



**International Academy for Production Engineering**

7<sup>th</sup> CIRP Conference on Assembly Technologies And Systems

**Tianjin, China**

**May 10 - 12, 2018**



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**Application of design principles for  
assembly instructions  
– evaluation of practitioner use**

by

**Sandra Mattsson, Dan Li and Åsa Fast-Berglund**

Chalmers University of Technology

# Outline

- Application of (2)
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- design principles for assembly instructions (1)
  - Design Principles for Information Presentation
- - evaluation of practitioner use (3)
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# Design Principles for Information Presentation (DFIP)

1. DFIP 1 was developed 2013-2015 (background)
  - 50 assembly work experiments, with instructions
  - All test subjects were interviewed
  - Instructions were improved
  - 10 more assembly work experiments
  - Conclusions led to the formulation of DFIP 1
2. DFIP 1:
  1. Support active cognitive processes
  2. Support mental models
  3. Support abilities and limitations
  4. Support individual preferences/differences
  5. Support perception (placement)

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# Design Principles for Information Presentation (DFIP)

1. DFIP 1 (earlier version), similar to DFIP 2
  - Less self-explanatory headings and lack of step 1 in DFIP 2
2. DFIP 2 (new version):
  1. Choose a work task in the workplace
  2. Identify and support active cognitive processes in each sub-task
  3. Analyse tasks based on how the operator perceives the work environment
  4. Analyse tasks depending on cognitive limitations
  5. Analyse tasks depending on individual differences and needs
  6. Analyse tasks depending on placement of information content and carrier

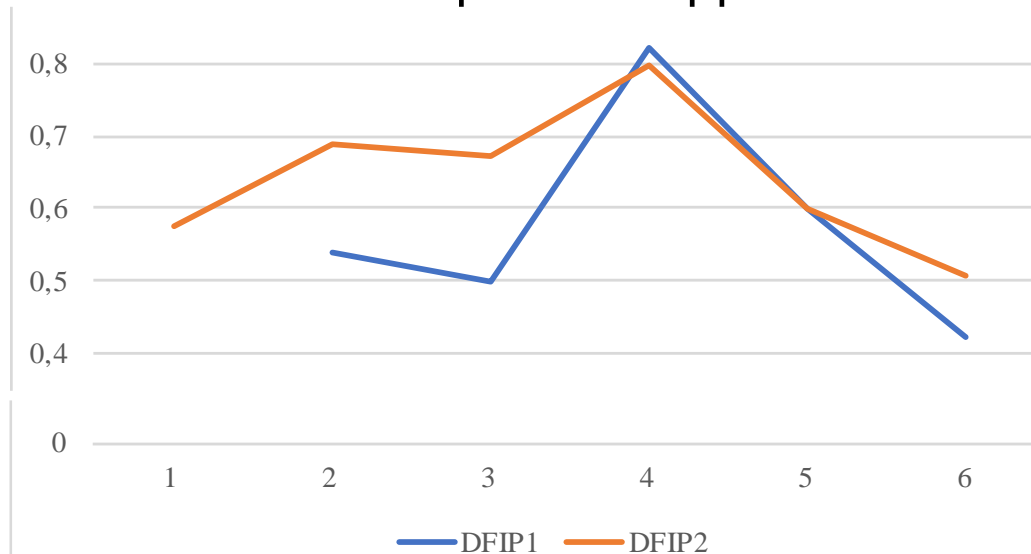
# Case Descriptions

1. Case A: DFIP 1 was used by 47 MSc. students (2016)
2. Case A: DFIP 2 was used by 57 MSc. students (2017)
  - Part of a course in cognitive ergonomics, individual assignments
3. Case B: DFIP 1 and 2 were used by 32 shop-floor operators and technicians (2016-2017)
  - Developing new assembly instructions in groups
  - Varying 2-4 participants
4. Case C: DFIP 2 was used in BSc. thesis (2017)
  - Creating 2 sets of work instructions at a SME; paper and video

# Evaluation and Results

## 1. Case A (MSc. course assignment)

- Sandra Mattsson and Dan Li assessed separately:
  - What DFIP steps were used
  - What extent these steps were applied



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# Evaluation and Results

1. Cases B (operators and technicians) and C (BSc. thesis at company)
  - Developed instructions were assessed:
    - What DFIP steps were used
    - What DFIP steps were disused
    - Is it easy to understand the assembly steps?
    - Is the overview good (final step)?
    - Is it possible to assemble the product wrong?

# Evaluation and Results

## 1. Case C (BSc. thesis at company)

Evaluation form	Paper instructions	Video instructions
1. Which DFIP steps were used	Steps 1, 2, 4, 6	Steps 1, 2, 3, 4, 6
2. Which DFIP steps were disused	Steps 3, 5	Step 5
3. Is it easy to understand the assembly steps?	Yes	Yes
4. Is the overview good (final step)?	No overview	No overview
5. Is it possible to assemble the product wrong?	Yes	Yes



# Evaluation and Results

## 1. Case C (BSc. thesis at company)

**Arbetsdokument**

**Syfte**  
Gäller för slutkund Leine Lindes produkter för att säkerställa rätt kvalitet

**Maskering av Käpa Front**

1. Sätt i en konisk hålplugg GK 1024x1000 vid artikel nr 128001 och 128008 , Axelmaskering GA 1187x150 vid artikel 128003 och 128004
2. Täck de fyra hälen med rondeller ifrån de färdigutskrivna tejparken, sätt de så att man lätt får tag i dem vid avmaskering
3. Täck hela ytan med en stor tejp, var noga med att trycka till teipen ordentligt så att det inte läcker in färg.
4. Vänd och sätt i 4 st. Push plugg M3 EPDM 1219766 vid artikel 128001 och 128003 och 6 st vid artikel 128008 och 128004
5. Gör hål i teipen, häng upp på hängare avsett för Leine Linde 21 st / vagn Totalt 210 st

**Kontroll innan avmaskering**  
Kontrollera artikeln enligt kravnivå 4 LK

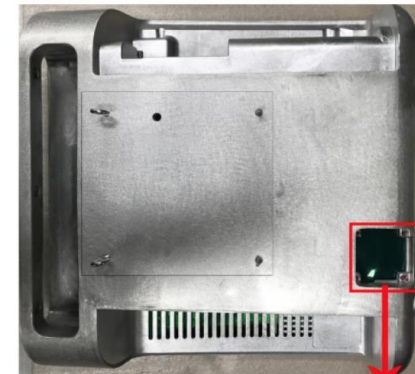
**Avmaskering av Käpa Front**

1. Ta bort och släng alla svarta små proppar. Saknas det nån och det finns färg i måste hålet gängas ur(doppa gängtapp i T-röd före) ,vid vass färgkant ta bort det med en försänkare.
2. Ta bort proppen ,rensa det stora hålet från färg med gradaren.
3. Vänd på artikeln och ta bort de små rondellerna inuti.
4. Skär bort den vassa färgkanten runt om med kniven.
5. Blås ordentligt runt om så att allt smuts försvinner. Va extra noggrann på insidan !
6. Packa i halvpall med 35 st /lager , 11 lager totalt 385 st
7. Använd medföljande foamskivor ,avsluta med en foamskiva och bubbelpåsar för att detaljerna ska ligga still vid transport.

**Korrigerande åtgärd**  
Ex Vid fel kontakta förman

➤ Fäst öglor och proppar i hål på baksidan.

Redskap: Hängöglor\*2, Ploppar\*6 och Tång



Tips!



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# Discussion and Conclusion

1. Choose a work task in the workplace	Not applicable to Case A Used in Cases B and C
2. Identify and support active cognitive processes in each sub-task	Used in all 3 cases
3. Analyse tasks based on how the operator perceives the work environment	Used in all 3 cases
4. Analyse tasks depending on cognitive limitations	Most used in Case A Least used in Case B Used in Case C
5. Analyse tasks depending on individual differences and needs	Used in Case A and B Not used in Case C
6. Analyse tasks depending on placement of information content and carrier	Least used in Case A Used in Cases B and C

- DFIP supports engineers and operators to create good work instructions
- Some DFIP steps are easier to apply, some's descriptions can be improved