

Information presentation for improved learning in final assembly, a case study

Or

Can productivity be affected by the information
flow?

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Background to the case study, problem description

- Manufacturing assembly information presentation is rarely minimalistic, this is known to influence quality and productivity
- “Push out as much information as possible” more is better
- Leading to a difficult situation for the assembly workers, or??
- **Problem/opportunity-case study:**
 - Is it possible to increase productivity by changing how we present information for an assembly worker
 - Is there a connection between information presentation and learning, and does this influence productivity?

How do we handle it

2. See, smell, feel, hear
"Perception of Elements in Current Situation"

1. Trigger! What happened?
"State of the Environment"

3. Understand, Grasp
"Comprehension of Current Situation"

4. Prognosis,
"Forecast", Outcome
"Projection of Future State"

The Process

- The right input?
- Lead to right quality?
- Support high productivity?

Action!
"Performance of Action"

Endsley, M. R. (2000). Ecological Understanding of Situation Awareness: A critical Review. In Endsley, M. R. & Garland, D. L. (eds.), *Situation Awareness Analysis and Measurement*, pp. 3-17. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

- Abilities
- Experience
- Training



The Study



The Study

- **Question: does productivity increase or decrease as a result of changing the user interface design?**
- **3 day study/tests**
- **30 highly skilled assembly worker from Volvo Trucks, Skövde.** Used to high demands regarding acting on information, working in a high paced production
 - **10** different worker each day
 - **20** minutes assembly cycle.
- **Lego assembly as a product**
 - **VERY VERY** simple/easy/elementary product
 - **6** product variants, **colour**, not part
- **3** different “user interface designs”
- **Same** production plan/schedule used for all days, **mixed high and low volume products**

The product

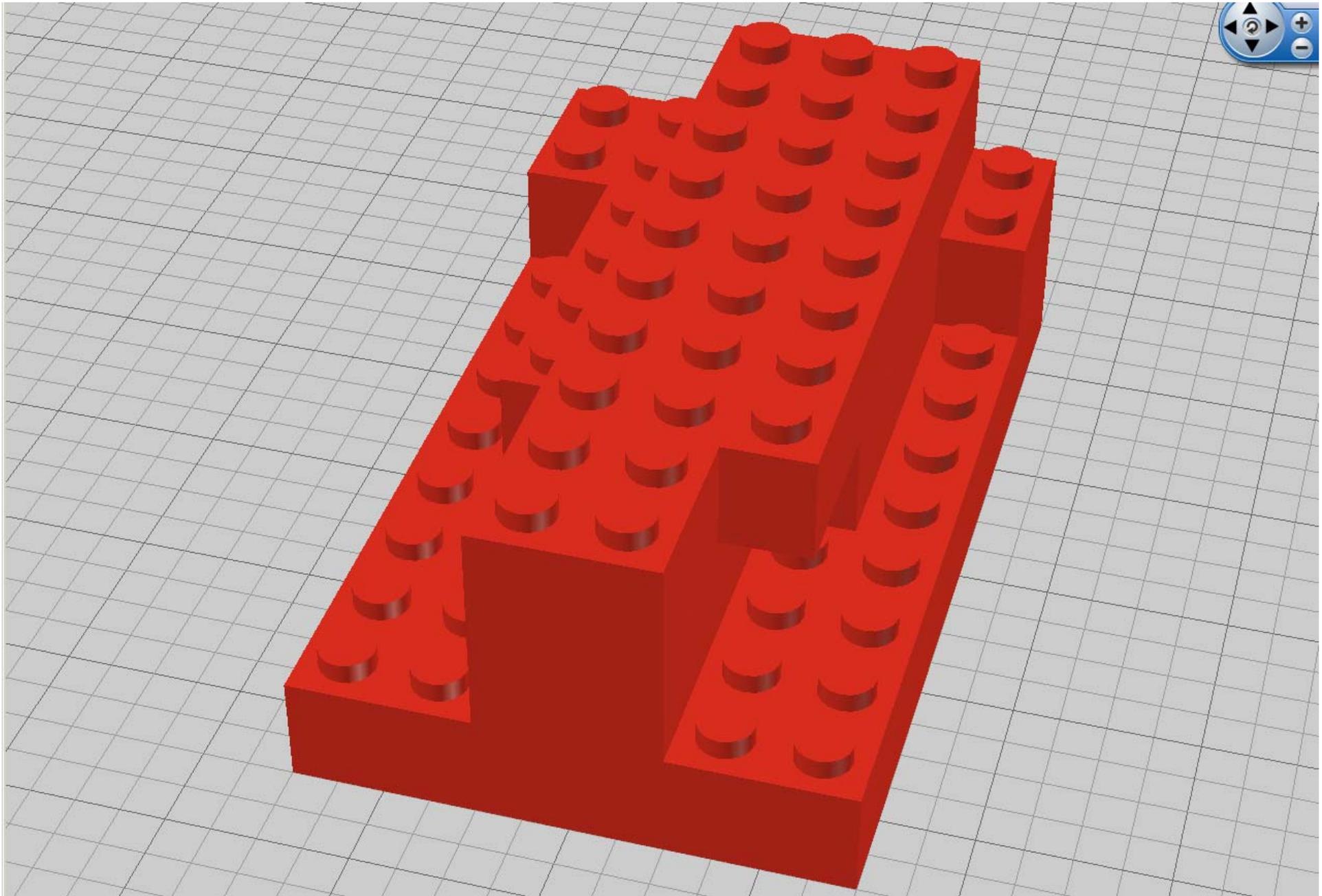
How

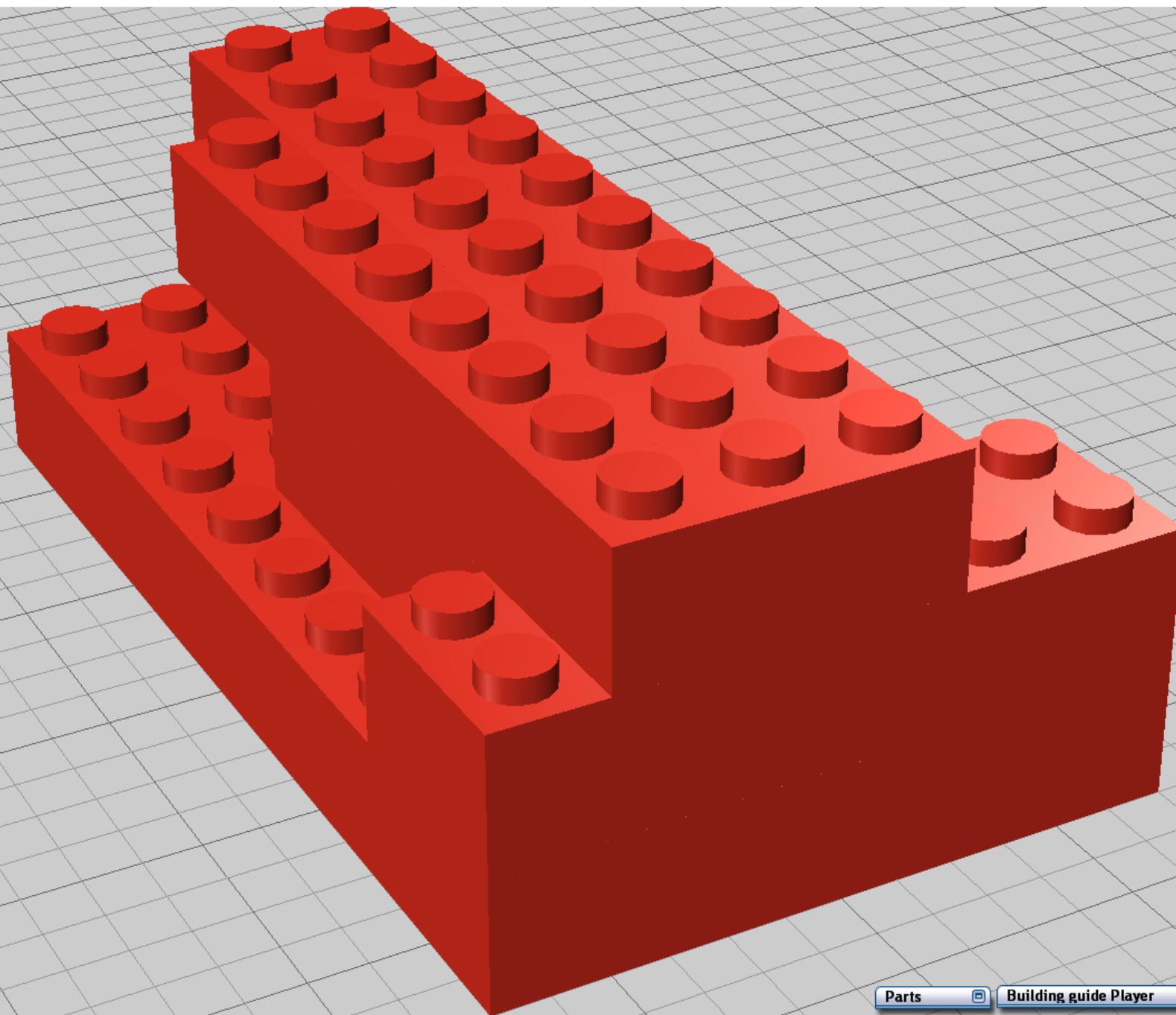
Process



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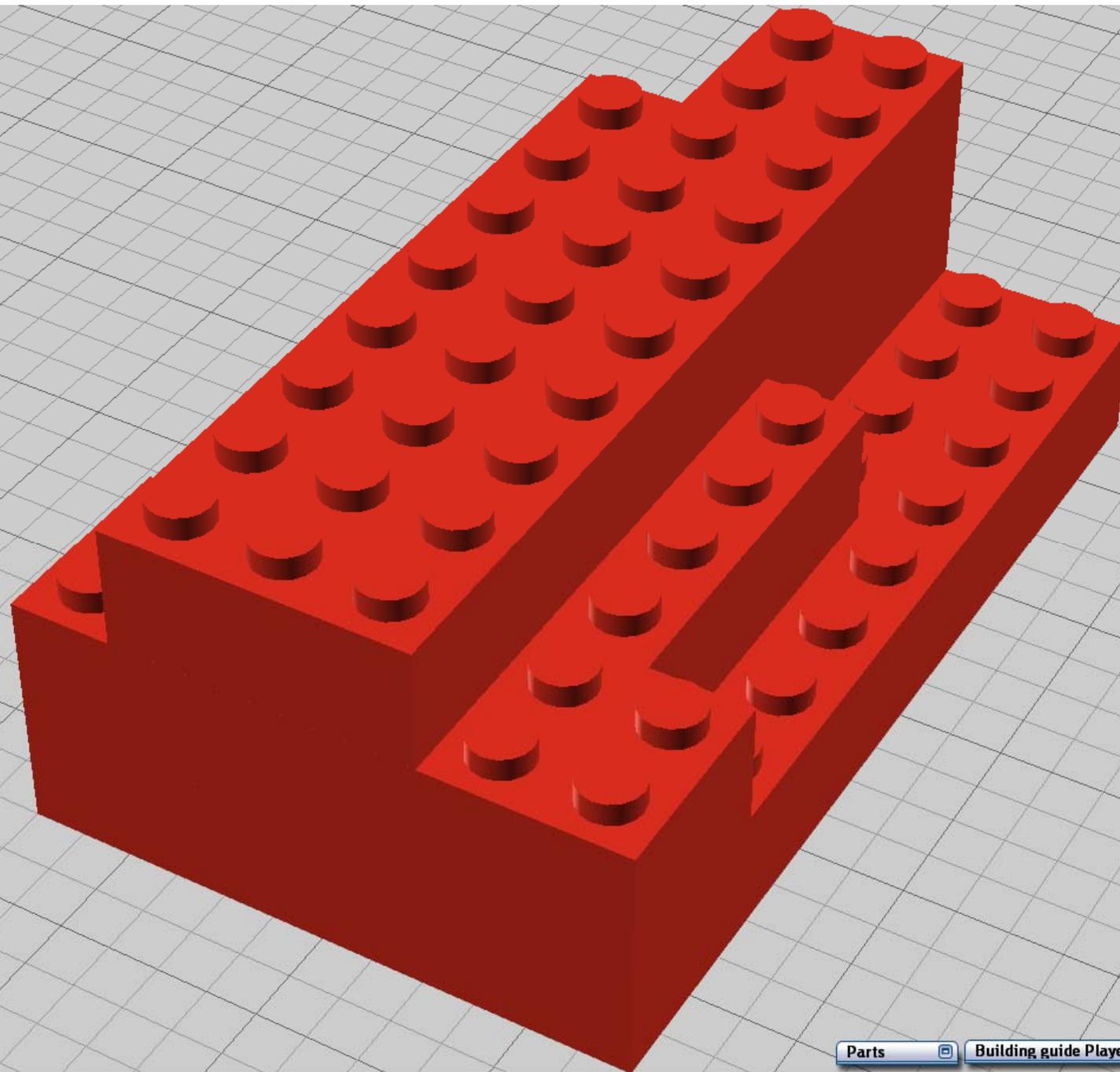




Parts Building guide Player



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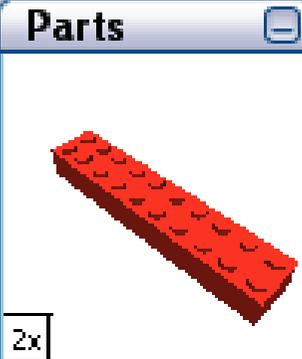
Parts

Building guide Player

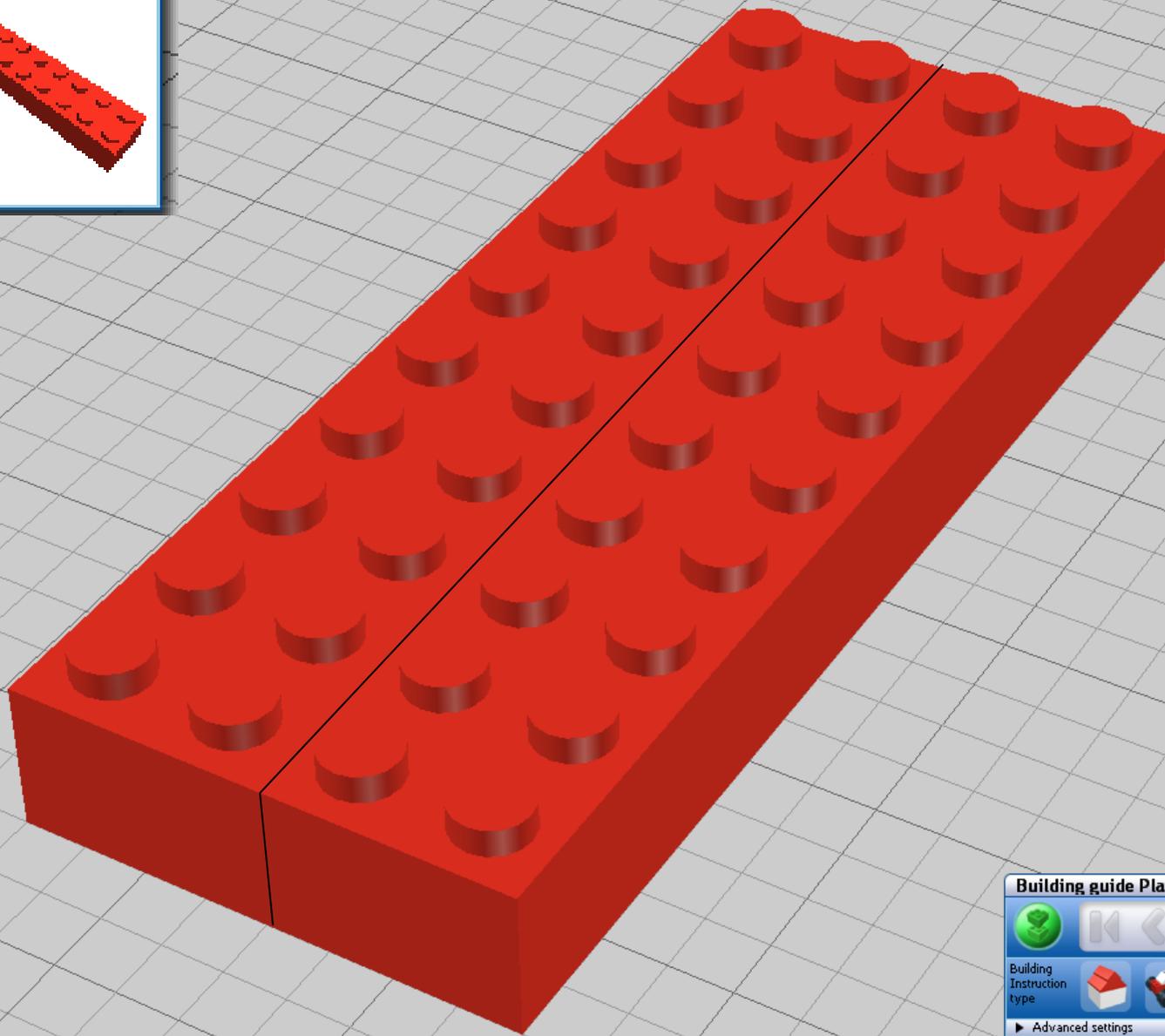


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Parts



2x



Building guide Player

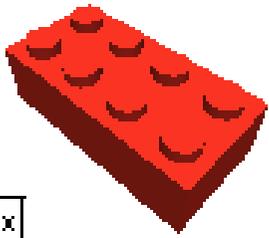
Step 1 / 5

Bricks/step 1

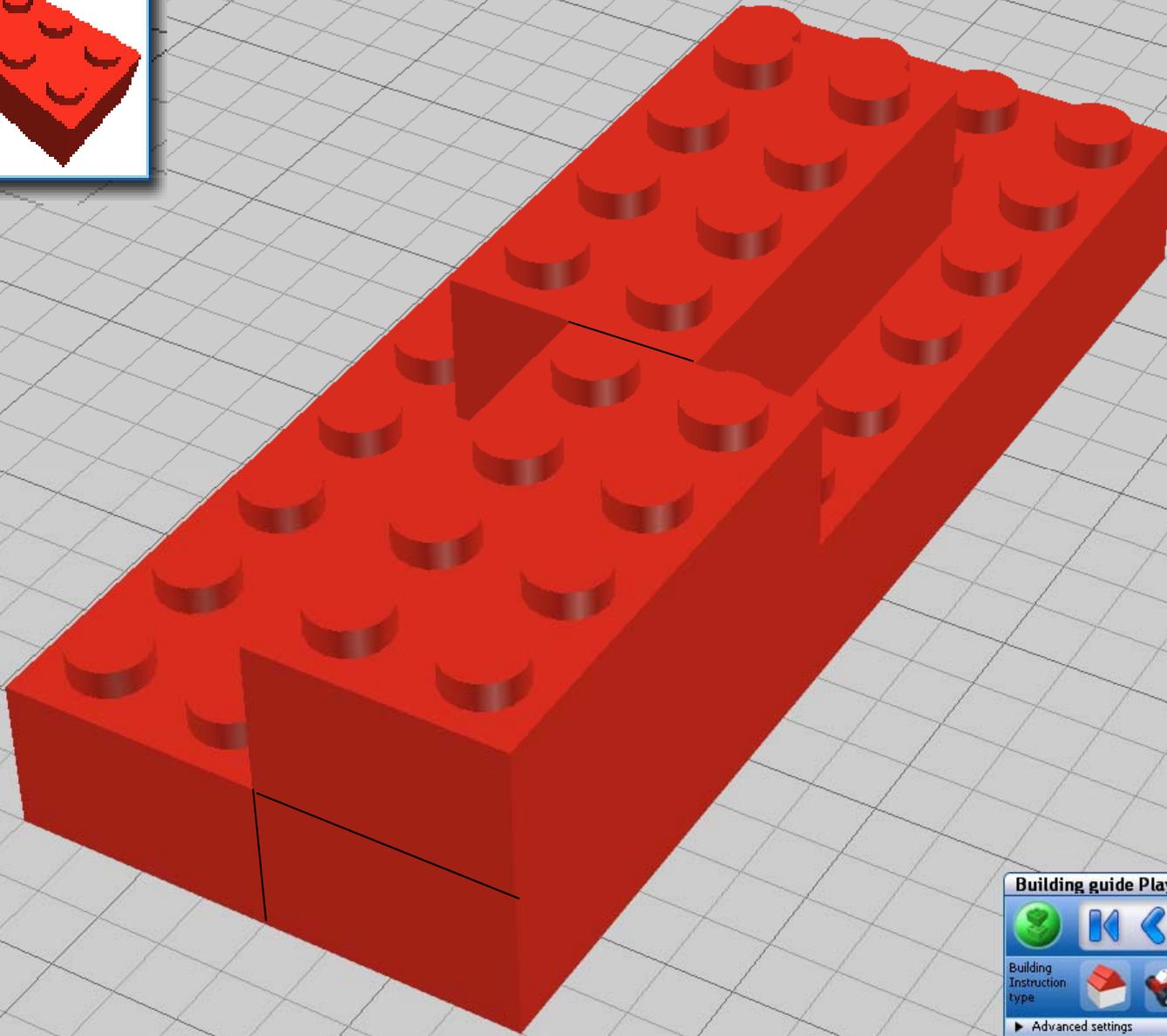
Print optimized

Advanced settings

Parts



2x



Building guide Player

Building Instruction type

Step 2 / 5

Bricks/step 1

Print optimized

Advanced settings



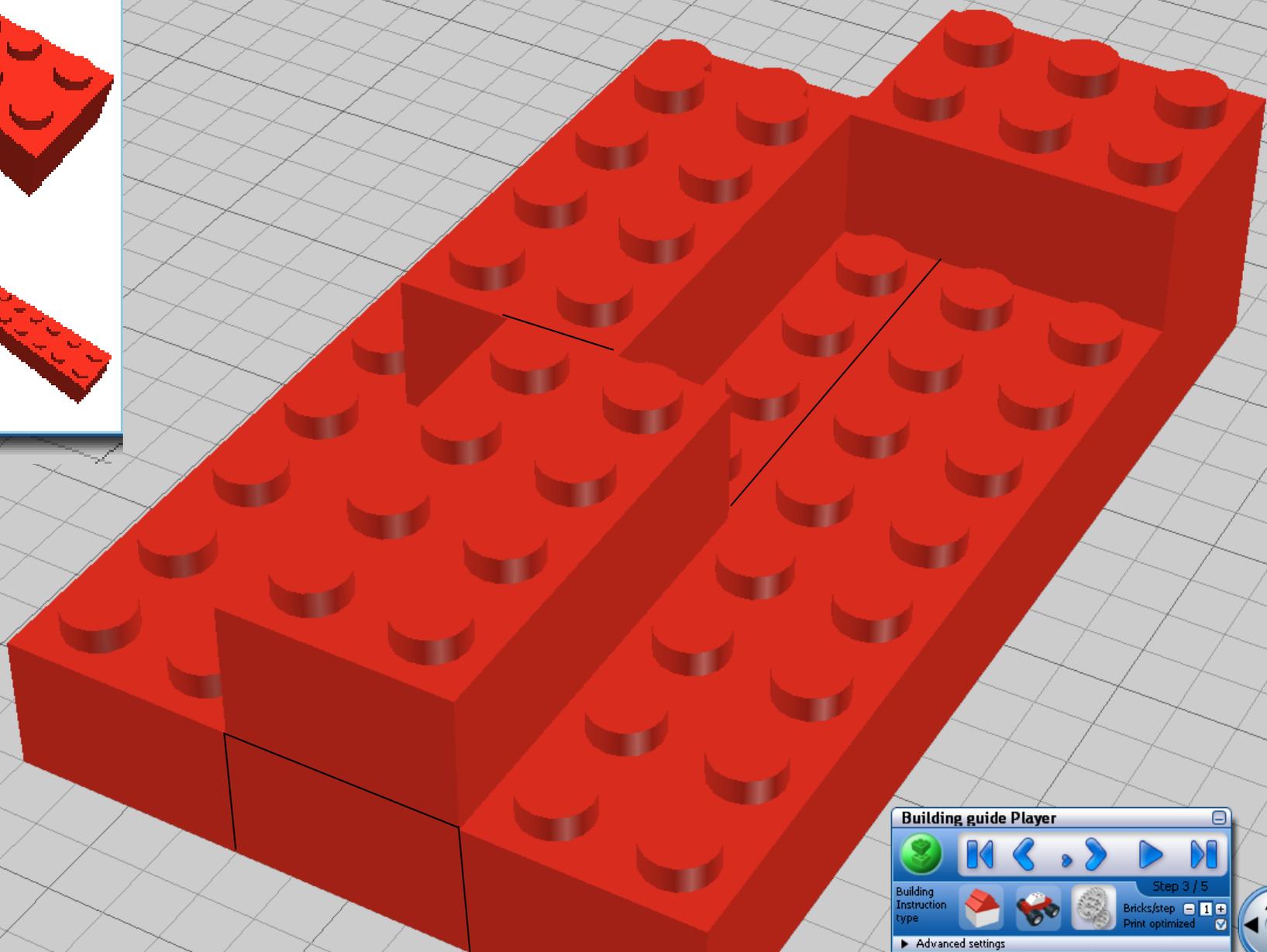
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Parts

1x

1x



Building guide Player

Step 3 / 5

Bricks/step 1

Print optimized

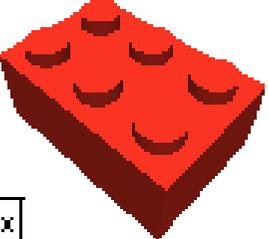
Advanced settings



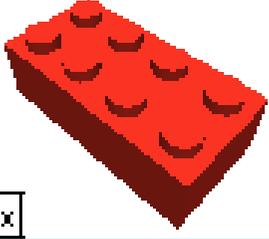
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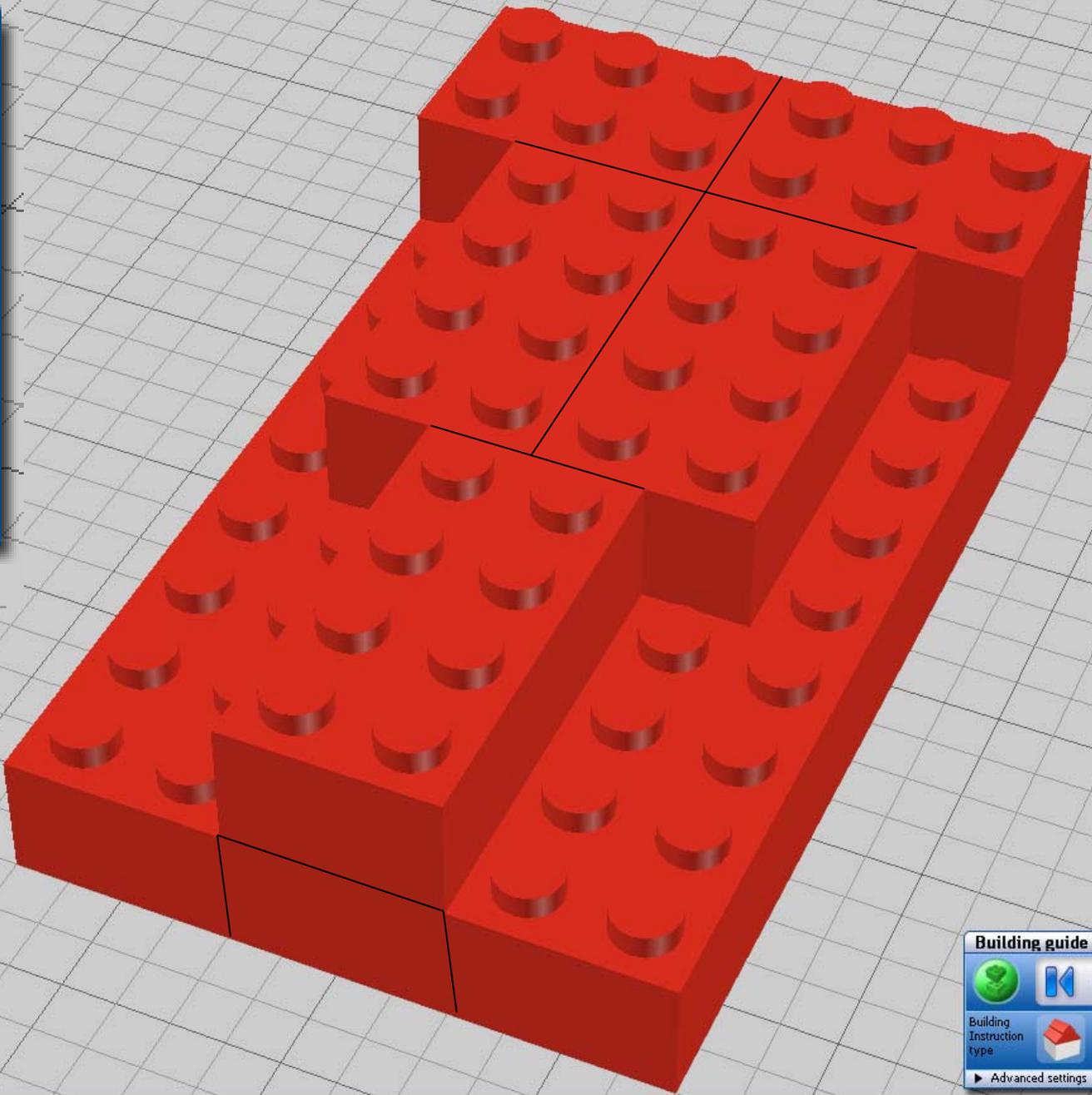
Parts



1x



1x



Building guide Player



Step 4 / 5

Building Instruction type



Briks/step 1

Print optimized

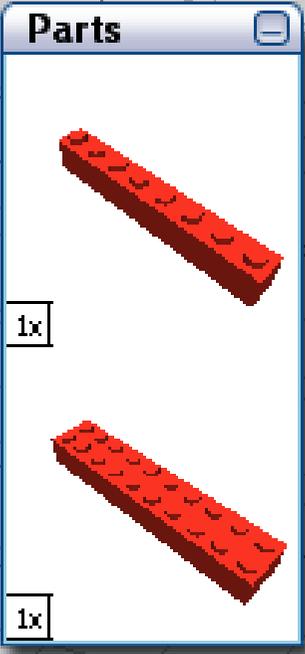
Advanced settings



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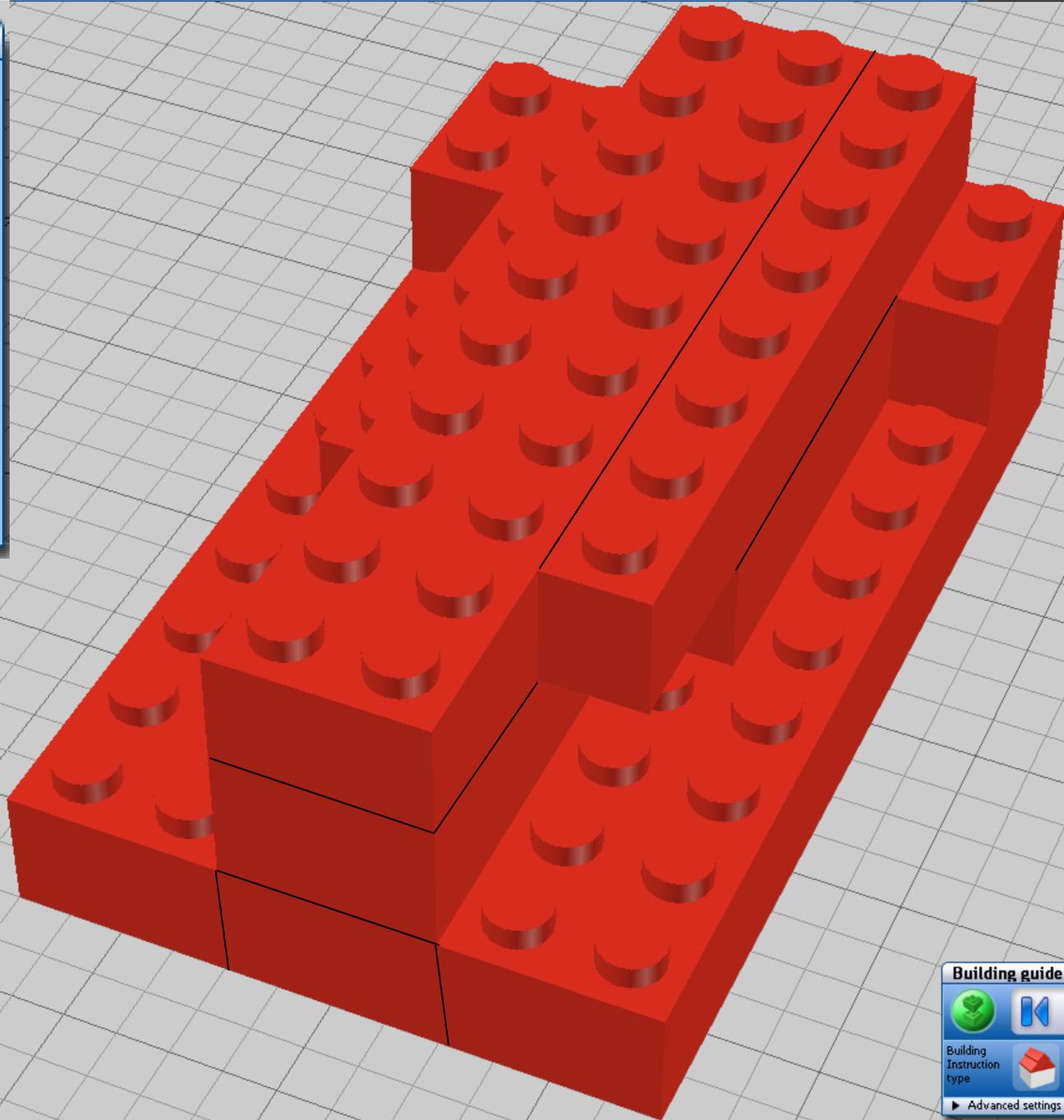
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Parts



1x

1x



Building guide Player



Step 5 / 5

Bricks/step 1

Print optimized

Advanced settings

The product

What

The Customer demand

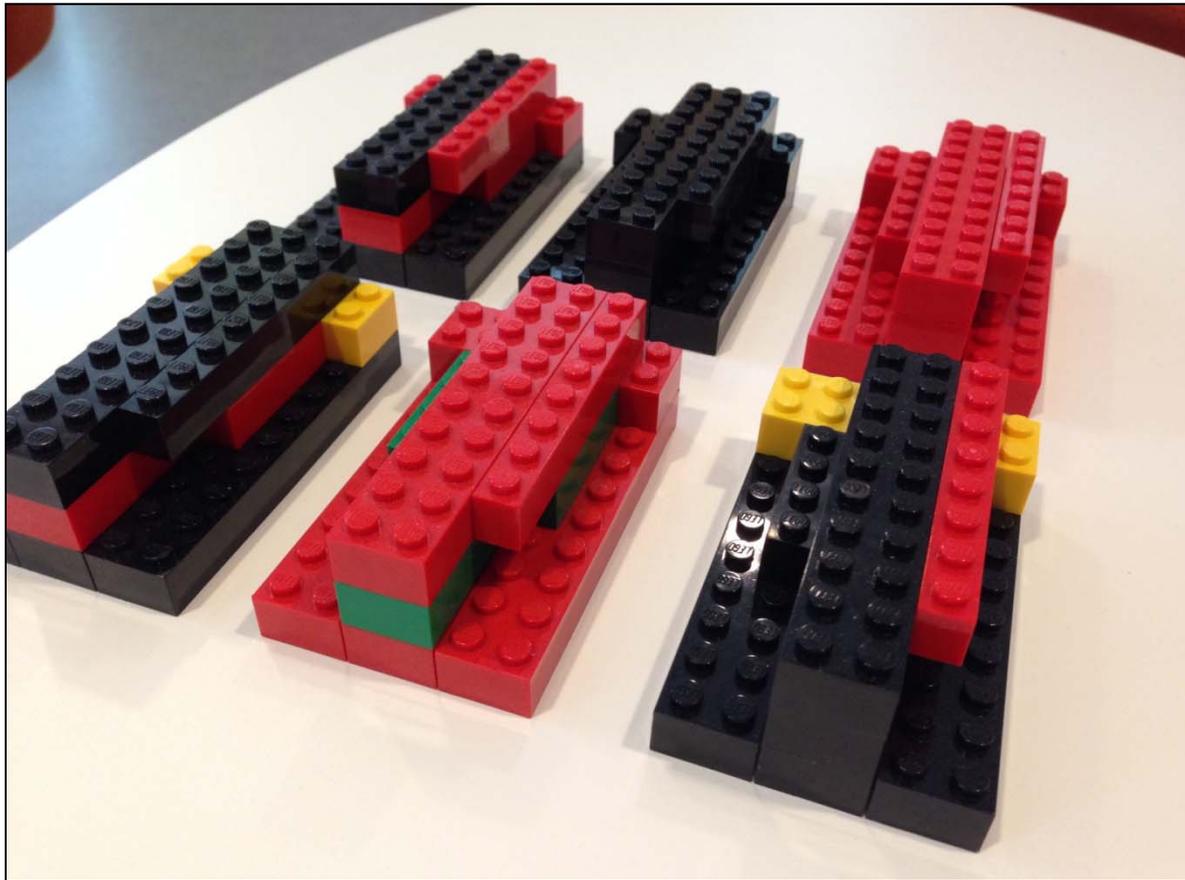


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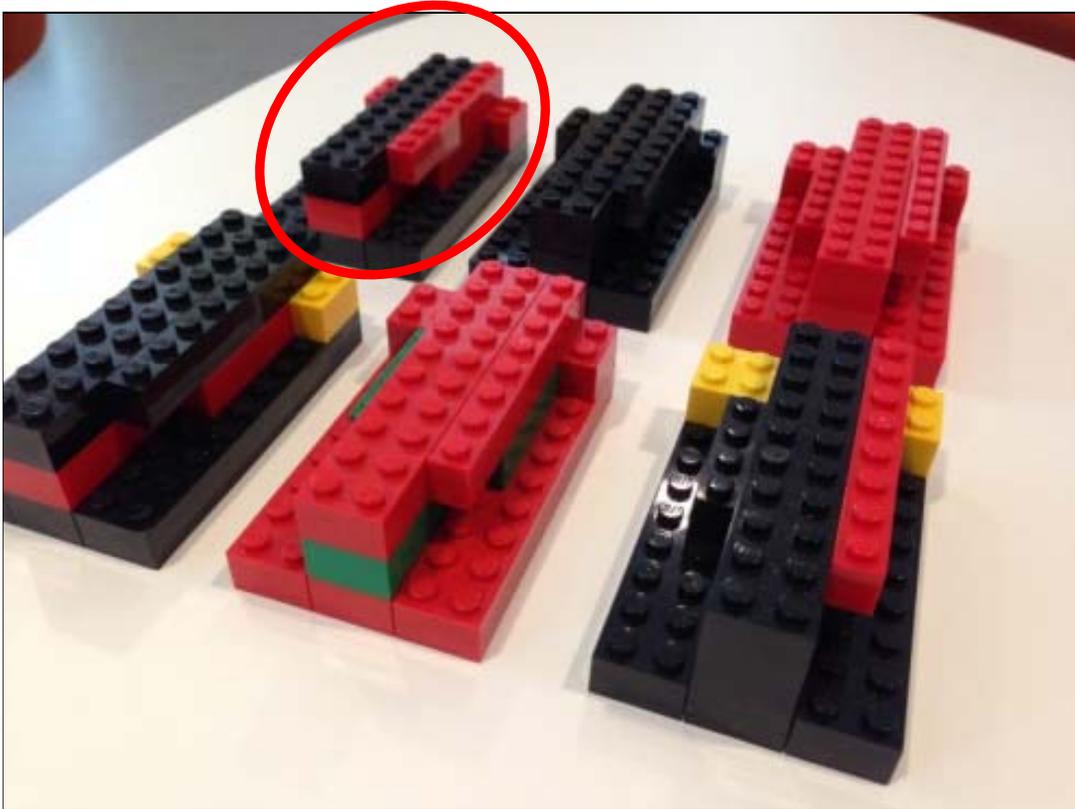
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The product variants

Difference: part colour and part number

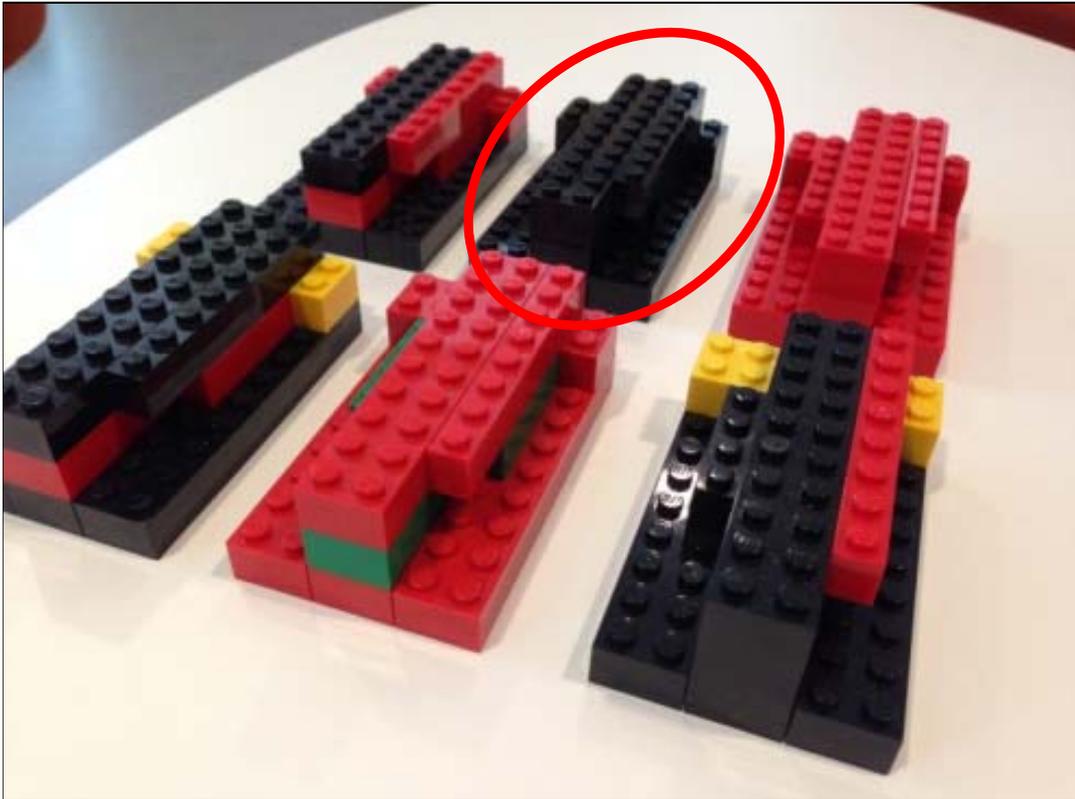


Product Variant 1



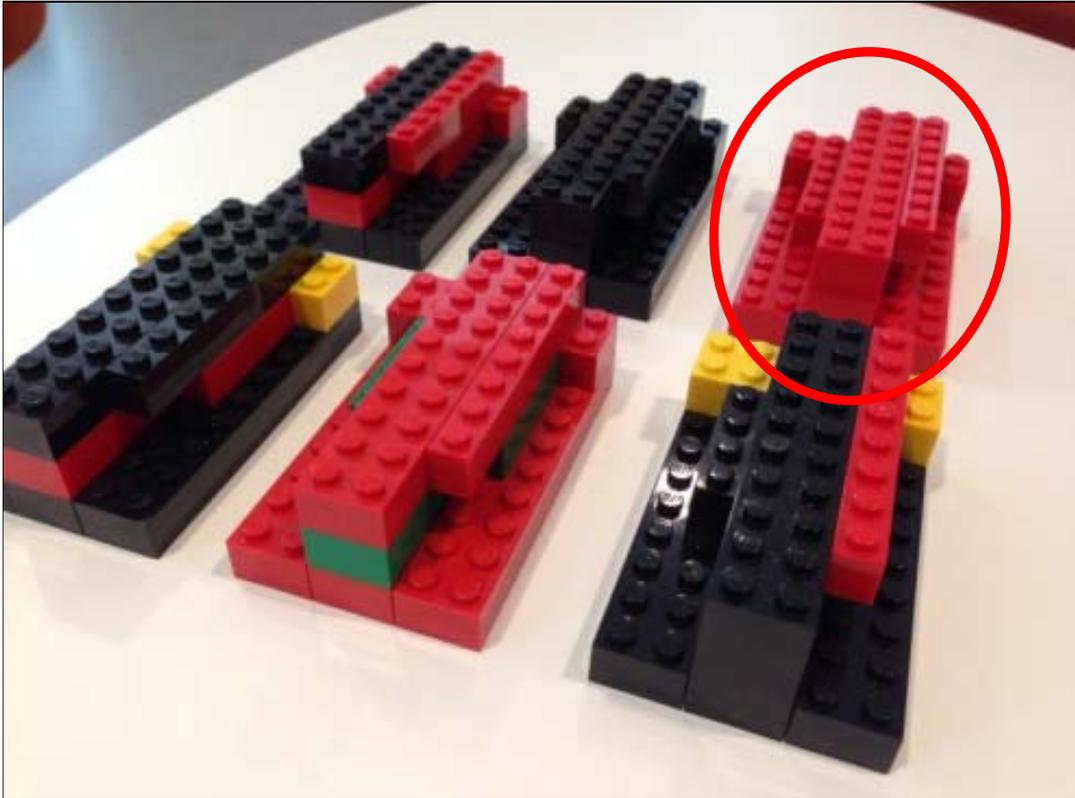
- 56109282 2x10
- 55724016 2x4
- 56109282 2x10
- 57046203 2x3
- 55724016 2x4
- 57046203 2x3
- 60668495 1x8
- 56109282 2x10

Product Variant 2



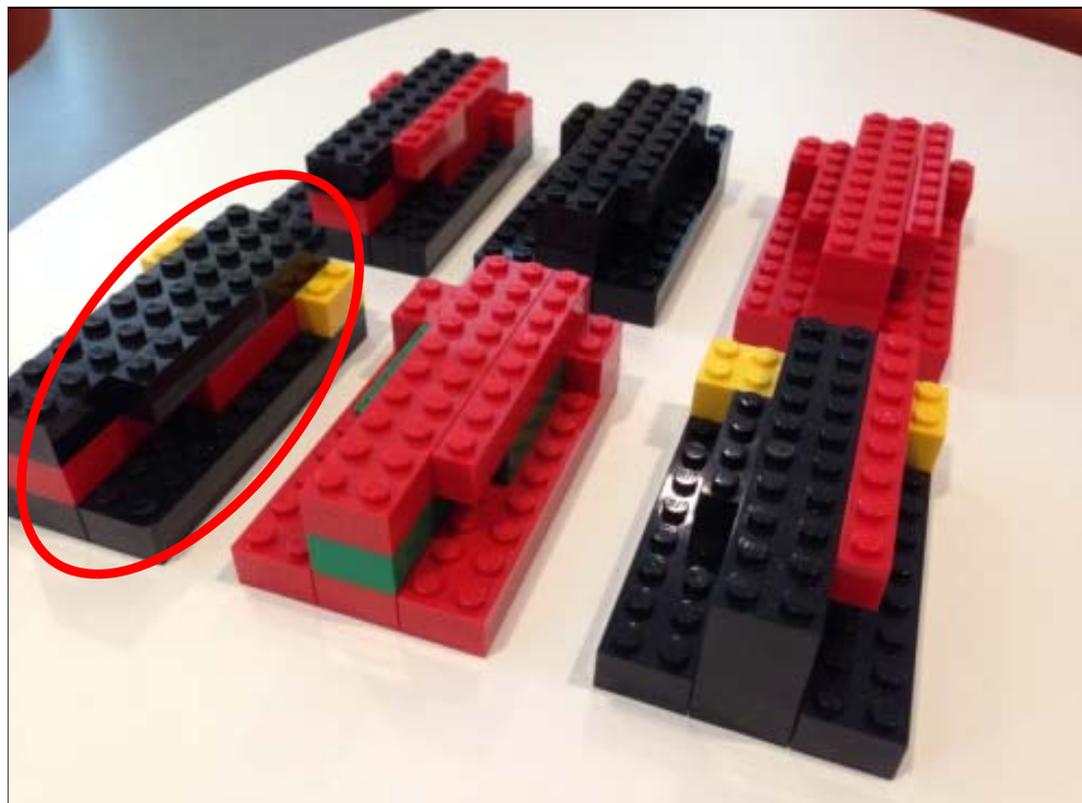
- 54152647 2x10
- 55724016 2x4
- 54152647 2x10
- 59129990 2x3
- 55724016 2x4
- 59129990 2x3
- 60668495 1x8
- 54152647 2x10

Product Variant 3



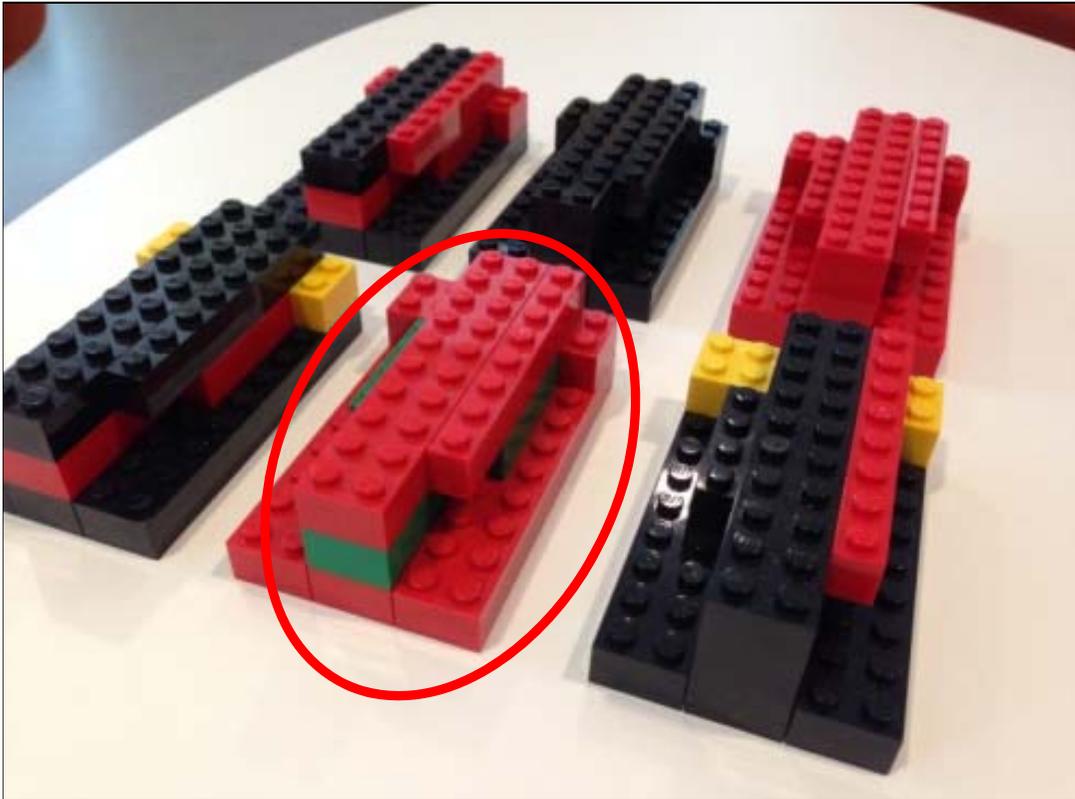
- 56109282 2x10
- 55724016 2x4
- 56109282 2x10
- 57046203 2x3
- 55724016 2x4
- 57046203 2x3
- 60668495 1x8
- 56109282 2x10

Product Variant 4



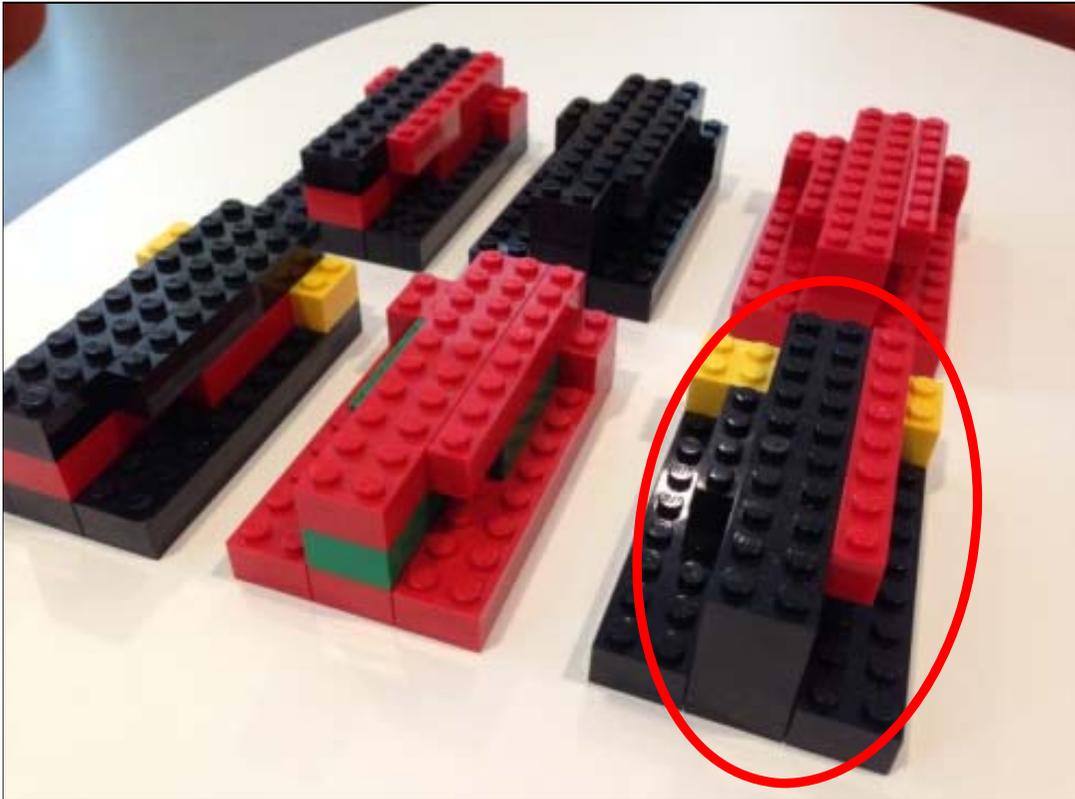
- 56109282 2x10
- 56799242 2x4
- 56109282 2x10
- 55310941 2x3
- 56799242 2x4
- 55310941 2x3
- 60668495 1x8
- 56109282 2x10

Product Variant 5



- 56109282 2x10
- 54629831 2x4
- 56109282 2x10
- 59129990 2x3
- 54629831 2x4
- 59129990 2x3
- 60668495 1x8
- 56109282 2x10

Product Variant 6



- 56109282 2x10
- 56799242 2x4
- 56109282 2x10
- 57046203 2x3
- 56799242 2x4
- 57046203 2x3
- 57974845 1x8
- 56109282 2x10

The experiment

And now **How** and **What**
together



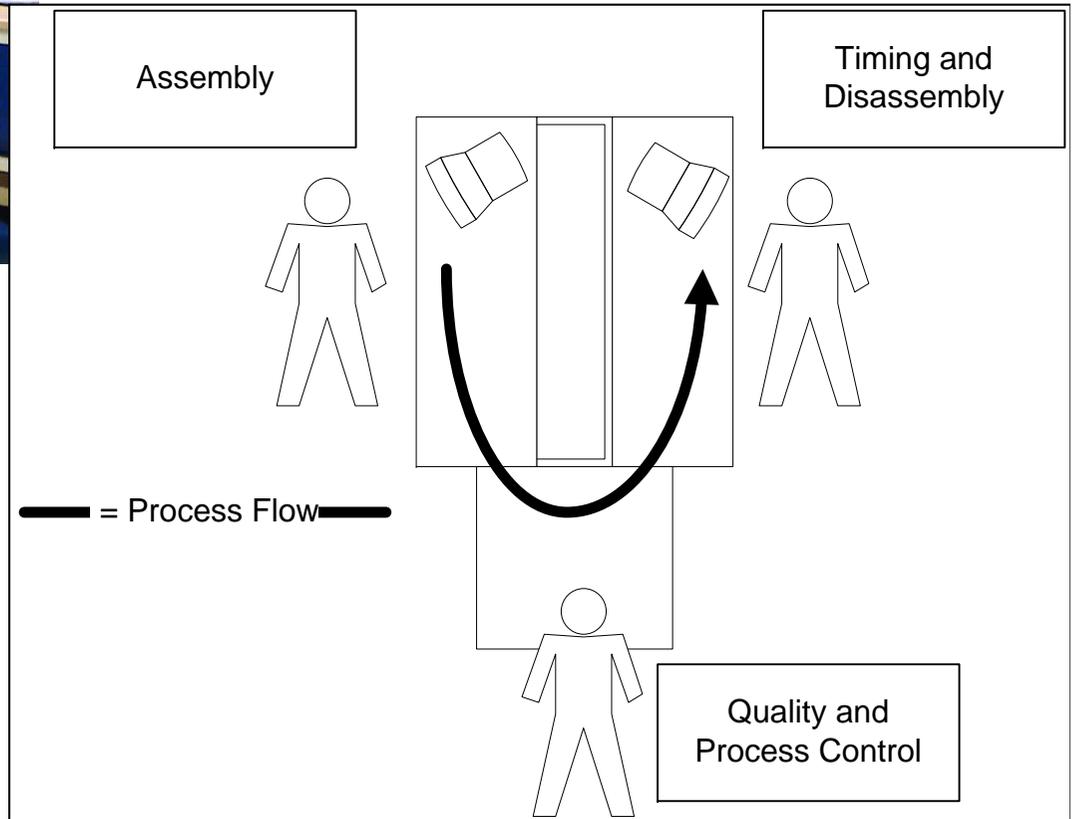
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- 2 minutes training/preparation
- WHAT to assembly showed on laptop
- The worker pushed “Enter” to view next demand

Bomb shelter
At the
University of
Skövde



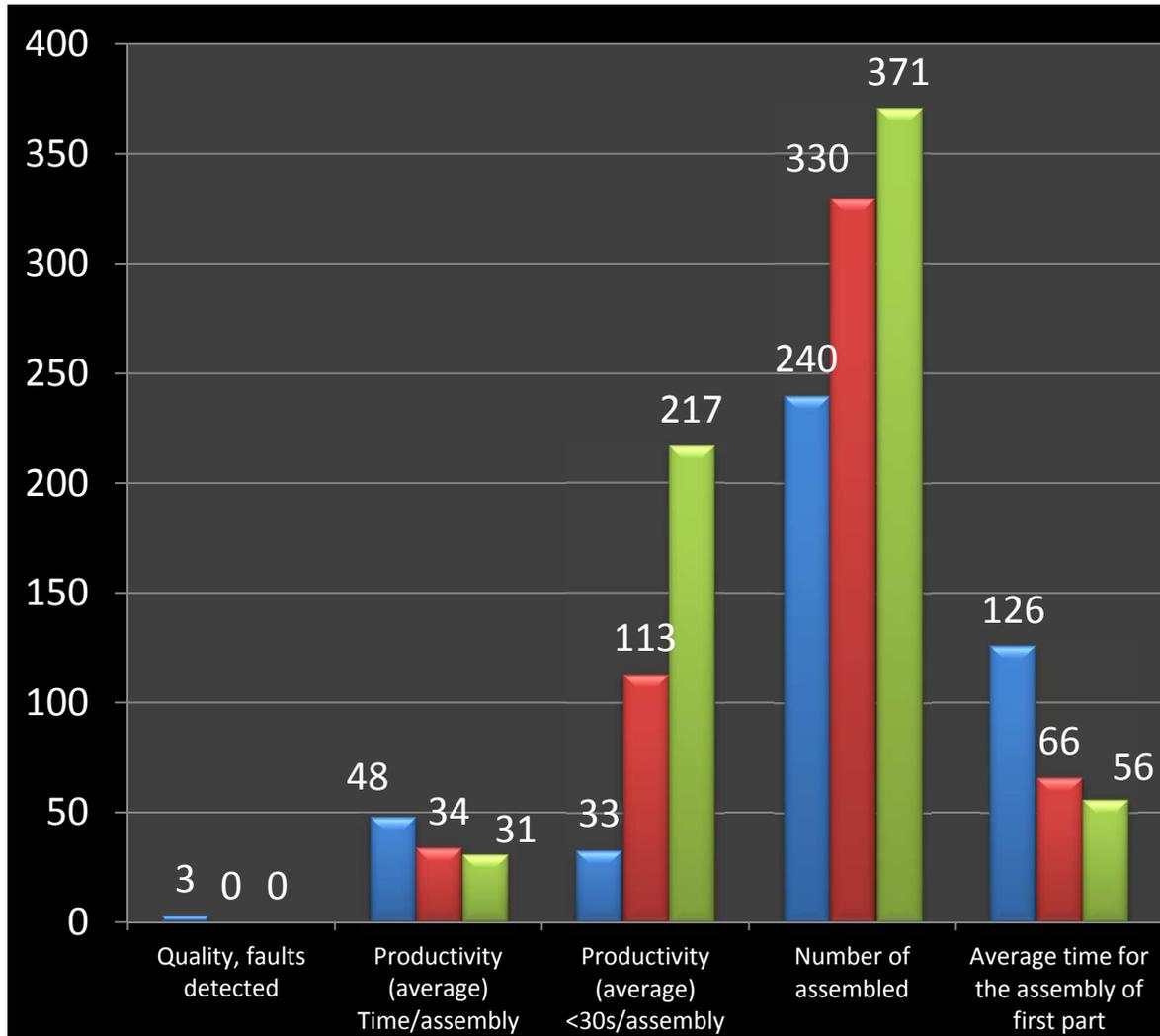
The information

Rubrik	Antal	Instruktionstext
• 56109282	2	Day 1
• 55724016	2	
• 56109282	1	
• 57046203	1	
• 55724016	1	
• 57046		
• 60668		
• 56109		

Rubrik	Antal	Instruktionstext
• 56109282	4	Day 2
• 57046203	2	
• 55724016	3	
• 60668495	1	

Rubrik	Antal	Instruktionstext
• 😊	4	Day 3
• ♂	2	
• 😊	3	
• 🎵	1	

Results/outcome



Rubrik	Antal	Instruktionstext
• 😊	4	
• ♂	2	
• 😊	3	
• 🎵	1	

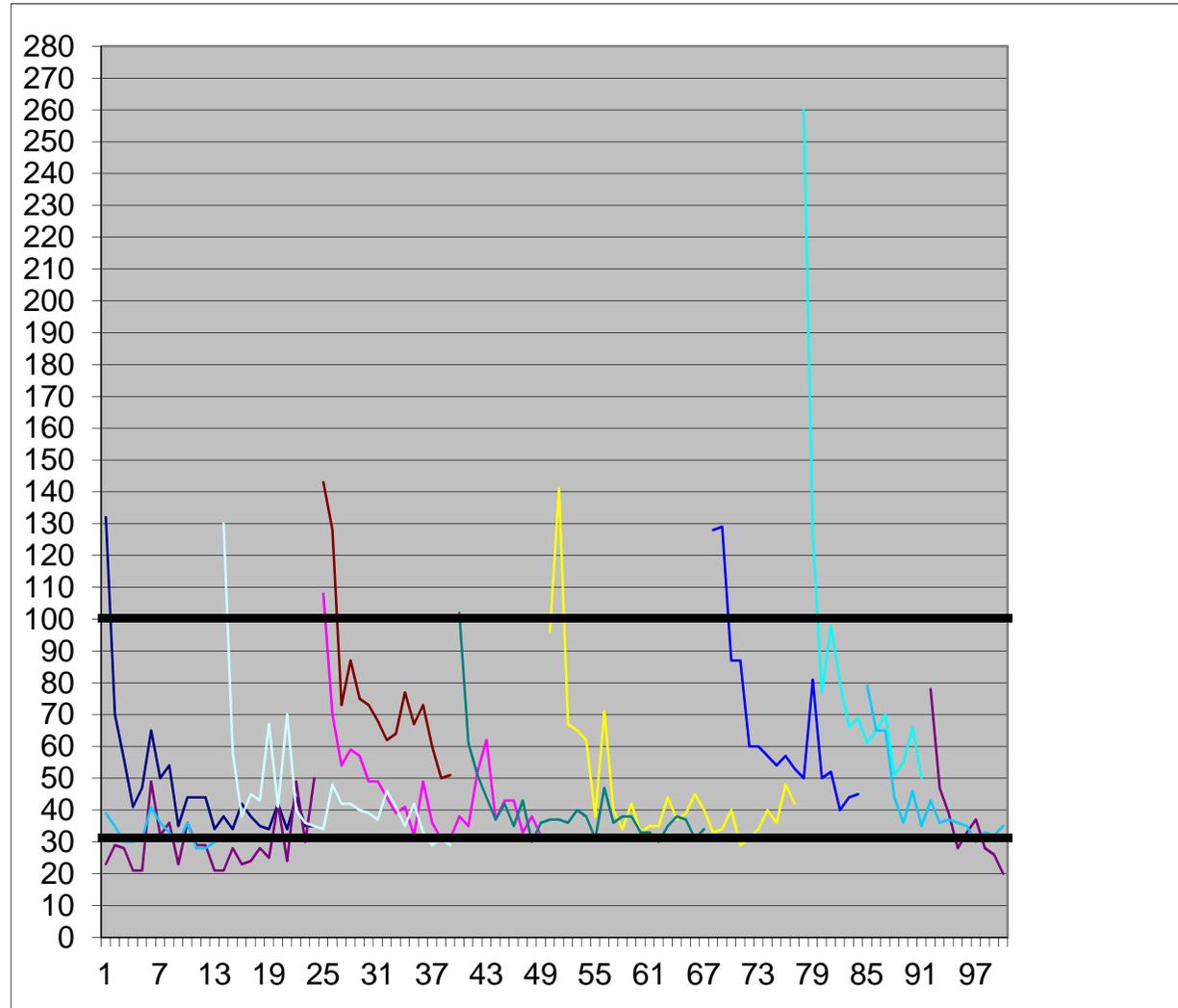
• 57046203	2	
• 55724016	3	
• 60668495	1	

• 561092		
• 557240		
• 561092		
• 570462		
• 55724016	1	
• 57046203	1	
• 60668495	1	
• 56109282	1	



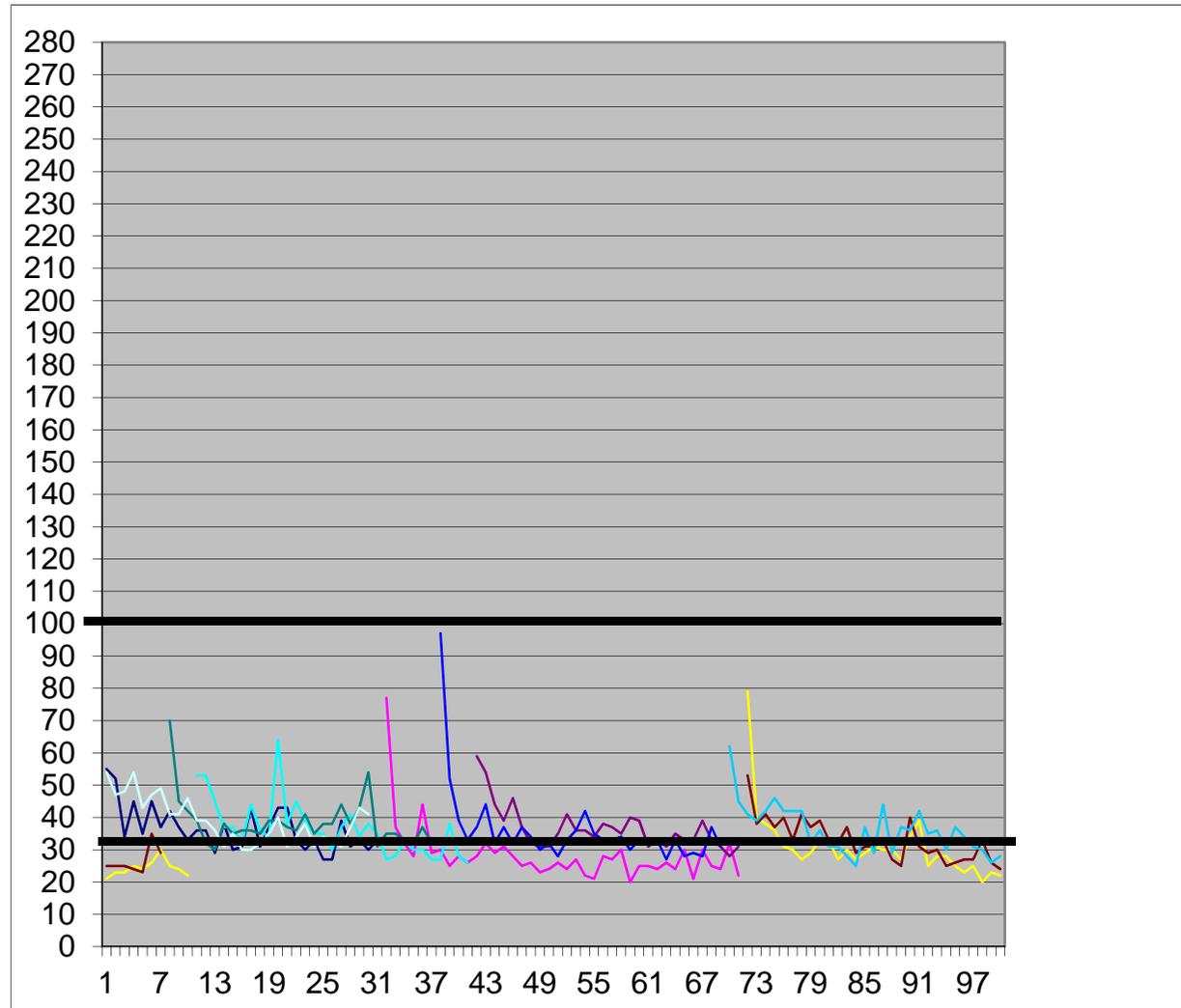
”Learning Curve”

Rubrik	Antal	Instruktionstext
• 56109282	2	
• 55724016	2	
• 56109282	1	
• 57046203	1	
• 55724016	1	
• 57046203	1	
• 60668495	1	
• 56109282	1	



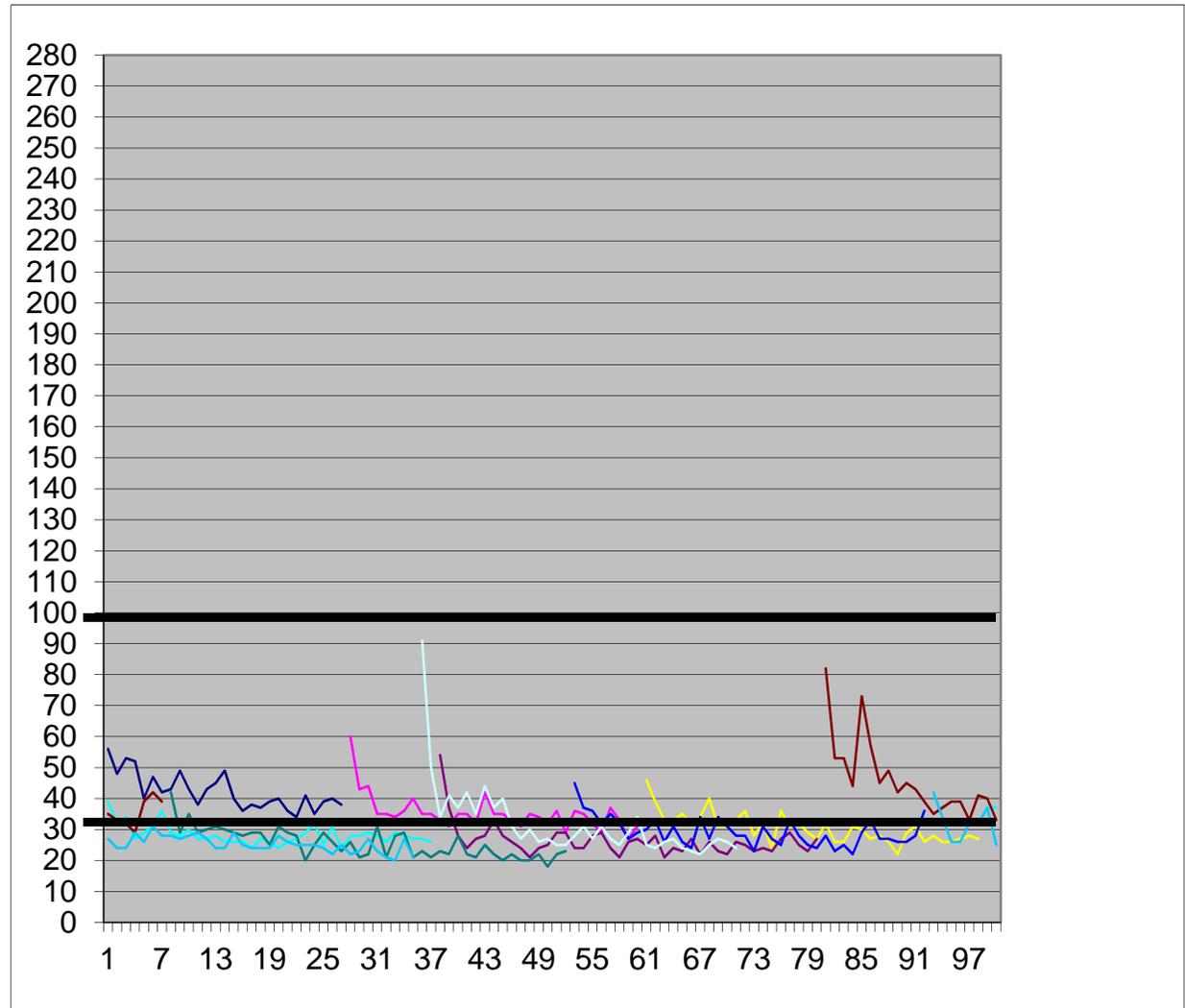
”Learning Curve”

Rubrik	Antal	Instruktionstext
• 56109282	4	
• 57046203	2	
• 55724016	3	
• 60668495	1	



”Learning Curve”

Rubrik	Antal	Instruktionstext
• 🤖	4	
• 🔄	2	
• 😊	3	
• 🎵	1	



Conclusions / reflexions

- **It is** possible to influence the productivity
- According to the assembler, much **easier** to assembly using symbols
- A **very simple**/easy/elementary product, if the product is complex, would the increase in productivity occur?
- Directly after a assembly of a low volume product, the **time to assembly a high volume product increased** compared with a assembly before a low volume **why!!???**

During the coffee:

Try how different information provider can affect productivity



Thank you

Questions?

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