Deutsche MTM-Vereinigung e.V.

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Human work in the "4.0" age

connecting the digital to real world!

1st International E-Mas Conference

March 21, 2019

Leon, Guanajuato, Mexiko

Identify the relevant aspects...





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Can we trust or "proof" digital motion data?



Are Motion Capturing and Human Simulation useful?

- Individualised work method (varying from cycle to cycle)
- Does planning work (work measurement, work standards) make sense in 4.0 times?
 - Do we need information about working times?
 - Do we need ergonomic workplace design?
 - If yes?
 - How?

Agenda

- Introduction
 - MTM Methods-Time Measurment
 - EAWS Ergonomic Assessment Worksheet
- Motion Capturing and Human Simulation
- Linking digital to real world!
 - Transfer of digital motion data into MTM analysis
- Q & A







The two dimensions/aspects of MTM



MTM Methods-Time Measurement

instrumental: methodology



- Process language, accepted norm/standard performance
- Worldwide approved standard
- Holistic description, evaluation and design or work systems and processes

institutional: organisation



- training, research, software & consulting one stop
- Worldwide unified trainings and certificates



How to apply MTM? How to create a work standard?

Plan or observe operation

Assemble connection plug to compressor and tighten with torque wrench.



Modeled standard operation incl. standard time (285 TMU \approx 10s)

D	Distance	e (cm)	0 ≤ 20	20 ≤	≤ 50	50 :	≤ 80	MT (exam	M-Dataca	a rd M-UAS
								Bas	ic Operatio	ons)
Ge	et and Pl	ace	AF1 (40 TMU)	Al (65	F2 TMU)	A (80	F3 TMU)			
На	Handle Aid		HB1 (40 TMU)	HI (60	HB2 HB3 D TMU) (75 TMU)		B3 TMU)	Choose		ocs and
] model operation		
										ration
M	итм	C P	MTM Planning Analy	And sis XI	Produc	tion An	alysis	File No Shee	o.	-
	Code	DZ	705.	0	5.		5			-
De	escription	Asser	nble connecti	on plu	g					_
No.	Descriptio	'n			Code		TMU	QxF	Total TMU	
1			Plug to t	I A	F2	65	1	65		
1	Turn on					A2	15	5	75	
1	Torque wrench					IB2	60	1	60	
1	1. Turn					A1	5	1	5	
1	23. Turn					C1	30	2	60	
1	Turn to torque					D	20	1	20	<u> </u>
								1	Σ 285	

EAWS - Ergonomic Assessment WorkSheet



Methodology to **assess** the **biomechanical risk** of work based on **physical loads** of the **whole body** and the **upper limbs**.



EAWS can be applied

- prospectively, preventively and correctively and
- is an effective tool to identify ergonomic (biomechanical) risk.

Intensity of

load



Change → towards work design - "prospective approaches"



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Motion Capturing suit AXS-Anzugs













Ergonomic assessment based on Motion Capturing

1. Motion data -> 2. Human model -> 3. Motion determination -> 4. Ergonomic assessment



MTN



1. Motion data: tracking with an MoCap suit (AXS)



source: Miele

2. Human Model & 3. Motion determination

4. Ergonomic assessment

- Identify and reduce awkward loads
- Synchronize planning and reality
- Exercise assembly operations

	* L						
Analysiert wurde der A	Arbeitsinhalt eines Werkers, weld	cher insgesamt 54,00 s andauert. Zu	r Analyse wurde das EAWS Verfahren in der Version E 1.3.5	2016-05-25 verwendet.			
Auswertung							
Ganzer Körper		Obere Extremitäten					
-	Haltung	10,0 Punkte	Aufgabe	1,6 Punkt			
	+ Kräfte	0,0 Punkte	+ Hand/Arm/Schulter	0.0 Punkt			
	+ Lasten	35,0 Punkte	+ Weitere Faktoren	0,0 Punkt			
	+ Extrapunkte	0,0 Punkte	* Dauer	6,5 Punkt			
\bigcirc	Geramtnunkte	45.0 Dunkte	Gecamtruinkte	10 E Dueld			

Simulation (ema) – manual operations, workplace

Transfer of digital motion data into MTM analysis

Simulation analysis (digital world) → As-is and Planning analysis (real world)

ΜΤΝ

Thank you for your attention!

Contact

www.dmtm.com/newsletter

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