Submitted in fulfilment of part of the requirements for the degree of MProf(ARCH) in the faculty of Engineering, the Built Environment and Information Technology, University of Pretoria, Pretoria, South Africa.

Mentor: Professor H.W. Wegelin

November 2004
The theme of this design discourse is to establish a centre for industrial and product design in Pretoria, by making use of an under-utilised site in the south western quadrant of Pretoria's CBD. This attempts to add to the urban domain and renewal of the specified area in the city.

Industrial and product design is currently being supported by government and the Council for Scientific and Industrial Research. Plans to extend the current training facilities are in place and Pretoria will need such a centre in the near future. This centre is created with traders in mind that have limited funds. The centre caters for individuals who wish to learn about design and manufacture through short courses that are offered at the facility. In addition, an official under-graduate programme is offered as well as postgraduate courses.

The centre forms part of the Museum Park precinct and contributes to the existing art and cultural activities that are part of the precinct.
Contents:

001 Building Conception
   001 Client 01
   002 Building accommodation 01

002 Introduction
   002 Aim 04
   003 Site 07
   004 Choice for site 09
   005 Architectural objectives 10
   006 Design theory and development study 10
   007 Product development school 10
   008 Learning in an industrial/product design school 10
   009 Design aim 11
   010 Industrial design training and awareness 11

003 Baseline document
   003 Global 13
   004 Local (South Africa) 13
   005 Local Economy 14
   006 Industrial Collaboration 15
   007 Economic Benefits 15
   008 Social impact 15
   009 Environmental impact 16
   010 Water 16
   011 Energy 17
   012 Site 17
   013 Economic factors 18

004 Urban context 20

005 Site context
   005 Form and Space 24
   006 Flow of energy 25
   007 Space 26
   008 Articulation 27
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>#000</td>
<td>Conclusion</td>
<td>29</td>
</tr>
<tr>
<td>#006</td>
<td>Precedents</td>
<td>30</td>
</tr>
<tr>
<td>#007</td>
<td>Design approach</td>
<td>35</td>
</tr>
<tr>
<td>#008</td>
<td>Design decisions</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Envelope of building</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Suspended studios</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Precinct considerations</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Courtyard</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Circulation</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Exhibition pods</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Auditorium design</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Design studio interior</td>
<td>50</td>
</tr>
<tr>
<td>#009</td>
<td>Design resolution</td>
<td>51</td>
</tr>
<tr>
<td>#010</td>
<td>Technical evolution</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Main structure</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Exhibition pod structure</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Eastern circulation space</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Hydraulic lift shaft</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Studio interior spaces</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Northern façade sun-shade device</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Environmental performance</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Thermal performance</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Mechanical ventilation</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Skin design</td>
<td>78</td>
</tr>
<tr>
<td>#011</td>
<td>Technical drawings</td>
<td>82</td>
</tr>
<tr>
<td>#012</td>
<td>Design resultant</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>Urban response</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Industrial design approach</td>
<td>96</td>
</tr>
<tr>
<td>#013</td>
<td>List of figures</td>
<td>97</td>
</tr>
<tr>
<td>#014</td>
<td>Sources</td>
<td>101</td>
</tr>
</tbody>
</table>
013

List of Figures:

001 Building requirements:
- Fig 1: Development concept sketches
- Fig 2: Exploration concepts

002 Introduction:
- Fig 1: Concept sketch of design centre
- Fig 2: Collaboration image with pencil sketch and Isuzu Zen concept sketch
- Fig 3: Jaguar XJ220 (Fiell, 1998. pg 274)
- Fig 4: Image of Africa (Adobe Photoshop electronic sample image)
- Fig 5: Locality map of Pretoria (www.mapstudio.co.za)
- Fig 6: Aerial sketch of precinct
- Fig 7: Aerial photograph (Geosciences dept. Tshwane electronic database, University of Pretoria)
- Fig 8: Aerial photograph (Geosciences dept. Tshwane electronic database, University of Pretoria)
- Fig 9: Aerial sketch of precinct

003 Baseline document:
- Fig 1: DesigNation website image (www.designation.co.za)

004 Urban context:
- Fig 1: Aerial photograph (Geosciences dept. Tshwane electronic database, University of Pretoria)
- Fig 2: Aerial sketch of precinct
- Fig 3: Aerial sketch of precinct
- Fig 4: Ground-figure study

005 Site context:
- Fig 1: Photo of City Hall from site
- Fig 2: Photo of site from fire station
- Fig 3: Panoramic of Minnaar Street and Bosman street intersection from site
- Fig 4: Aerial photograph (Geosciences dept. Tshwane electronic database, University of Pretoria)
- Fig 5: Photo towards site from City Hall gardens
013
- Fig 6: Photo of NZASM building from site
- Fig 7: Pedestrian space on northern side of Minnaar Street towards Bosman Street
- Fig 8: Pedestrian paving on western edge of site
- Fig 9: NZASM building
- Fig 10: Cooperation Buildings to the south of site
- Fig 11: View of City Hall from gardens
- Fig 12: Pedestrian space on Northern side of Minnaar Street towards Paul Kruger Street
- Fig 13: Fire brigade building on western side of site across Bosman Street

006 Precedents:
- Fig 1: Museum of Rock Art (Cerver, 2000. pg 296)
- Fig 2: Dept. Geosciences (Cerver, 2000. pg 339)
- Fig 3: Dept. Geosciences (Cerver, 2000. pg 338)
- Fig 4: Utrecht School of Design and Fashion (Cerver, 2000. pg 324
- Fig 5: Wozocos (Cerver, 2000. pg 850-1)

007 Design Approach:
- Fig 1: GM Autonomy (Newbury, 2002. pg 79)
- Fig 2: Alfa Romeo Kamal (Newbury, 2003. pg 24)
- Fig 3: Isuzu Zen concept (Newbury, 2002. pg 107)
- Fig 4: Renault Talisman (Newbury, 2002. pg 217)
- Fig 5: Perspective sketch of building design
- Fig 6: Comparing the building to the Honda Unibox (Newbury, 2002. pg 88)

008 Design decisions:
- Fig 1: Aerial sketch of precinct
- Fig 2: Urban response diagrams
- Fig 3: Urban design concepts
- Fig 4: Progress of building form
- Fig 5: Concept sketch of building
- Fig 6: Sketch of building elevation
- Fig 7: 3D rendering of building model
- Fig 8: Aerial sketch of precinct
- Fig 9: Perspective sketch of City Hall precinct
013

- Fig 10: Panoramic of City Hall precinct from Transvaal Museum
- Fig 11: Old railway building existing on site
- Fig 12: 3D rendering of internal courtyard concept
- Fig 13: Interior sketch of eastern circulation wing
- Fig 14: Sketch of exposition pods from outside
- Fig 15: View of fire brigade on western side of Bosman Street
- Fig 16: Sketch of western façade concept
- Fig 17: Sketch of internal courtyard from eastern circulation wing
- Fig 18: Sketch of entrance into studio spaces
- Fig 19: Interior sketch of studio design

009 Design resolution:
- Fig 1-14: Sketch development of building design
- Fig 15: 3D rendered perspective with annotations
- Fig 16: 3D rendered perspective with annotations

010 Technical evolution:
- Fig 1: 3D rendered image of concrete superstructure
- Fig 2: 3D rendered image of studio bridge structure
- Fig 3: Sketch investigation of structure
- Fig 4: 3D rendered image of steel bridge structure
- Fig 5: 3D rendered image of building composition
- Fig 6: 3D rendered image of exhibition pod structure
- Fig 7: Sketch composition of exhibition pod positioning on eastern circulation wing
- Fig 8: Detail of steel support structure for creeper system
- Fig 9: Sketch composition of hydraulic steel structure positioning on western circulation wing
- Fig 10: Interior sketch of studio design
- Fig 11: Interior 3D rendered detail for studio edge
- Fig 12: Section detail of southern edge of studios
- Fig 13: Sketch section exploration of studio louvres and balconies
- Fig 14: Sketch diagram of solar-heater system
- Fig 15: Airflow diagram of building
- Fig 16: Air movement through studio spaces
013
- Fig 17: Air-conditioner ducting system
- Fig 18: Steel support structure for eastern creeper system
- Fig 19: Eastern wing with creeper employed
- Fig 20: 3D rendered composition illustrating steel skin composition
- Fig 21: 3D rendering, illustrating the entire building composition

011 Technical drawings:

012 Design discourse:
- Fig 1: Urban design sketch
- Fig 2: Sketch of final design
- Fig 3: 3D rendered model