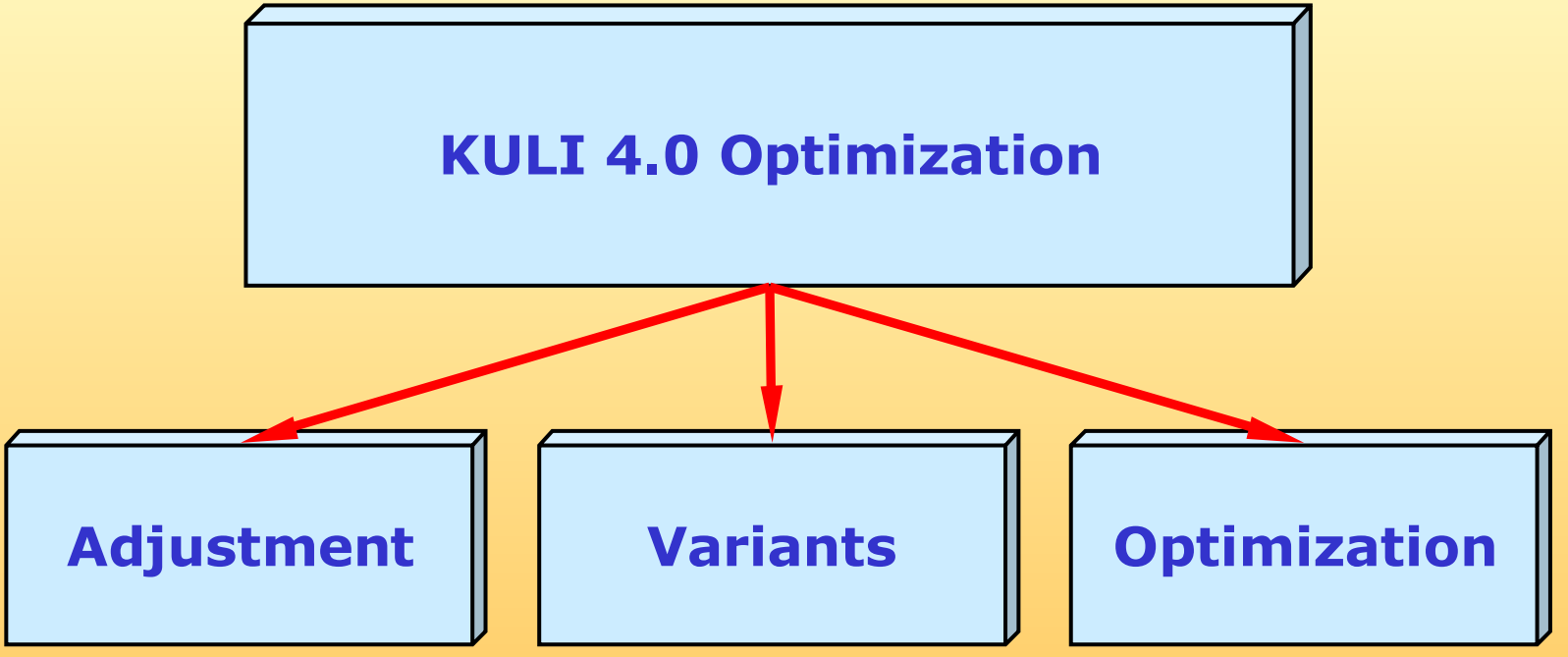
Component Types

Fan Speed

Ambient Parameters

Different Cooling System Models

KULI New Features

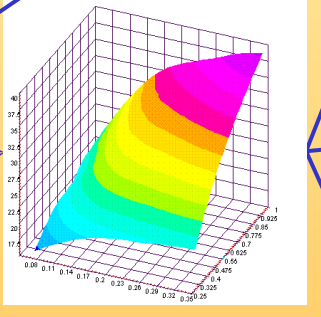


What to Do with the Optimization

- Parameter Variation
  - Parameter Studies
  - Comparison of Component Types
  - Influence of Ambient Conditions
- Adjustment of BiR
  - Faster Build Up of Cooling System Models
- Optimization of Fan Speed
  - Fan Speed depending on Demands

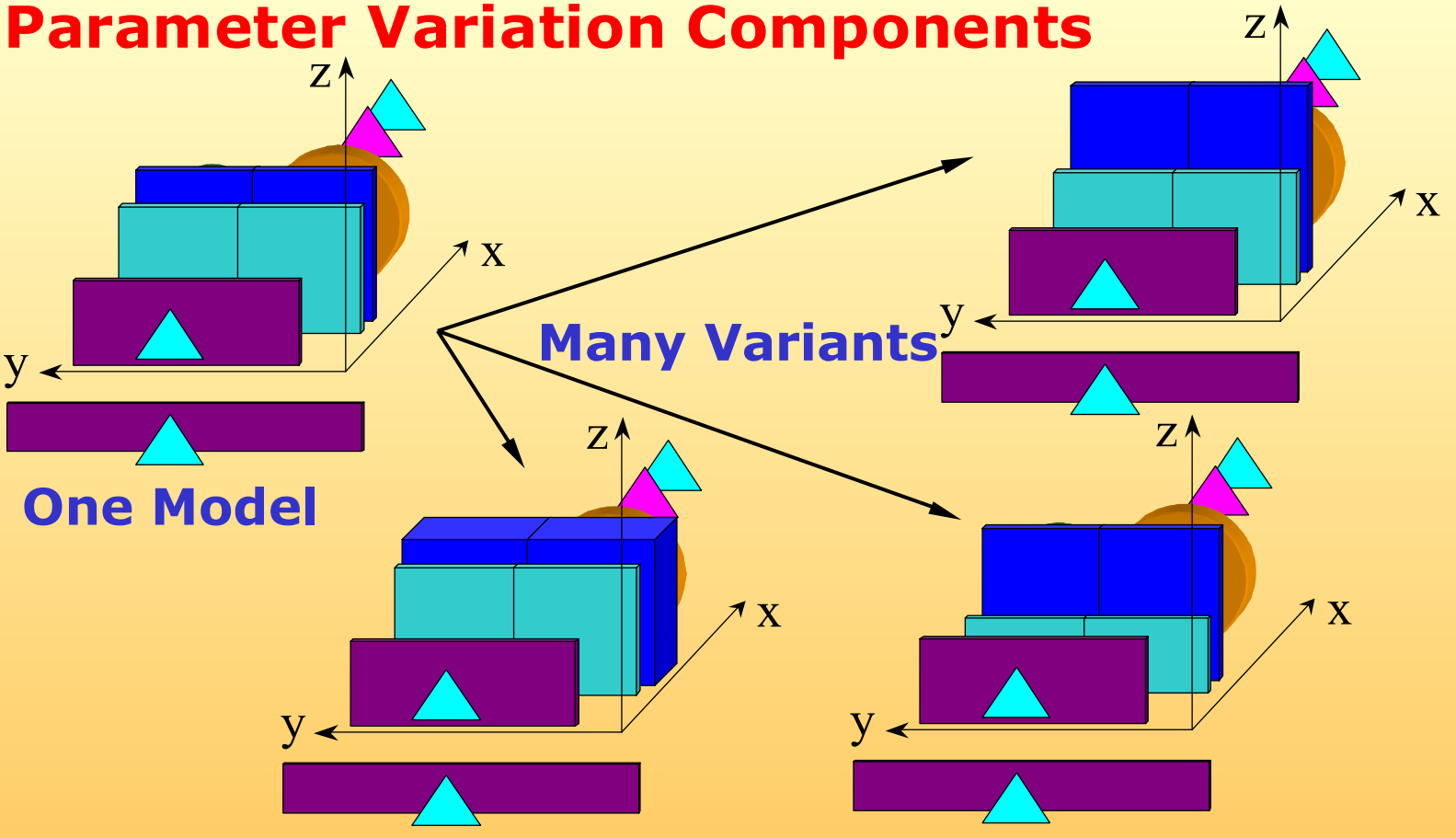
Parameter Variation General Data

- Surrounding Temperature
- Ambient Pressure
- Rel. Moisture Content of Air
- Warm Up Temperature
- Engine Speed
- Engine Load
- Driving Speed



- Speed of mechanically driven Fan
- Temperature Input
- Flow Rate
- Heat Input

Parameter Variation Components

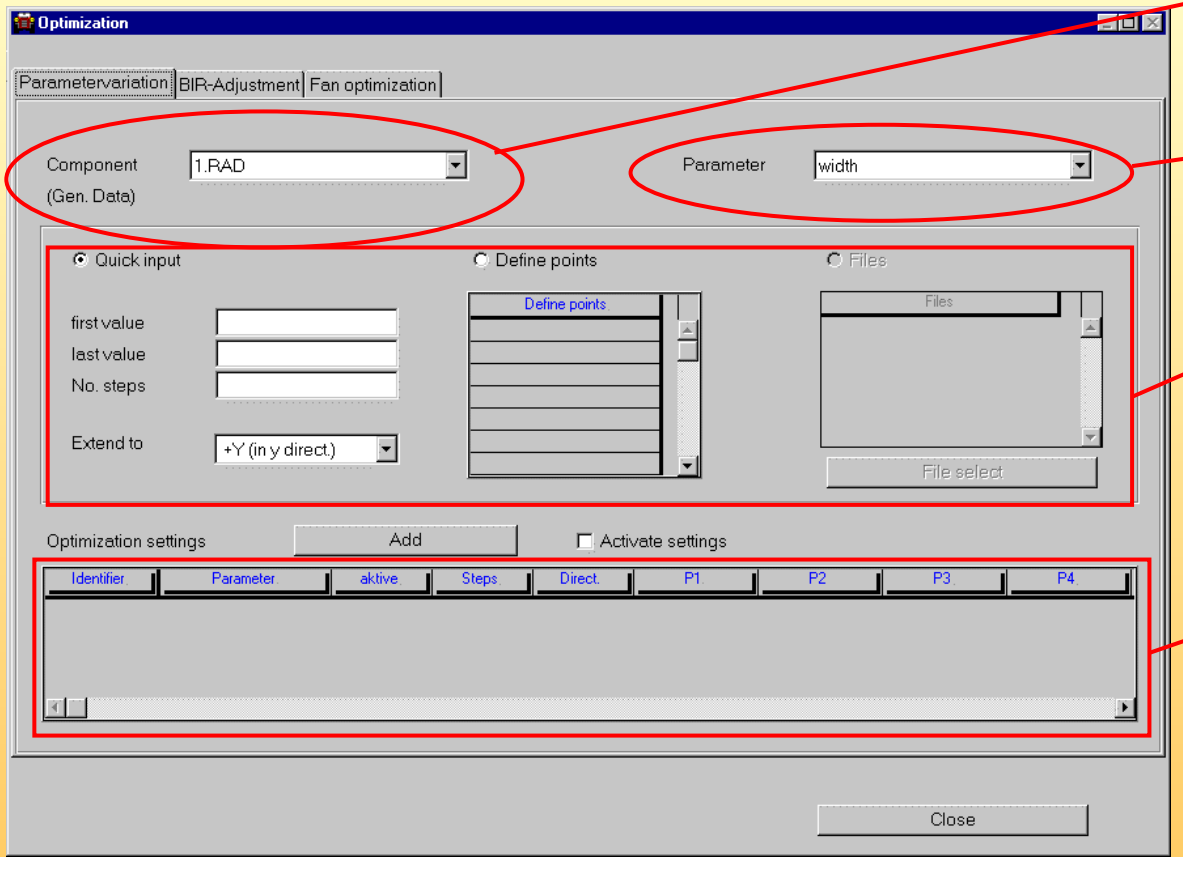


Parameter Variation Components

Cross Flow Heat Exchangers	Height
	Width
	Component
Mechanically driven Fan	Diameter
	Component
Electrically driven Fan	Diameter
	E-Fan Stages
	Component

Parameter Variation Components

Parameter Variation



Component or General Data

Type of Parameter

Definition of Parameter Values

List of defined Variations

What to Do with the Optimization

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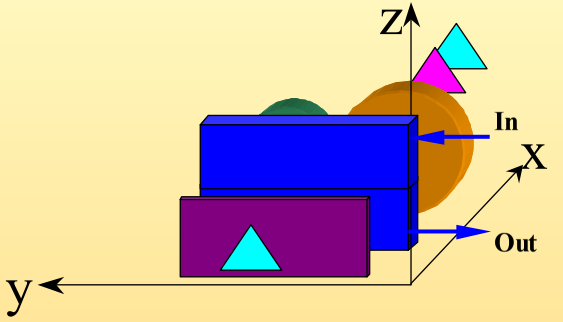
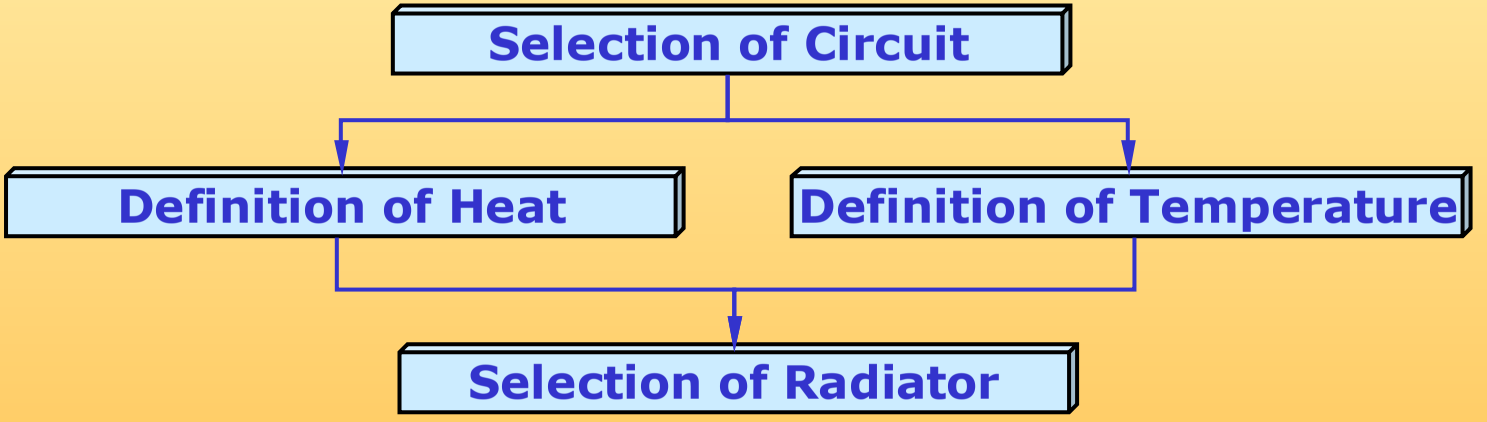
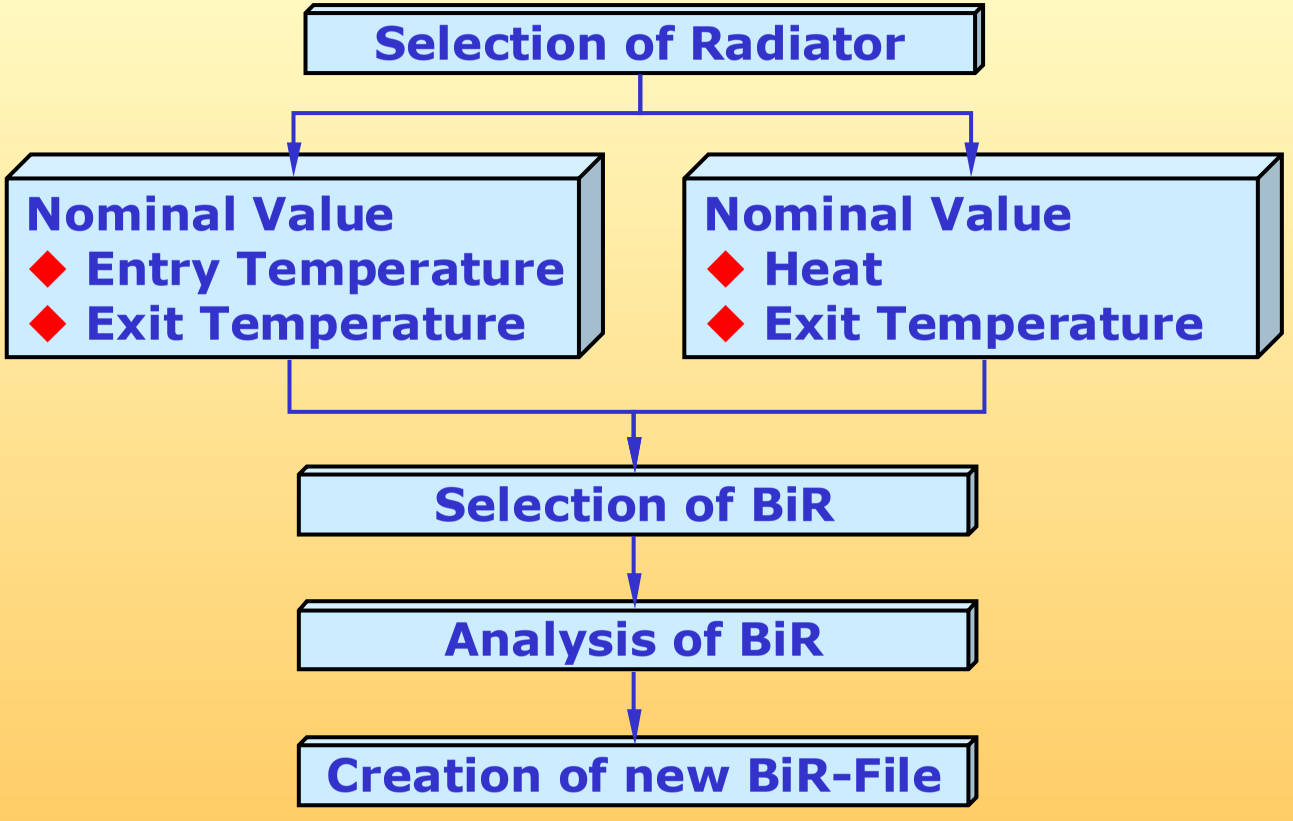
Adjustment of Built-In Resistance

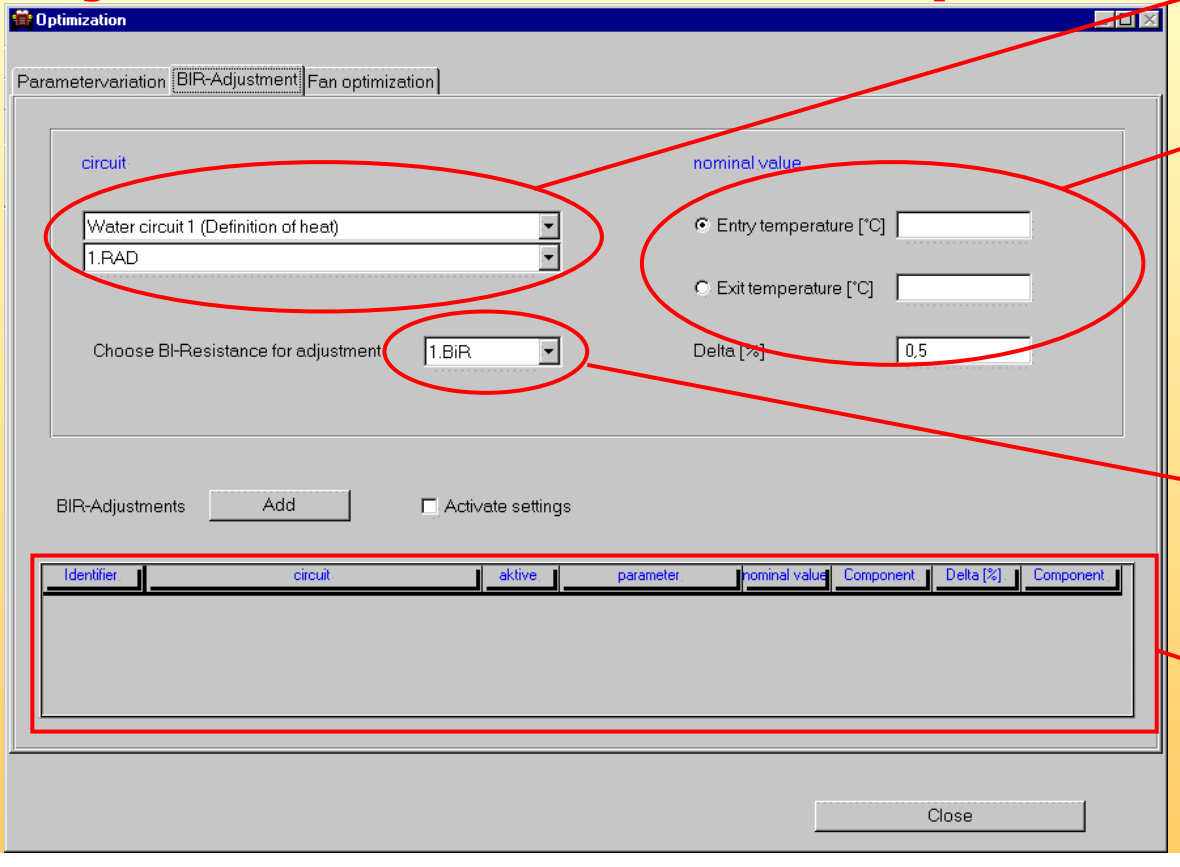




Adjustment of Built-In Resistance



Adjustment of BiR Heat Input



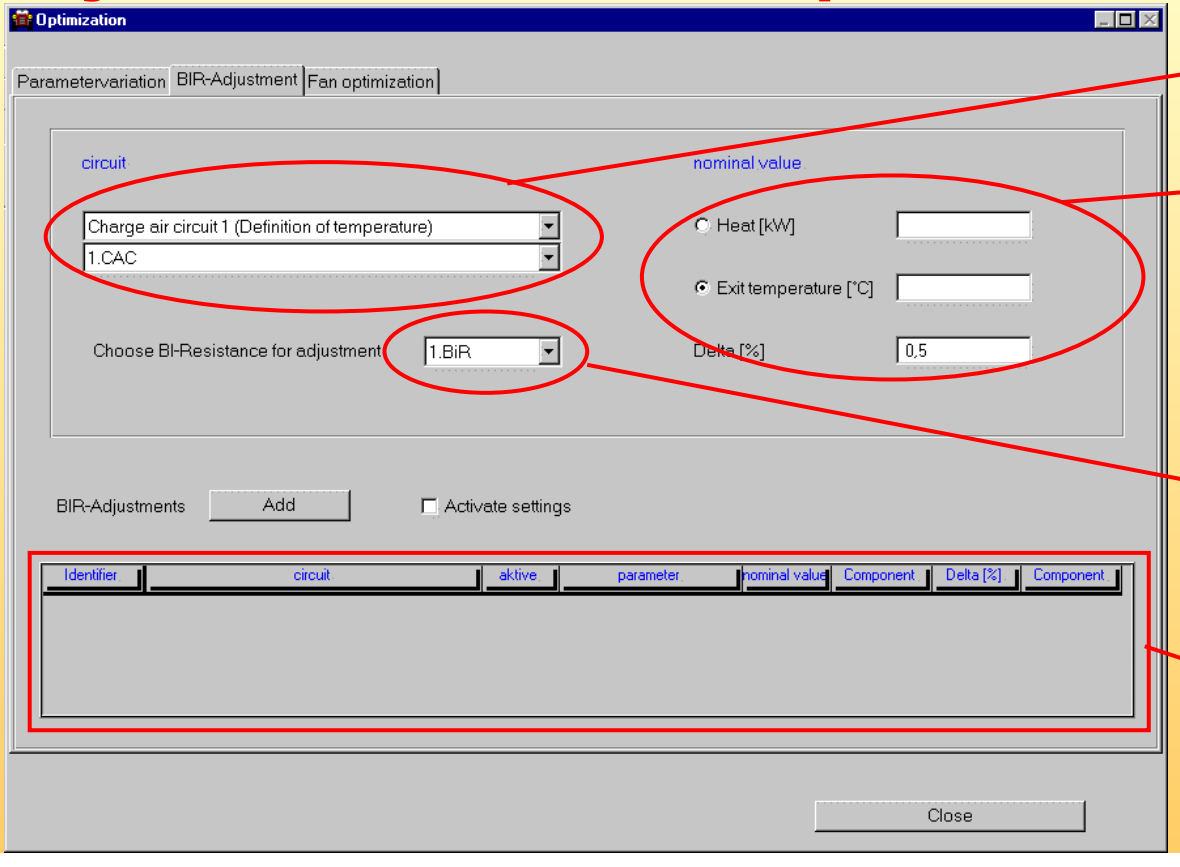
Circuit and Radiator

Nominal Value

Selection BiR

List of defined Adjustments

Adjustment of BiR Temperature Input



Circuit and Radiator

Nominal Value

Selection BiR

List of defined Adjustments

What to Do with the Optimization

- Parameter Variation
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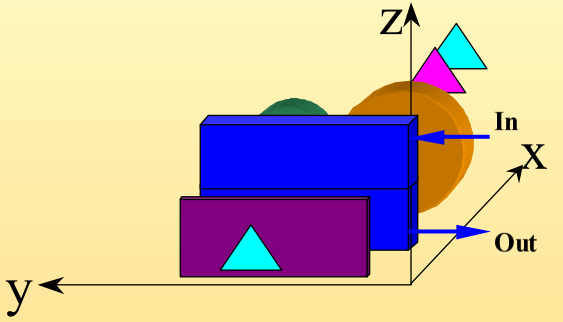
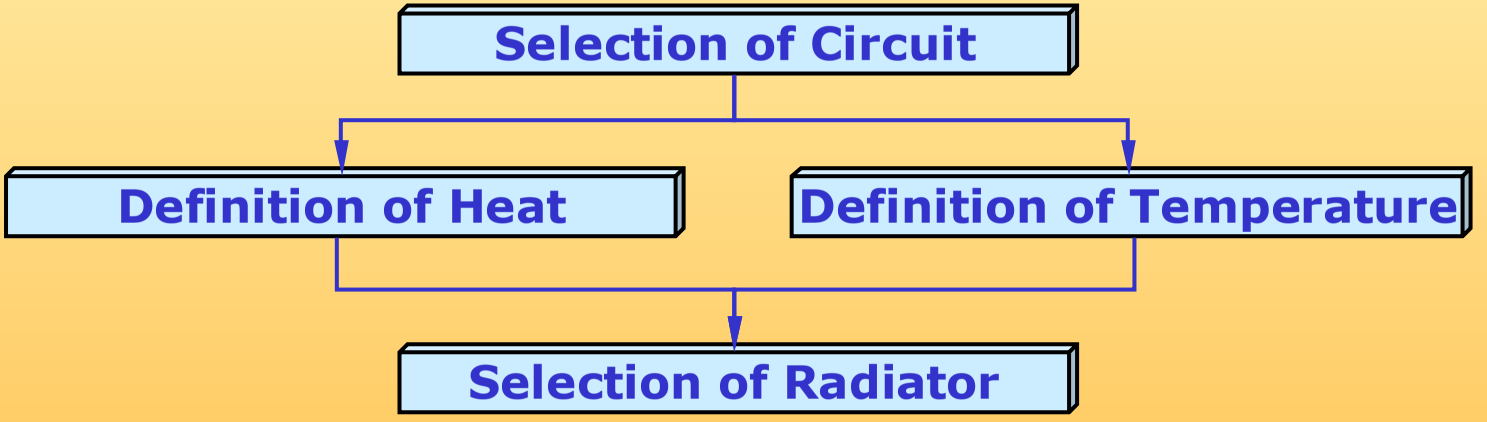
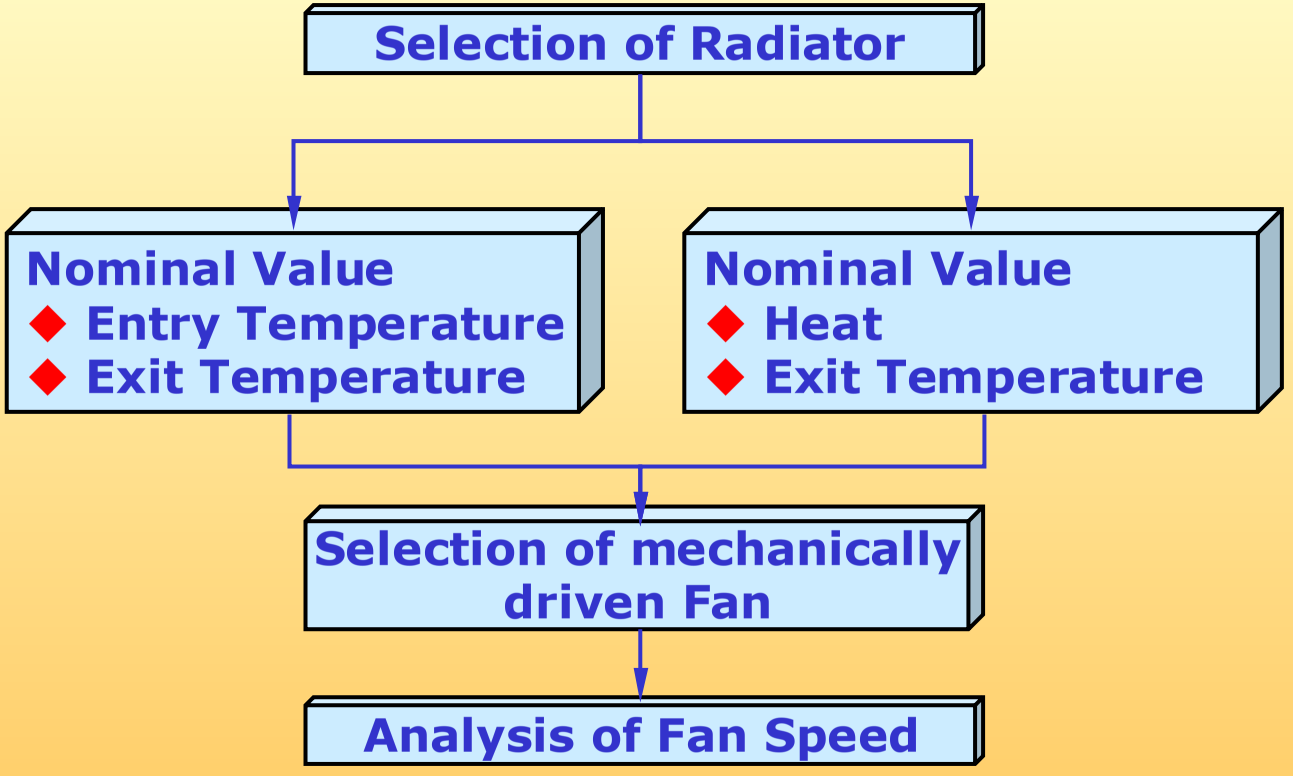
Optimization of Fan Speed

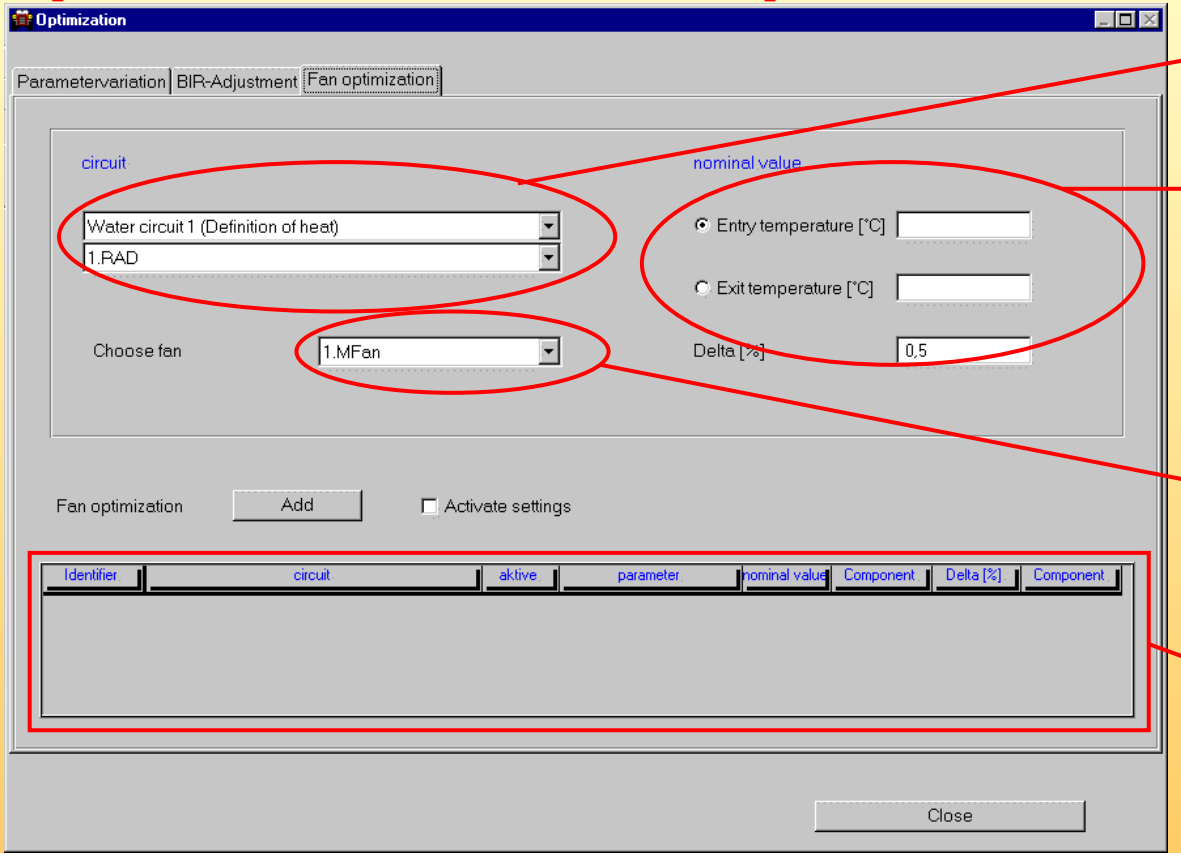




Optimization of Fan Speed



Optimization of Fan Speed Heat Input



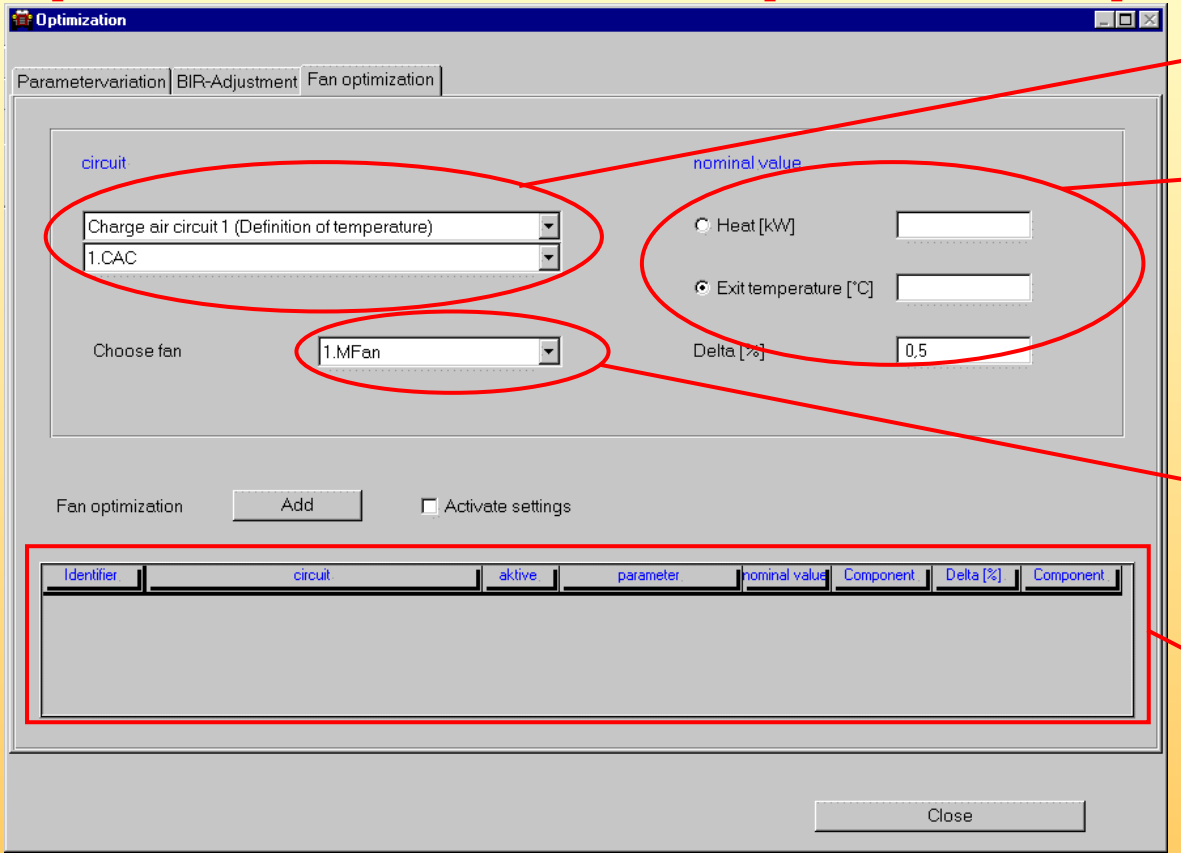
Circuit and Radiator

Nominal Value

Selection MFan

List of defined Fan Optimization

Optimization of Fan Speed Temp. Input



Circuit and Radiator

Nominal Value

Selection MFan

List of defined Fan Optimization

Conclusion

- Reducing the Time for Model Equalization
- Only one Model for Parameter Studies
- Less Time for Model Creation
- Reducing the Time of Analysis
- Quick Comparison of different Component Types
- Easy Consideration of Ambient Influences
- Making Influences of System Changes clearer