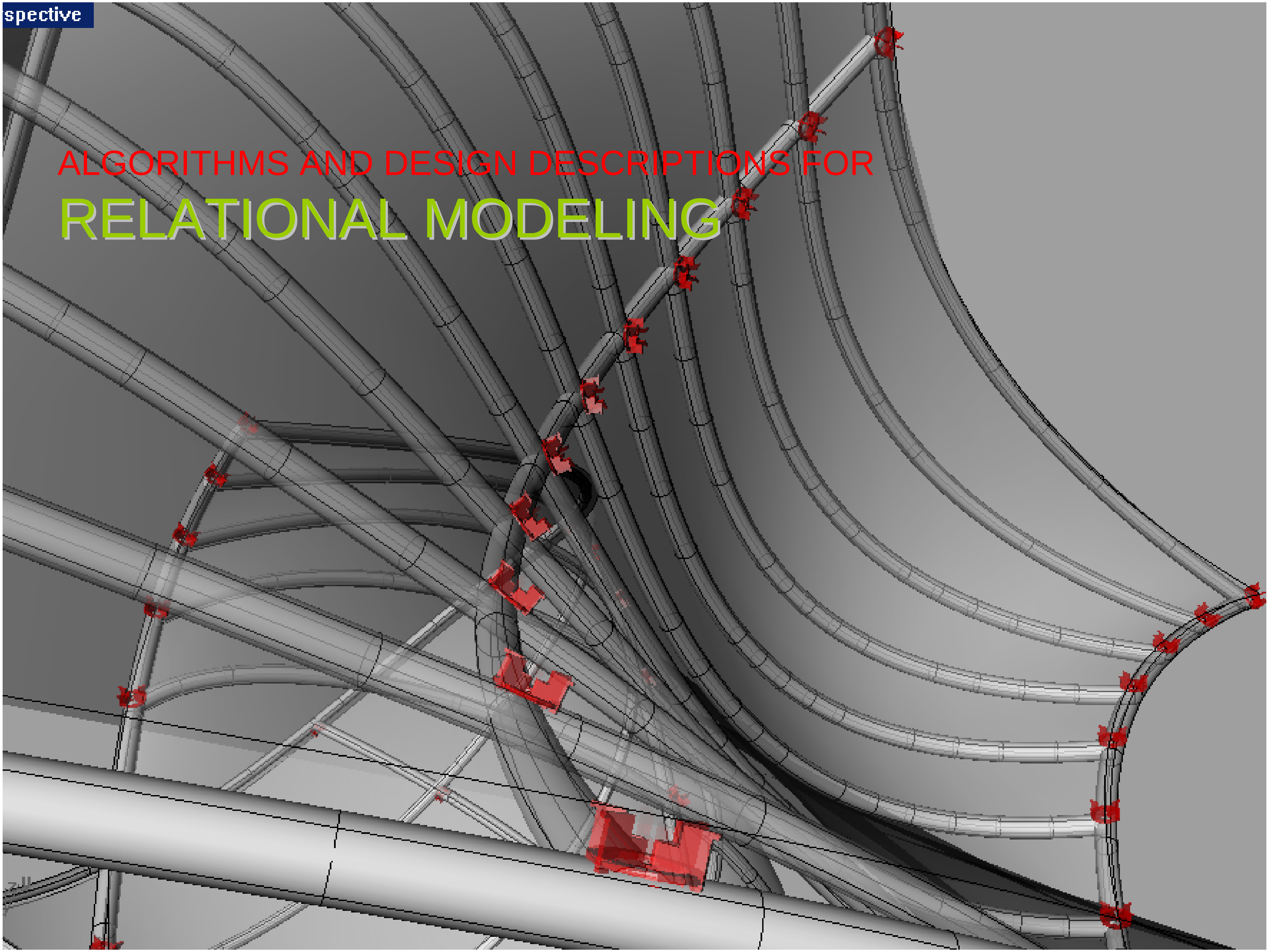
ALGORITHMS AND DESIGN DESCRIPTIONS FOR

RELATIONAL MODELING

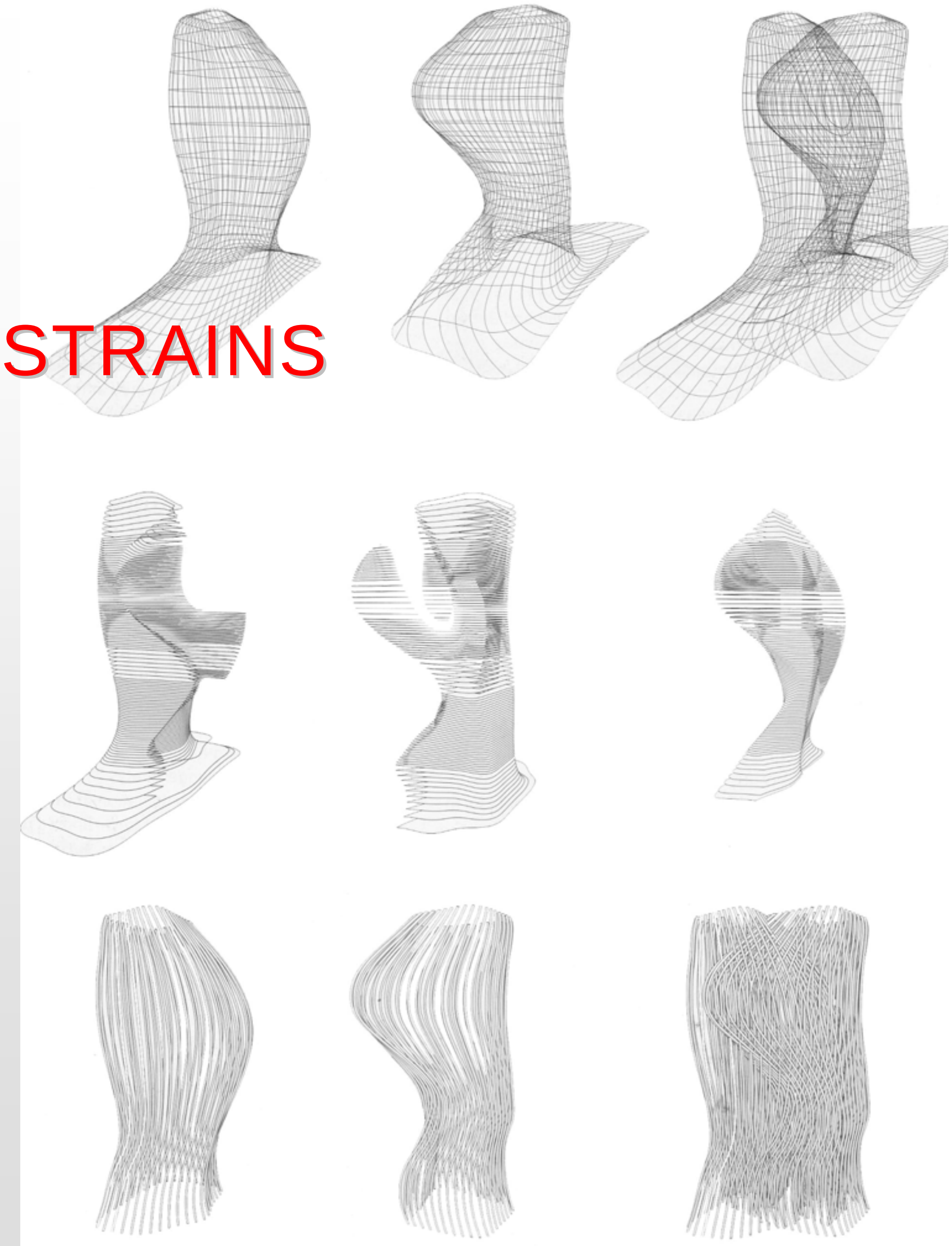


VARIATION AND CONSTRAINS

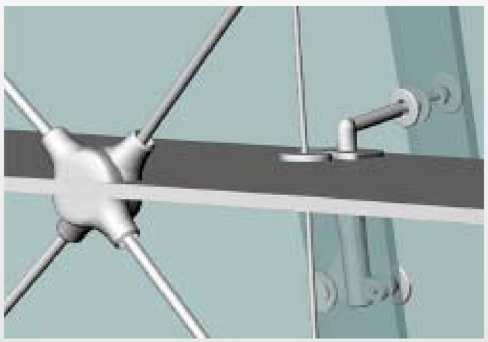
Parametric models allow variations but are constrained to fixed topologies

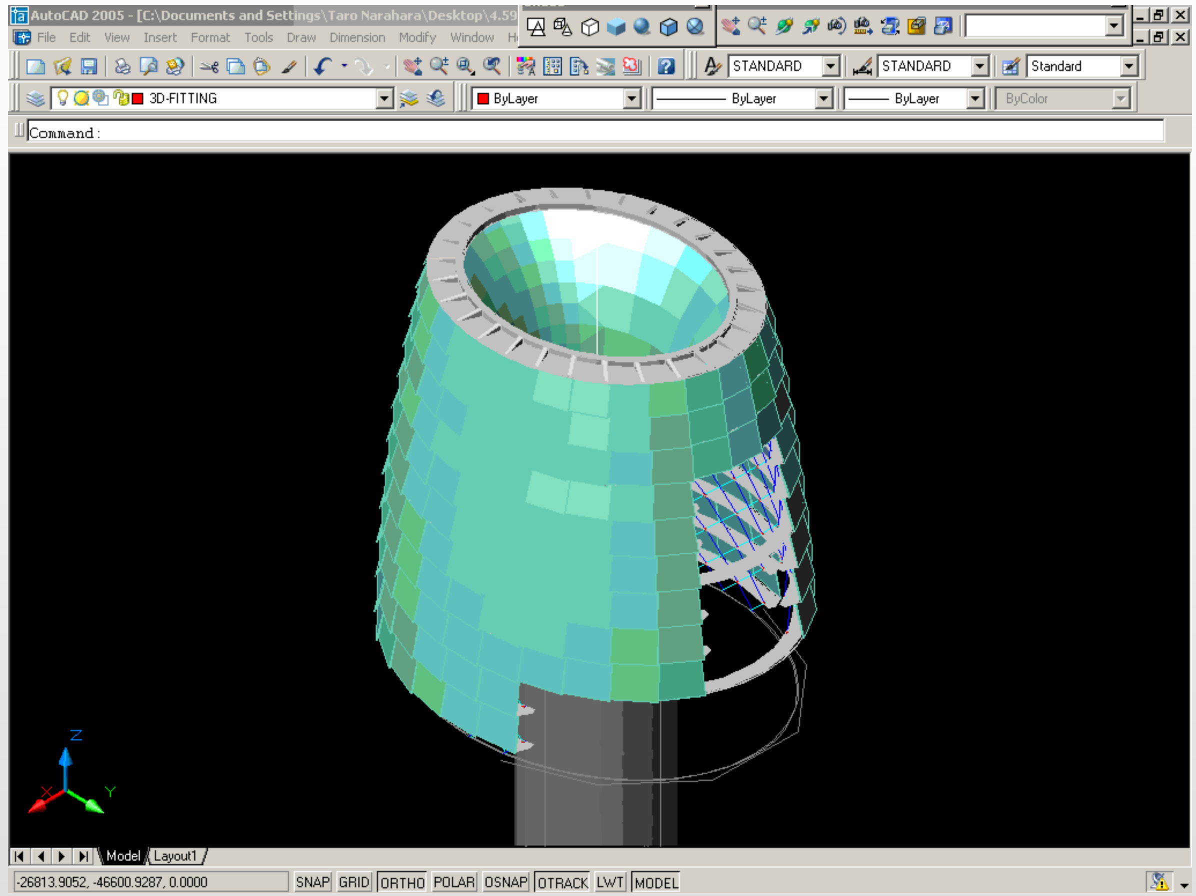
Time compound effect of building a model increases with complexity of the model

Unpredictable situations



PRECEDENT: PRE-PARAMETRIC





LOCAL **SYSTEM** **GLOBAL**

Insertion of the hardware(cable-cramp) was done manually.

Do not translate the changes in global geometry.

THE IMPORTANCE OF THIS INVESTIGATION

-Creating information for digital fabrication

2D information for 3D assembly

-Expediting monotonous tasks

-Utilizing the computational power for precision and calculation

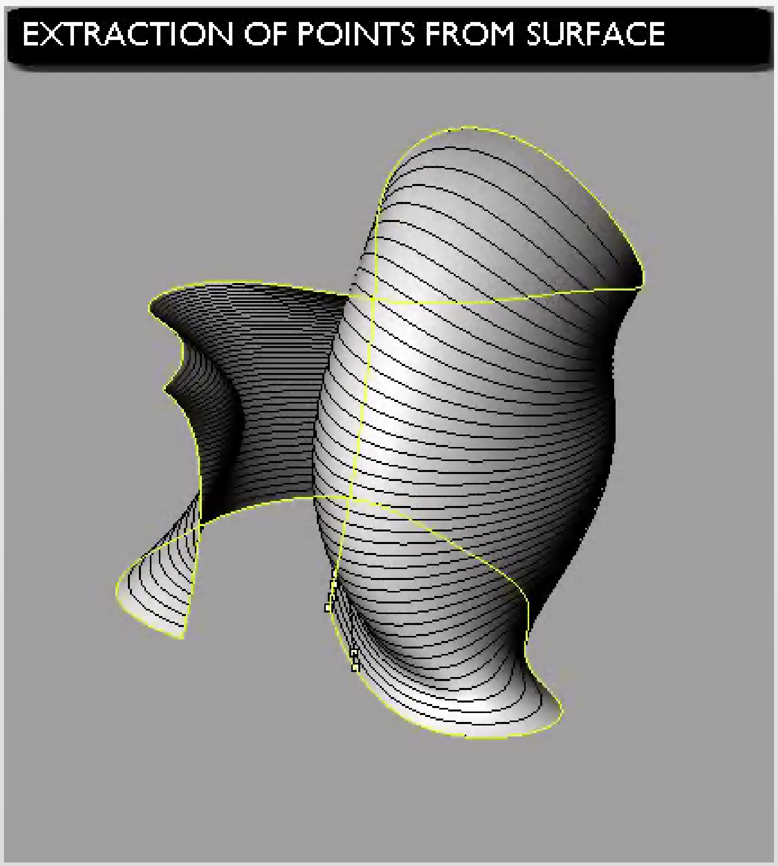
TRANSLATION OF GEOMETRIC INFORMATION

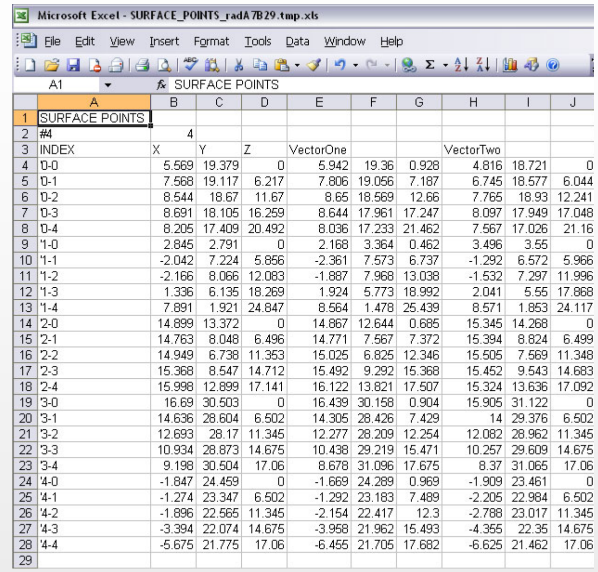
Applications: Rhinoceros 3.0, MS Excel, and Digital Project

Input: Design surface

Method: points extraction algorithm

Rhinoceros environment

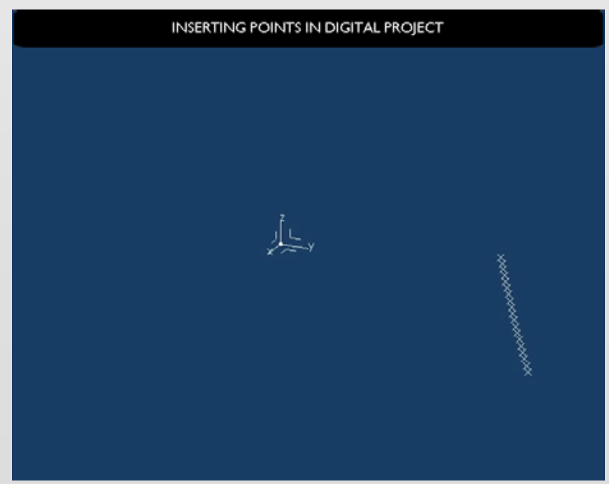




	A	B	C	D	E	F	G	H	I	J
1	SURFACE POINTS									
2	#4	4								
3	INDEX	X	Y	Z	VectorOne			VectorTwo		
4	'0-0	5.569	19.379	0	5.942	19.36	0.928	4.816	18.721	0
5	'0-1	7.568	19.117	6.217	7.806	19.056	7.187	6.745	18.577	6.044
6	'0-2	8.544	18.67	11.67	8.65	18.569	12.66	7.765	18.93	12.241
7	'0-3	8.691	18.105	16.259	8.644	17.961	17.247	8.097	17.949	17.048
8	'0-4	8.205	17.409	20.492	8.036	17.233	21.462	7.567	17.026	21.16
9	'1-0	2.845	2.791	0	2.168	3.364	0.462	3.496	3.55	0
10	'1-1	-2.042	7.224	5.856	-2.361	7.573	6.737	-1.292	6.572	5.966
11	'1-2	-2.166	8.066	12.083	-1.887	7.968	13.038	-1.532	7.297	11.996
12	'1-3	1.336	6.135	18.269	1.924	5.773	18.992	2.041	5.55	17.868
13	'1-4	7.891	1.921	24.847	8.564	1.478	25.439	8.571	1.853	24.117
14	'2-0	14.899	13.372	0	14.867	12.644	0.685	15.345	14.268	0
15	'2-1	14.763	8.048	6.496	14.771	7.567	7.372	15.394	8.824	6.499
16	'2-2	14.949	6.738	11.353	15.025	6.825	12.346	15.505	7.569	11.348
17	'2-3	15.368	8.547	14.712	15.492	9.292	15.368	15.452	9.543	14.683
18	'2-4	15.998	12.899	17.141	16.122	13.821	17.507	15.324	13.636	17.092
19	'3-0	16.69	30.503	0	16.439	30.158	0.904	15.905	31.122	0
20	'3-1	14.636	28.604	6.502	14.305	28.426	7.429	14	29.376	6.502
21	'3-2	12.693	28.17	11.345	12.277	28.209	12.254	12.082	28.962	11.345
22	'3-3	10.934	28.873	14.675	10.438	29.219	15.471	10.257	29.609	14.675
23	'3-4	9.198	30.504	17.06	8.678	31.096	17.675	8.37	31.065	17.06
24	'4-0	-1.847	24.459	0	-1.669	24.289	0.969	-1.909	23.461	0
25	'4-1	-1.274	23.347	6.502	-1.292	23.183	7.489	-2.205	22.984	6.502
26	'4-2	-1.896	22.565	11.345	-2.154	22.417	12.3	-2.788	23.017	11.345
27	'4-3	-3.394	22.074	14.675	-3.958	21.962	15.493	-4.355	22.35	14.675
28	'4-4	-5.675	21.775	17.06	-6.455	21.705	17.682	-6.625	21.462	17.06
29										

Excel spreadsheet

Digital Project environment

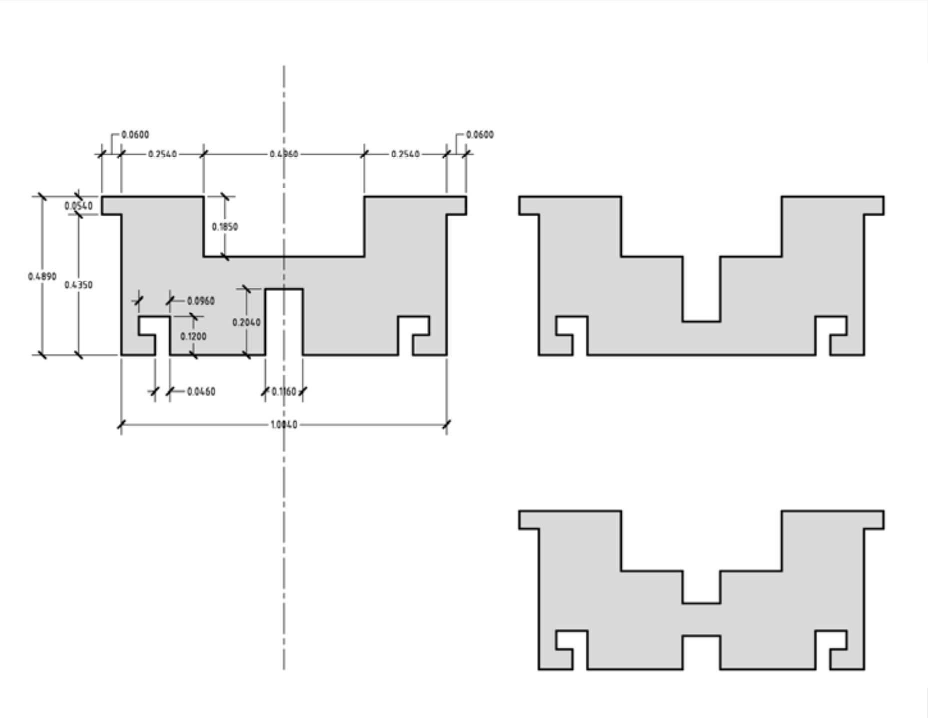


Phase 01

CREATING DESIGN DESCRIPTIONS [joint details]

Designer creates a design description:

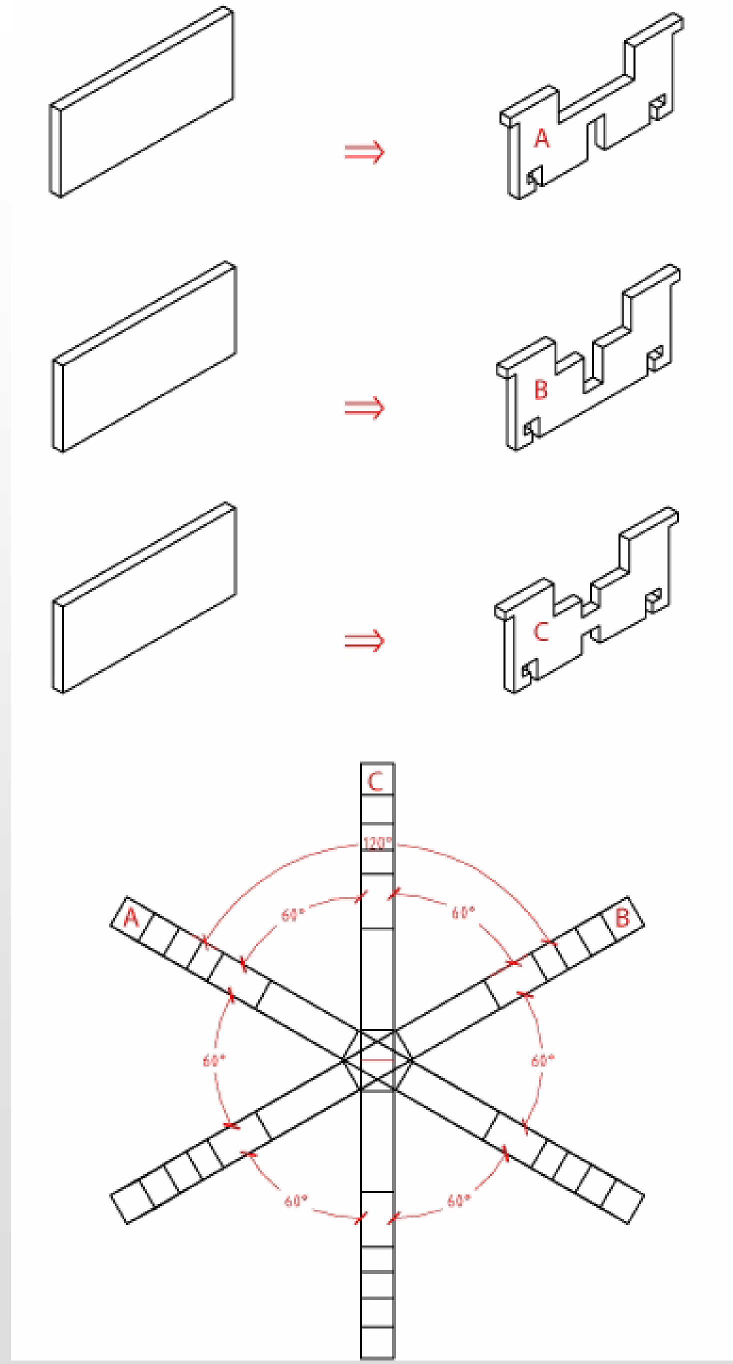
- Joint angles
- Dimensions
- Geometric information



Design description of joint

JOINT CONSTRUCTION

Digital Project environment



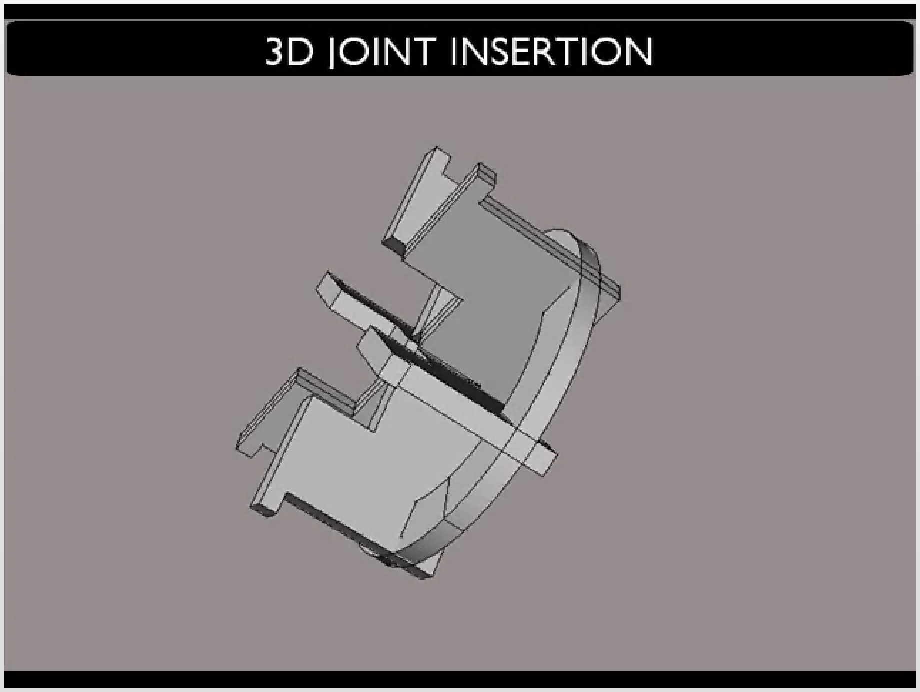
Phase 02

INSERTION OF DESIGN DESCRIPTIONS

[joint details]

Design description computed

Design description inserted as joints



Completed joint for insertion

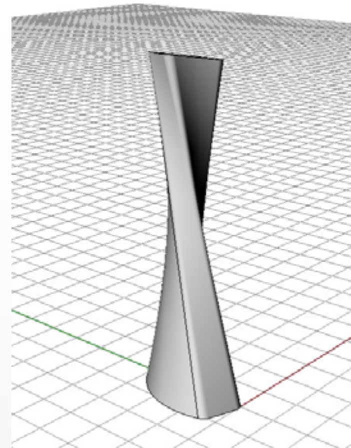
CURRENT FINDINGS

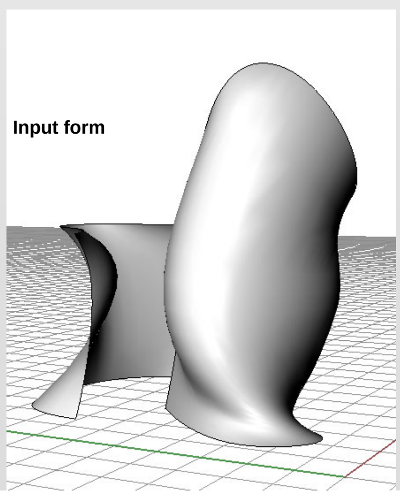
Rapid Generation of detailed information for fabrication

Reusability of designed components that adapt to specific conditions

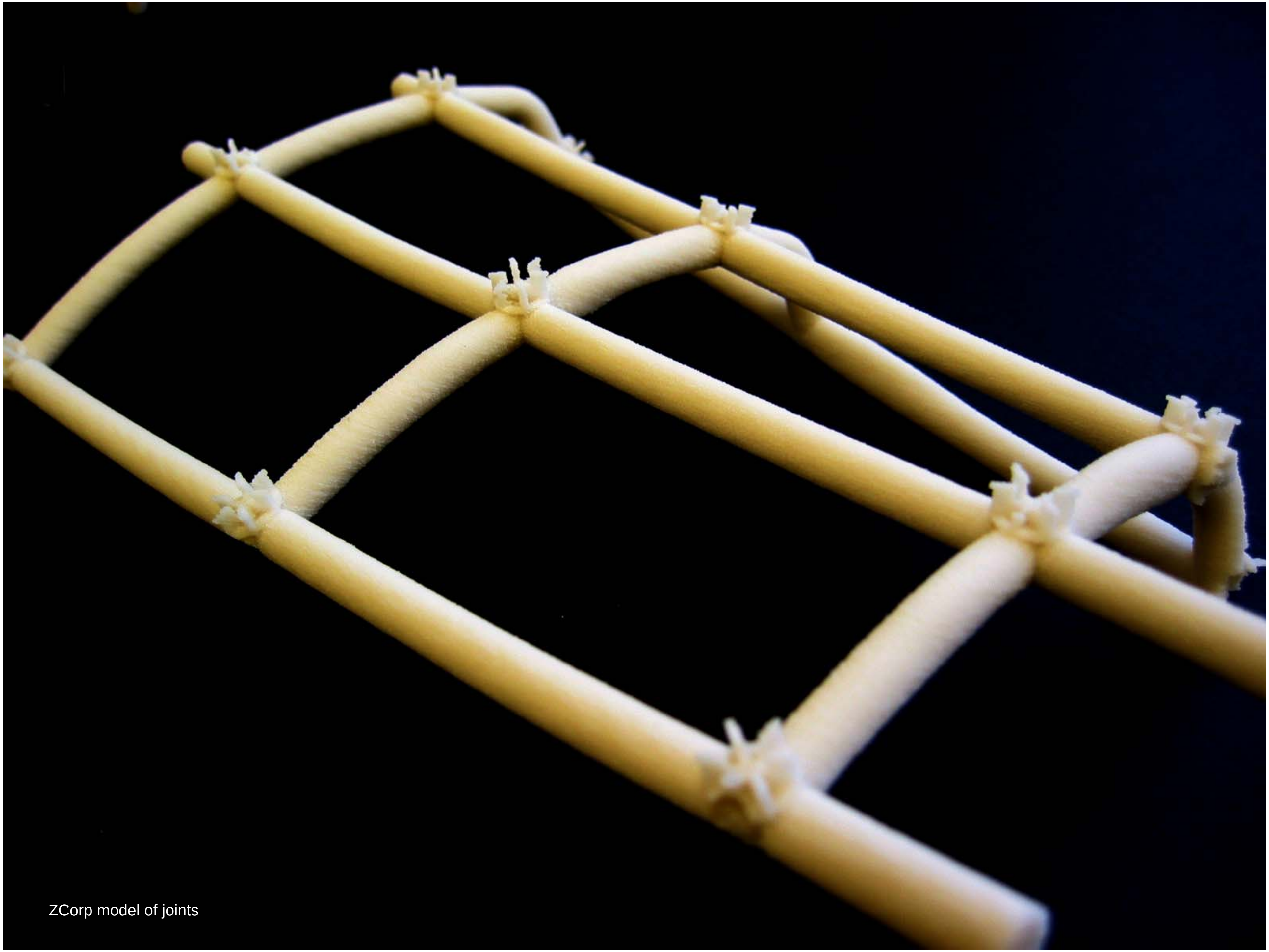
Expedites laborious tasks

Input form

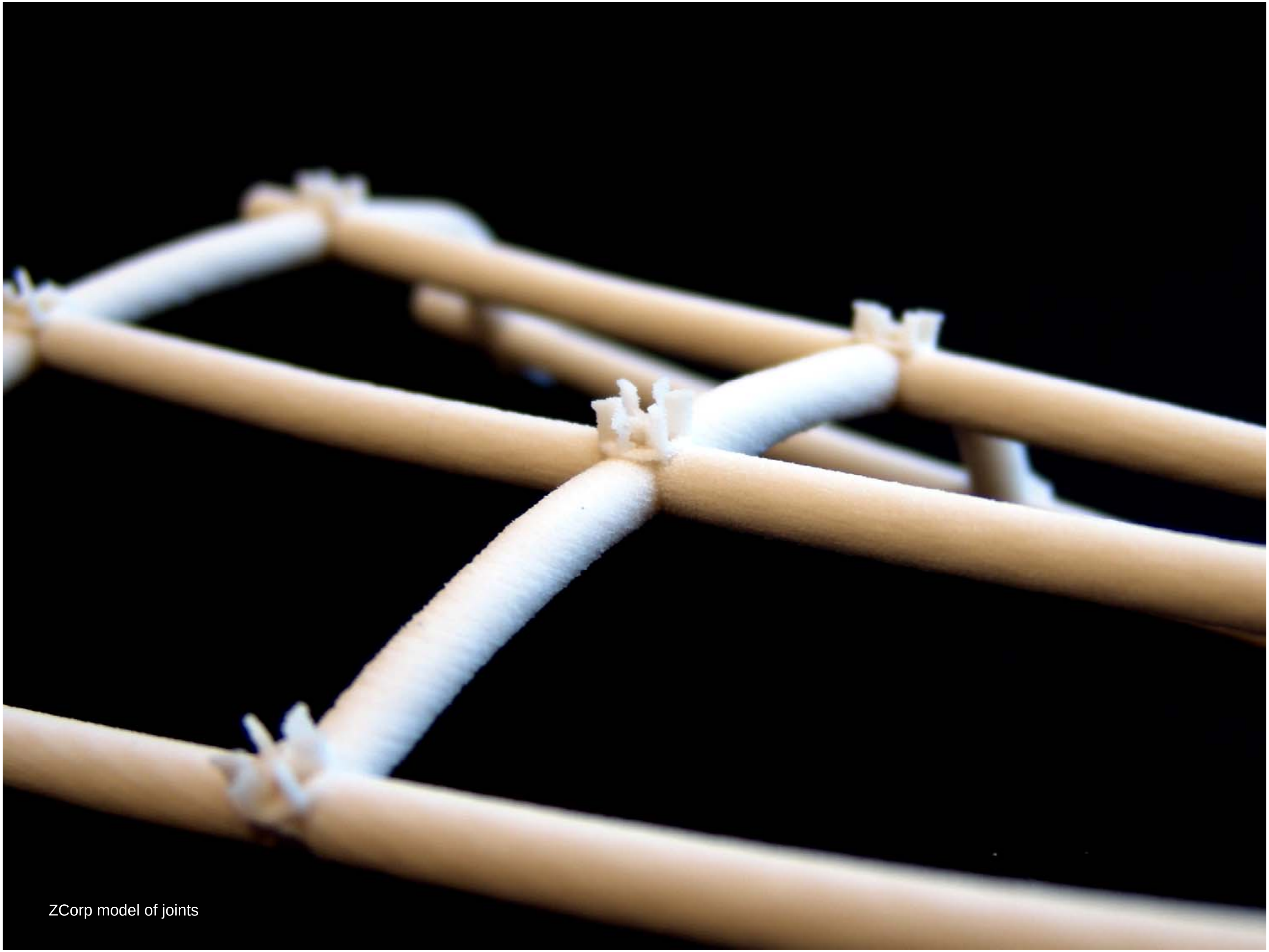




Digital Project environment



ZCorp model of joints



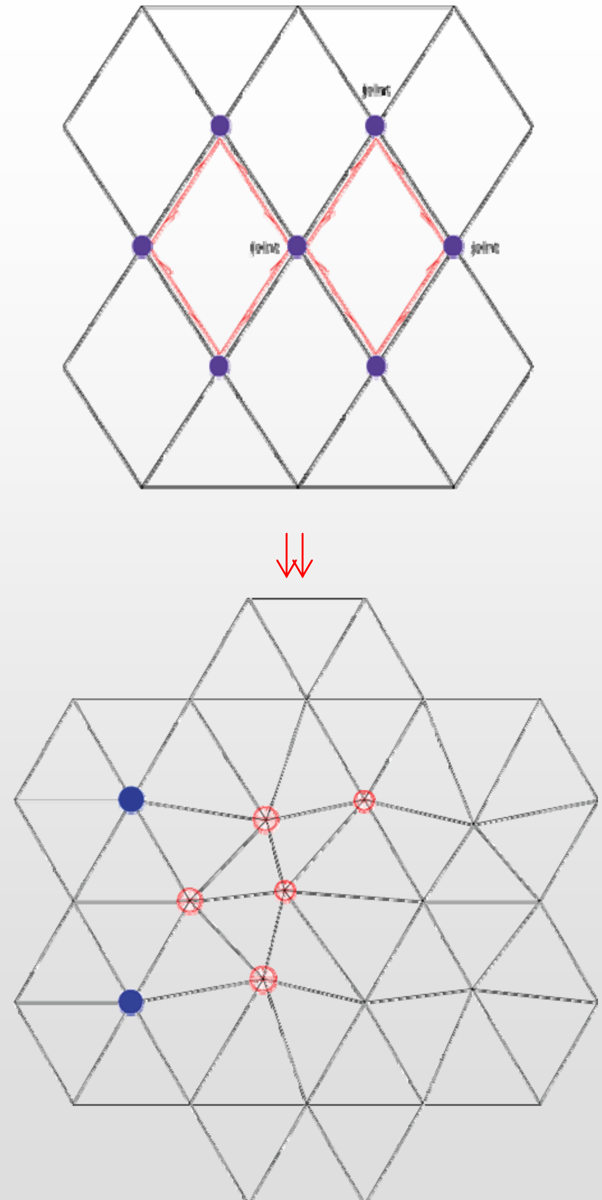
ZCorp model of joints

FUTURE EXPLORATION

Joints need to know of their neighbors and the global system

Joints need to know about the material which it secures

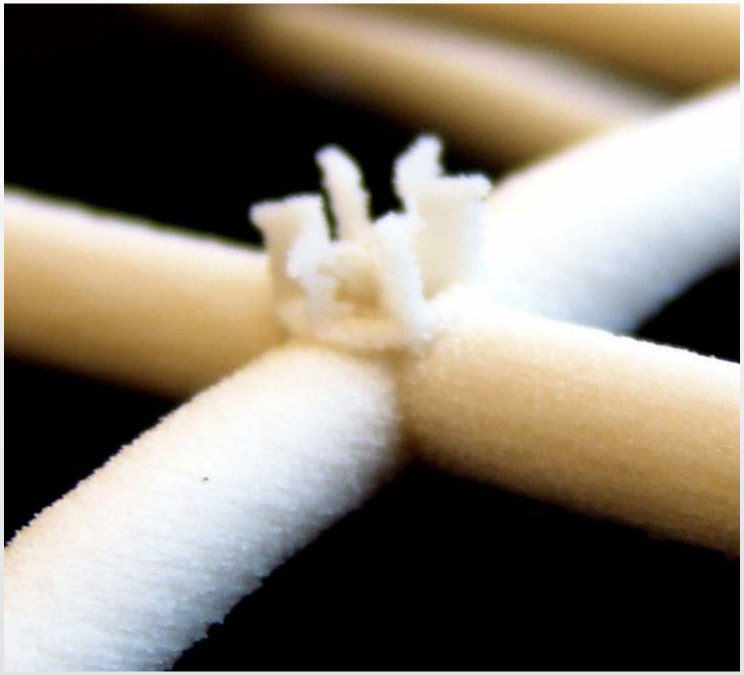
Joints need to be able to update its location and orientation based on any surface or renegotiation



Surface deformation

Raising Interesting Issues such as…

CUSTOMIZATION vs STANDARDIZATION



Every single joints are uniquely fabricated to satisfy local conditions.

Taking advantage of the recent advancement in digital fabrication.

Standardize the details to avoid increase in cost.

Single detail accommodates various local conditions