

Assignment Letter / *Surat Tugas*

No. AL/ARCS/1855/II/2021
 Date February 1st, 2021
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 Doc. Main Document / *Dokumen Utama*
 Type

Dena Hendriana, BSc., S.M., Sc.D,

Activity Assignment

Penugasan Kegiatan

Director of Academic Research and Community Services

Direktur Lembaga Penelitian Akademik dan Pengabdian kepada Masyarakat

In consideration of:

His appointment as Director of Academic Research and Community Services of Swiss German University under Decree nr. SK/020/HR/XI/19, dated November 18th, 2019

Mengingat:

Pengangkatannya sebagai Direktur Lembaga Penelitian Akademik dan Pengabdian kepada Masyarakat dengan SK pengangkatan no. SK/020/HR/XI/19, tertanggal 18 November 2019

Herewith gives the task to:

Name : **Dena Hendriana, BSc., S.M., Sc.D,**
 Position : **Head of Master of Mechanical Engineering Study Program**
 Employee ID : **11211528**

Dengan ini menugaskan kepada:

Name : **Dena Hendriana, BSc., S.M., Sc.D,**
 Position : **Kepala Program Studi Master Teknik Mesin**
 NIK : **11211528**

To follow the activity below:

Untuk berpartisipasi pada kegiatan berikut ini:

Nr.	Activity/ <i>Kegiatan</i>	Organizer/ <i>Penyelenggara</i>	Day & Date/ <i>Hari & Tanggal</i>	Venue/ <i>Tempat</i>
1.	Penelitian simulasi sirkulasi udara di dalam warehouse yang sangat besar bekerja sama dengan PT. LOGOS	Swiss German University	Februari – September 2021	Swiss German University The Prominence Office Tower

The appointed shall accomplish the task in responsible ways in line with the related guidelines and other regulations given by SGU.

Pihak yang bersangkutan harus melaksanakan tugas dan tanggung jawab sebaik-baiknya, sesuai dengan petunjuk dan peraturan dari SGU.

Assignor / *Pemberi Tugas:*



Kholis Abdurachim Audah , M.Sc, Ph.D

Director of Academic Research and Community Services
Direktur Lembaga Penelitian dan Pengabdian kepada Masyarakat



SWISS GERMAN UNIVERSITY

LAPORAN

**PENELITIAN SIMULASI SIRKULASI UDARA DI DALAM
WAREHOUSE YANG SANGAT BESAR
BEKERJA SAMA DENGAN PT. LOGOS**

Dena Hendriana, B.Sc., S.M., Sc.D – Team Leader
Erwin Wong (PT. LOGOS) – Team Member

MASTER OF MECHANICAL ENGINEERING

2021

Swiss German University
The Prominence Tower Alam Sutera
Jalan Jalur Sutera Barat No 15, Tangerang 15143
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Judul Penelitian	: Penelitian Simulasi Sirkulasi Udara di Dalam Warehouse yang Sangat Besar Bekerja Sama dengan PT. LOGOS
Nama Team Leader	: Dena Hendriana, B.Sc., S.M., Sc.D
Research Center/Dept.	: Master of Mechanical Engineering
E-mail	: dena.hendriana@sgu.ac.id
Mobile phone	: 081213715844
Masa program	: Februari – September 2021 (7 bulan)
Keterangan Aktifitas	: PT. LOGOS mengembangkan desain warehouse yang sedang dibangun. Mereka memerlukan informasi tentang estimasi sirkulasi udara didalam ruang warehouse, terutama ketika suhu udara panas. Thermal load datang juga dari truk yang diparkir dan dalam keadaan idle. Simulasi sirkulasi udara dilakukan dengan menggunakan software CFD OpenFOAM yang merupakan software OpenSource. Simulasi telah dilakukan untuk memprediksi suhu udara dalam ruang warehouse. Juga telah dilakukan simulasi udara untuk desain alternative konstruksi jalan akses ke tingkat 3 warehouse. Hasil simulasi memberikan konfiden kepada developer untuk meneruskan proses pembangunan warehouse. Kegiatan ini merupakan kegiatan pengabdian masyarakat dari Swiss German University yang memanfaatkan keilmuan akademik dari Komputasi Fluida untuk kebutuhan masyarakat yang disini adalah dari pihak Industri yaitu PT. LOGOS. Hasil dari penelitian ini tidak dipublikasikan dikarenakan kerahasiaan dari produk PT. LOGOS.

Alam Sutera, Tangerang

Date: September 2021



Dena Hendriana, B.Sc., S.M., Sc.D

NIK: 11211528

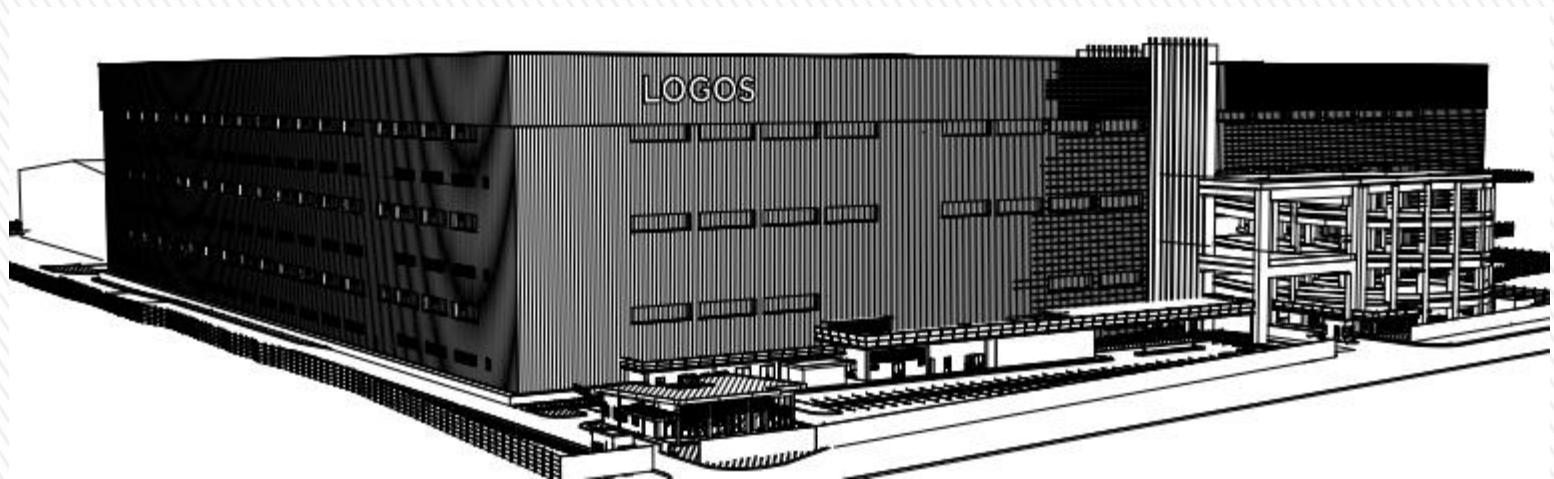
Progress Report



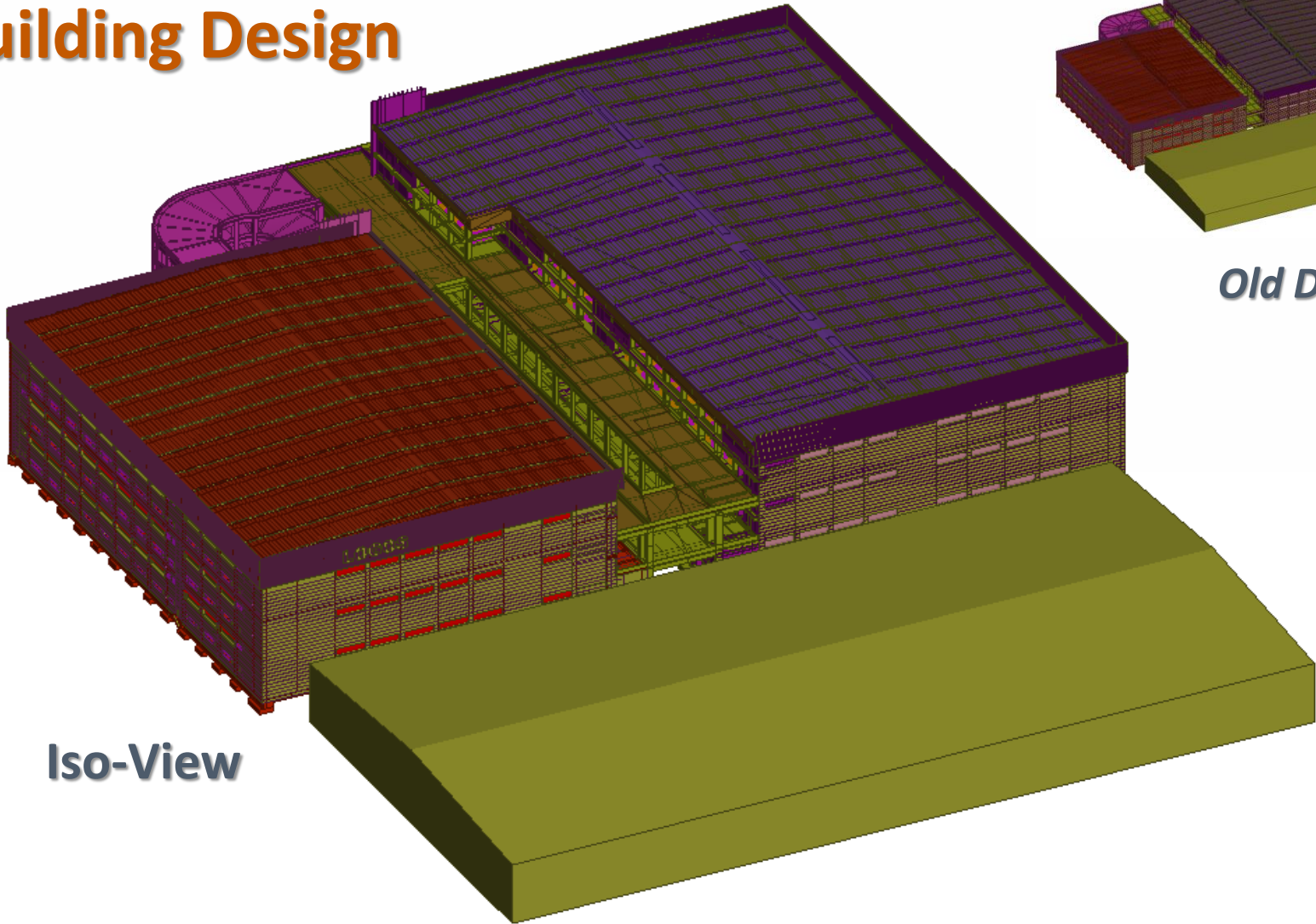
27 September 2021

To: **Mr. Tony Elie – Director**
Mr. Erwin Wong – Development Manager
LOGOS

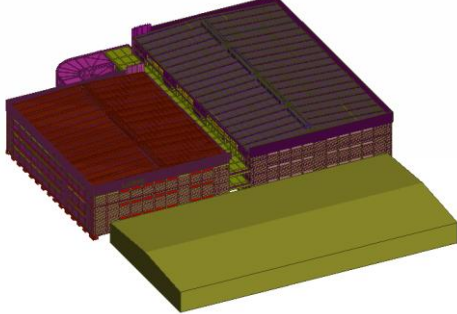
By Dr. Dena Hendriana
Researcher at CCFD



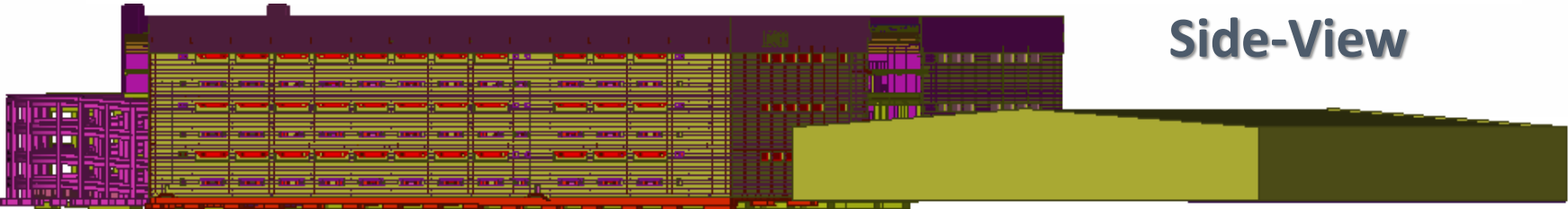
Building Design



Iso-View

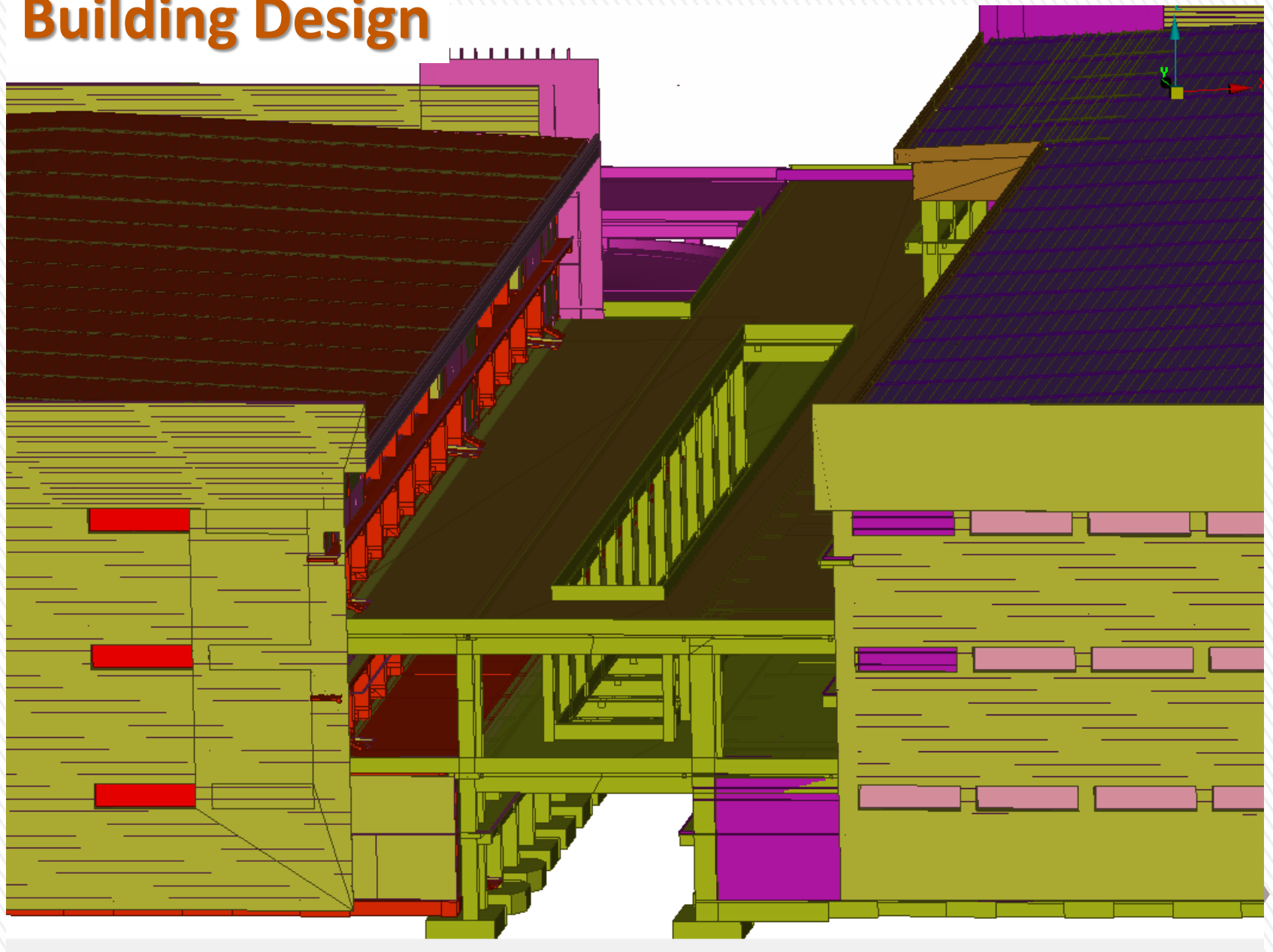


Old Design



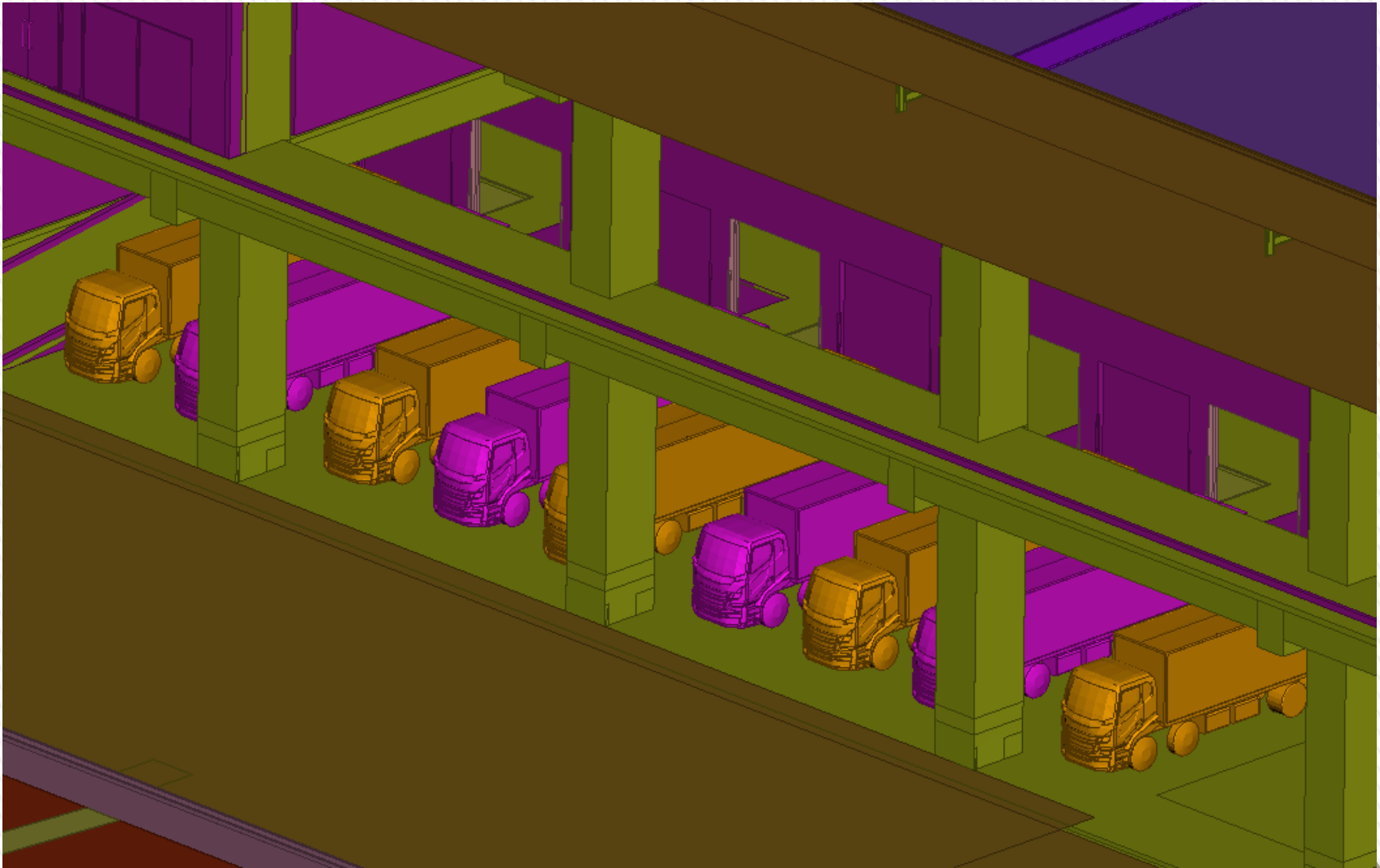
Side-View

Building Design



Driveway (1st, 2nd, 3rd level)

Building Design



***Full Truck Capacity in Loading Area
50% Truck On and 50% Loading Door Open***

Conclusions

- New design with void in the driveway has smaller building wake.
- Some areas of the void is having air flow from Level 1 to Level 3 and some other areas having air flow in the opposite direction.
- Air temperature in level 3 driveway is slightly lower in the new design due to stronger air flow.
- Driveway void does not change air flow inside the warehouse A and B significantly, but slightly cools the warehouse B Level 3.
- Local high air temperature on the driveway is 33C at the 3rd Level (which is lower than old design) due to heat load on driveway 3rd floor of 50C
- Local high air temperature in warehouse A is around 31C in the 3rd Level due to heat load on the ceiling of 40C.
- Local high air temperature in warehouse B is around 33C in the 3rd Level.
- In this case, wind speed of 25 kph is enough to stabilize the temperature inside the building and the driveway.



Next Step / Recommendation

- Run the simulation with low wind speed (3.6 kph or 1m/s) to see heat accumulation inside the building and in the driveway area.
 - Case No. 1
 - Case No. 5
 - Case No. 15
- Fans might be needed when considering low wind speed.

	Case	Wind from	Speed	Temp. u/n roof	Truck	WH Door	Ambient Temp.	Fan	Driveway Temp	WH Temp.	Priority
			km/h	Inside/Outside [C]	[%]	with Louvre	[C]				
Existing	1	S to N	0	40/55	75	All Closed	30	0			1
	2	S to N	25	40/55	100	All Closed	30	0			1
	3	S to N	0	40/55	75	All Closed	30		30	30	3
	4	S to N	25	40/55	100	All Closed	30		30	30	3
	5	S to N	0	40/55	75	50% Closed	30	0			5
	6	S to N	25	40/55	100	50% Closed	30	0			5
	7	S to N	0	40/55	75	50% Closed	30		30	30	7
	8	S to N	25	40/55	100	50% Closed	30		30	30	7
New	11	S to N	0	40/55	75	All Closed	30	0			2
	12	S to N	25	40/55	100	All Closed	30	0			2
	13	S to N	0	40/55	75	All Closed	30		30	30	4
	14	S to N	25	40/55	100	All Closed	30		30	30	4
	15	S to N	0	40/55	75	50% Closed	30	0			6
	16	S to N	25	40/55	100	50% Closed	30	0			6
	17	S to N	0	40/55	75	50% Closed	30		30	30	8
	18	S to N	25	40/55	100	50% Closed	30		30	30	8