IT Cooling Solutions
В свете быстро растущей популярности и спроса на модульные ЦОД мы бы хотели представить системы и решения для их охлаждения. Компания STULZ имеет богатый опыт оснащения модульных ЦОД системами кондиционирования воздуха и теплоотвода и может предложить полный набор соответствующего оборудования, как для установки внутри самого контейнера, так и для монтажа снаружи по принципу «add-on».

„Reliable STULZ solutions for modular DC cooling“

«НАДЕЖНЫЕ РЕШЕНИЯ STULZ ДЛЯ ОХЛАЖДЕНИЯ МОДУЛЬНЫХ ЦОД»

A presentation by Thomas Steinberg, STULZ GmbH
Structure

- Forecasts MDC
- „normal“ DC vs. Modular DC
- Different types of MDC
- Heat-Loads & Densities
- STULZ Solutions for MDC
- Success-stories
Forecasts MDC

- Modular Datacenters Market is expected to reach $40.41 billion by 2018 at a CAGR (compound annual growth rate) of 37.41% from 2013 to 2018.

Forecasts MDC

- Modular solutions % increase/decrease in uptake into 2013

Source: http://www.datacenterdynamics.com/focus/archive/2013/01/dcd-industry-census-growth-2013
Forecasts MDC

- Increase of investment in Modular Data Center technologies from 2011 - 2013

New build traditional DC vs. Modular DC

http://www.youtube.com/watch?v=7NzZ_lBEK6I
New build traditional DC vs. Modular DC

Sources: IBM
# New build traditional DC vs. Modular DC

<table>
<thead>
<tr>
<th></th>
<th>Traditional DC</th>
<th>Modular DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment time</td>
<td>&gt; 6 months (brick building)</td>
<td>3-4 months</td>
</tr>
<tr>
<td>Flexibility</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Availability</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Reliability</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Efficiency</td>
<td>High (day 1 scenario)</td>
<td>High</td>
</tr>
<tr>
<td>Green-IT</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Day 1 CAPEX</td>
<td>High</td>
<td>Lower / pay as you grow</td>
</tr>
<tr>
<td>Scalability</td>
<td>Low / space</td>
<td>High / new modules</td>
</tr>
<tr>
<td>Local Know-How needed</td>
<td>High</td>
<td>Low / only for non-prefittable solutions</td>
</tr>
<tr>
<td>Quality control</td>
<td>Complex</td>
<td>Simple</td>
</tr>
<tr>
<td>Portability</td>
<td>No</td>
<td>possible</td>
</tr>
</tbody>
</table>
Different types of MDC

- Containerized
  - Whole DC in one container
  - One container for each part of the DC
    - Server & Cooling Container
    - UPS Container
    - GenSet Container, etc.
    - Up to 12-16 racks in 1 container

STULZ IT Cooling Solutions

Outdoor Container and Air Handler

Telecom

Chiller

Indoor Cooling

High Density Cooling
Different types of MDC

- Modular
  - Several modules put together to create a white space
  - Theoretically unlimited possibilities in easy extension of the DC
Heat-Loads & Densities

- Low / medium density < 7kW / Rack
- High density 7-15kW / Rack
- Very high density > 15kW / Rack
Computer room / Small data centers
1 – 10 cabinets

Medium data centers
10 – 100 cabinets

Large data centers
100 – 500 cabinets

Mega data centers
> 500 cabinets

Heat-Loads & Densities
STULZ Solutions for MDC

- Container
  - Low-density: Telecom-Line or MiniSpace
  - Medium Density: Split-Air or CyberRow
  - High Density: CyberCon

- Modular
  - Low-density: CyberAir
  - Medium density: CyberAir or CyberRow
  - High density: CyberHandler/CyberCon/CyberAir
COOLING SOLUTIONS FOR
CONTAINERIZED DATA CENTERS
STULZ Solutions for Container

Low-Density

- Tel-Air (indoor)
  - Packaged unit – integrated condenser
  - Energy efficient – integrated FC
  - Capacity 4,5 – 12,5 kW
  - Emergency ventilation @ 48VDC
  - ... and many more!

![Installation example]

<table>
<thead>
<tr>
<th>TLF/TLD</th>
<th>TLF/TLD40</th>
<th>TLF/TLD60</th>
<th>TLF/TLD80</th>
<th>TLF/TLD90</th>
<th>TLF/TLD2</th>
<th>TLF/TLD4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipo di unità</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
</tr>
<tr>
<td>Potenza frigorifera totale ($^\text{1}$)</td>
<td>4,5</td>
<td>6,0</td>
<td>8,3</td>
<td>9,2</td>
<td>11,0</td>
<td>12,5</td>
</tr>
<tr>
<td>Potenza frigorifera sensibile ($^\text{2}$)</td>
<td>4,5</td>
<td>6,0</td>
<td>8,3</td>
<td>9,2</td>
<td>11,0</td>
<td>12,5</td>
</tr>
<tr>
<td>Livello pressione sonora (interno/esterno) ($^\text{3}$)</td>
<td>53/64</td>
<td>55/64</td>
<td>61/64</td>
<td>62/67</td>
<td>63/67</td>
<td>63/67</td>
</tr>
<tr>
<td>Portata aria (DX)</td>
<td>1,000</td>
<td>1,500</td>
<td>2,000</td>
<td>2,200</td>
<td>3,000</td>
<td>3,200</td>
</tr>
<tr>
<td>Portata aria (free cooling)</td>
<td>800</td>
<td>1,200</td>
<td>1,600</td>
<td>1,800</td>
<td>2,400</td>
<td>2,600</td>
</tr>
<tr>
<td>Capacità riscaldamento max.</td>
<td>1,5</td>
<td>1,5</td>
<td>4,5</td>
<td>4,5</td>
<td>4,5</td>
<td>4,5</td>
</tr>
<tr>
<td>Altezza</td>
<td>1,990</td>
<td>1,990</td>
<td>1,990</td>
<td>1,990</td>
<td>1,990</td>
<td>1,990</td>
</tr>
<tr>
<td>Larghezza</td>
<td>600</td>
<td>600</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
</tr>
<tr>
<td>Profondità</td>
<td>650</td>
<td>650</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Peso</td>
<td>170</td>
<td>190</td>
<td>250</td>
<td>260</td>
<td>270</td>
<td>280</td>
</tr>
</tbody>
</table>

$^1$ Condizioni di funzionamento: Temperatura interna 30°C/umidità relativa interna 30% / temperatura esterna 35°C
$^2$ 400V/3P/YN/S0/Nz + 48 V c.c.
$^3$ Ad una distanza di 2 m, in condizioni di campo libero
STULZ Solutions for Container

Low-Density

- Wall-Air (outdoor)
  - Packaged unit – integrated condenser
  - Energy efficient – integrated FC
  - Capacity 4 – 16 kW
  - Emergency ventilation @ 48VDC
  - Anti vandalism screws
  - ... and many more!

### Wall-Air Displacement

<table>
<thead>
<tr>
<th>Model</th>
<th>WDE40</th>
<th>WDE60</th>
<th>WDE80</th>
<th>WDEA0</th>
<th>WDEA2</th>
<th>WDEA4</th>
<th>WDEA6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cooling capacity (^{1,2})</td>
<td>kW</td>
<td>4.3</td>
<td>6.1</td>
<td>8.0</td>
<td>10.0</td>
<td>12.0</td>
<td>13.9</td>
</tr>
<tr>
<td>External sound pressure level (^3)</td>
<td>dB(A)</td>
<td>50</td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>58</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>170</td>
<td>200</td>
<td>200</td>
<td>240</td>
<td>240</td>
<td>250</td>
</tr>
<tr>
<td>Height (including condenser fan)</td>
<td>mm</td>
<td>2,085</td>
<td>2,085</td>
<td>2,085</td>
<td>2,226</td>
<td>2,226</td>
<td>2,226</td>
</tr>
<tr>
<td>Width</td>
<td>mm</td>
<td>879</td>
<td>879</td>
<td>879</td>
<td>992</td>
<td>992</td>
<td>992</td>
</tr>
<tr>
<td>Depth</td>
<td>mm</td>
<td>565</td>
<td>565</td>
<td>565</td>
<td>730</td>
<td>730</td>
<td>730</td>
</tr>
<tr>
<td>Air flow in cooling mode</td>
<td>m³/h</td>
<td>1,100</td>
<td>1,700</td>
<td>2,700</td>
<td>2,400</td>
<td>2,800</td>
<td>3,600</td>
</tr>
<tr>
<td>Air flow in free cooling mode</td>
<td>m³/h</td>
<td>900</td>
<td>1,300</td>
<td>1,800</td>
<td>2,500</td>
<td>2,500</td>
<td>3,000</td>
</tr>
</tbody>
</table>

\(^1\) Outside temperature 35°C/inside temperature 30°C/rel. humidity 30%
\(^2\) 400V/3Ph/N/50Hz (Plus) 48V DC
\(^3\) Measured at 2m distance, free field
STULZ Solutions for Container

Medium-Density

- Split-Air LN (LowNoise)
  - Energy efficient – integrated FC
  - Capacity 4 – 11 kW
  - Lower footprint – due to roof-mounting
  - Emergency ventilation @ 48VDC
  - ... and many more!

### Split-Air Low Noise

<table>
<thead>
<tr>
<th></th>
<th>CSL40</th>
<th>CSL60</th>
<th>CSL80</th>
<th>CSL90</th>
<th>CLS A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total/sensitive cooling capacity (°C/°C) kW</td>
<td>3.4/3.4</td>
<td>5.2/4.8</td>
<td>6.5/6.4</td>
<td>9.2/9.0</td>
<td>11.1/10.9</td>
</tr>
<tr>
<td>Total/sensitive cooling capacity (°C/°C) kW</td>
<td>3.8/2.8</td>
<td>5.2/4.8</td>
<td>6.5/6.4</td>
<td>9.2/9.0</td>
<td>11.1/10.9</td>
</tr>
<tr>
<td>Air flow (compressor operation/free cooling) m³/h</td>
<td>1000/900</td>
<td>1200/1100</td>
<td>1700/1500</td>
<td>2300/2100</td>
<td>3000/2700</td>
</tr>
<tr>
<td>Heating °C</td>
<td>1.5</td>
<td>1.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Sound level (interior/exterior) dBA</td>
<td>60/43</td>
<td>62/43</td>
<td>59/43</td>
<td>62/46</td>
<td>64/51</td>
</tr>
<tr>
<td>Height/width/depth (indoor unit) mm</td>
<td>310/856/1050</td>
<td>310/856/1050</td>
<td>375/956/1300</td>
<td>375/956/1300</td>
<td>375/956/1300</td>
</tr>
<tr>
<td>Height/width/depth (outdoor unit) mm</td>
<td>578/906/400</td>
<td>641/1052/454</td>
<td>641/1052/454</td>
<td>1386/1052/454</td>
<td>1386/1052/454</td>
</tr>
<tr>
<td>Weight (indoor unit) kg</td>
<td>70</td>
<td>70</td>
<td>90</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Weight (outdoor unit) kg</td>
<td>60</td>
<td>80</td>
<td>80</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>Supply voltage V/Ph/Hz</td>
<td>230/1/50 / 400/3/50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Conditions: Inside temperature 25 °C / rel. humidity 40 % / outside temperature 35 °C
* 2 m clear distance
* Optional

20
STULZ Solutions for Container

Medium-Density

- CyberRow
  - „deliver the air where it’s needed“
  - cold curtain in front of the racks
  - Indirect free cooling
  - Capacity 20 – 56kW
  - 3 sizes: 300/400/600mm
  - 4 cooling systems: A/CW/G/GE
  - Independently controlled fans
  - Huge variety of options
STULZ Solutions for Container

High-Density

- CyberCon
  - Packaged cooling container
  - More space in the IT-container
  - High density
  - Integrated FC
  - adiabatic

### STULZ CyberCon DX

<table>
<thead>
<tr>
<th>kW</th>
<th>219</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBH</td>
<td>747</td>
</tr>
<tr>
<td>Tons</td>
<td>62</td>
</tr>
<tr>
<td>m³/h</td>
<td>39,077</td>
</tr>
</tbody>
</table>

Capacity data based on 105°F (40.6°C)db / 72.8°F(22.7°C) wb – *For Reference Only* – Built designs are driven by customer specification.
Integrated Exhaust Air

- Exhaust Damper
- Adiabatic Cooler
- Fan Box
- Return Air Duct
- Condenser Section
- Mixing Chamber
- Exhaust Air Path
COOLING SOLUTIONS FOR MODULAR DATACENTERS
STULZ Solutions for Modular DC

Low-Density

- **MiniSpace**
  - small footprint
  - 3 cooling systems A/CW/G
  - EC-Fan technology
  - Front service
  - Up-/Down- & Front-flow
  - Direct FC possible

- 2 sizes for varying cooling capacities
  - 600x600mm: 5 – 15kW
  - 1000x850mm: 18 – 25KW
STULZ Solutions for Modular DC

Medium-Density

- **CyberRow**
  - „deliver the air where it’s needed“
  - cold curtain in front of the racks
  - Indirect free cooling
  - Capacity 20 – 56kW
  - 3 sizes: 300/400/600mm
  - 4 cooling systems: A/CW/G/GE
  - Independently controlled fans
  - Huge variety of options
STULZ Solutions for Modular DC

Medium-Density

- CyberAir3
  - Latest EC-Fan technology
  - EC-compressor
  - Highest optionality
  - 7 cooling systems
  - Indirect & direct FC
  - Cooling capacity 20 – 240kW
  - ... and many more!
CyberAir 3
Cooling Systems

A System
G System
GE System
Indirect Free Cooling
ACW System

CW System
CW2 System
GCW System
CyberHandler

» Scalable frame & std section provide a modular design
» Installed on top of / next to a building
» Latest EC-fan technology
» Cooling capacities 50 – 530kW
» Superior corrosion protection due to aluminium
STULZ SUCCESS - STORIES
Success – Story: IBM PMDC

- UK, Midlands
- A car manufacturer in England
- STULZ units: CW units & indoor chiller
- Cooling capacity: approx. 400kW in a single container
Success – Story: Flexenclosure

- Cote d’Ivoire
- Telecom Provider MTN
- STULZ units: DX
- Cooling capacity: ~500kW

Success – Story: Gazprom

- 13 several sites in Russia (remote areas)
- Gazprom
- STULZ units: CyberRow AS
- Cooling capacity: ~75kW
Test Center
Witness tests for customers—Ensuring high availability and creating transparency

Cape Town, Sao Paulo, Paris, Moscow, London, Shanghai, Dubai, Frankfurt – wherever you are planning your data centre, we are there for you. When you perform a witness test at STULZ, we simulate your conditions live in our climatic chambers, and take account of your requirements and influencing variables down to the last detail.
For any questions please contact:

Санкт-Петербург,
18-ая линия, В.О., д. 31, лит. З
Тел. : (812) 363 11 93
Факс: (812) 363 11 94
spb@h-ts.ru

Москва,
ул. Стромынка, д.4, корп.1
Тел./факс : (495) 661 75 74
msk@h-ts.ru