INDEVA
INTELLIGENT DEVICES FOR HANDLING

Initial ergonomic assessments for lifting gear: results comparing different models

by

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MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A PALLET ON THE GROUND WITHOUT TWISTING AROUND TO FACE THE PALLET

NET LOADING OR UNLOADING TIME: 24-26 SECONDS

GROSS LOADING AND UNLOADING TIME: 28 SECONDS

FREQUENCY: 8.6 ITEMS PER MINUTE

WEIGHT 16 KG

MOVING CASES MANUALLY

INTELLIGENT DEVICES FOR HANDLING

ASSESSMENT OF MANUAL LOAD MOVEMENT USING NIOSH FORMULA

SITUATION UNACCEPTABLE AS DISTANCE FROM BODY IS GREATER THAN 63 CM

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A PALLET ON THE GROUND, TWISTING AROUND TO FACE THE PALLET

NET LOADING OR UNLOADING TIME: 26 SECONDS

GROSS LOADING AND UNLOADING TIME: 28 SECONDS

FREQUENCY: 8.6 ITEMS PER MINUTE

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

WC = Weight constant: ***25***

No.	Description of action:	Weight (kg)	Height of hands from ground [cm]	Frequency (No. actions per min.)	Time spent raised (min.)	**Lifting index****
1	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*8.00*	*480*	**7.68**
2	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*7.00*	*480*	**6.28**
3	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*6.00*	*480*	**5.12**
4	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*5.00*	*480*	**3.95**
5	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND**	*16*	*90*	*4.00*	*480*	**3.07**
6	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*3.00*	*480*	**2.51**
7	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*2.00*	*480*	**2.13**
8	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND)**	*16*	*90*	*1.00*	*480*	**1.84**
9	**CASE FOR PALLET ROLLER CONVEYOR (ON GROUND**	*16*	*90*	*0.50*	*480*	**1.71**

ASSESSMENT OF MANUAL LOAD MOVEMENT USING NIOSH FORMULA

SITUATION: the risk index is very high if this task is carried out continuously for 480 minutes, both at 8 actions per minute (480 items/h) and at 0.5 actions per minute (30 items/h).

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET, TWISTING AROUND TO FACE THE PALLET

NET LOADING OR UNLOADING TIME: 26 SECONDS

GROSS LOADING AND UNLOADING TIME: 28 SECONDS

FREQUENCY: 8.6 ITEMS PER MINUTE

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

WC = Weight constant: ***25***

No.	Description of action	Weight (kg)	Height of hands from ground (cm)	Frequency (No. actions Per min.)	Time spent raised (min.)	**Lifting index****
1	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*8.00*	*480*	**7.45**
2	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*7.00*	*480*	**6.09**
3	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*6.00*	*480*	**4.96**
4	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*5.00*	*480*	**3.83**
5	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*4.00*	*480*	**2.98**
6	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*3.00*	*480*	**2.44**
7	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*2.00*	*480*	**2.06**
8	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*1.00*	*480*	**1.79**
9	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*0.50*	*480*	**1.65**
10	**CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)**	*16*	*90*	*0.10*	*480*	**1.58**

ASSESSMENT OF MANUAL LOAD MOVEMENT USING NIOSH FORMULA

SITUATION: the risk index is still very high if this task is carried out continuously for 480 minutes, either at 8 actions per minute (480 items/h) or at 0.1 actions per minute (6 items/h).

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

WC =Weight constant: **25**

No.	Description of action	Weight (kg)	Height of hands from ground (cm)	Frequency (no. actions per min.)	Time spent raised (min.)	Lifting index**
1	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	8.00	60	2.23
2	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	7.00	60	1.91
3	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	6.00	60	1.79
4	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	5.00	60	1.68
5	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	4.00	60	1.60
6	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	3.00	60	1.52
7	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	2.00	60	1.47
8	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	1.00	60	1.40
9	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	0.50	60	1.38
10	CASE FOR PALLET ROLLER CONVEYOR (HEIGHT OK)	16	90	0.10	60	1.34

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ASSESSMENT OF MANUAL LOAD MOVEMENT USING NIOSH FORMULA

SITUATION: the risk index still implies the presence of a risk even when alternating movement 1 hour on/1 hour off.

MOVING CASES MANUALLY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND/OR UNLOADING ONTO A PALLET: PROBLEMS FOR THE UPPER LIMBS

SITUATION

ELBOW: PERFORMS FLEXION/EXTENSION

WRIST: ULNAR DEFLECTION WITH USE OF FORCE

HAND: HOOKED POSITION WITH USE OF FORCE

MOVING CASES USING PN ERGO

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INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 74 SEC

GROSS LOADING OR UNLOADING TIME: 76 SEC

FREQUENCY: 3.2 ITEMS PER MINUTE

WEIGHT 16 KG

MOVING CASES USING PN ERGO

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right= 8

Take handle
Lower
Push down
Press button
Raise
Lower
Push down
Raise

LOADING AND UNLOADING ONTO A RAISED PALLET

LEVEL OF FORCE USED:
vertically: MODERATE
in motion: GENTLE/MODERATE

MOVING CASES USING PN FLEX

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 74 SEC

GROSS LOADING OR UNLOADING TIME: 76 SEC

FREQUENCY: 3.2 ITEMS PER MINUTE

WEIGHT 16 KG

MOVING CASES USING PN FLEX

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right= 8

Take handle
Lower
Push down
Press button + raise
Lower
Press button
Push down
Raise

LOADING AND UNLOADING ONTO RAISED PALLET

LEVEL OF FORCE USED:
vertically: GENTLE/MODERATE – STRONG
in motion: GENTLE

MOVING CASES USING PN FLEX

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right= 8

Take handle
Lower
Push down
Press button + raise
Lower
Press button
Push down
Raise

LOADING AND UNLOADING ONTO RAISED PALLET

LEVEL OF FORCE USED:
vertically: GENTLE/MODERATE – STRONG
in motion: GENTLE

MOVING CASES USING LIFTRONIC EASY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 46 SEC

GROSS LOADING OR UNLOADING TIME: 48 SEC

FREQUENCY: 5 ITEMS PER MINUTE

MOVING CASES USING LIFTRONIC EASY

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INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right = 6

Take handle
Lower
Push down
Raise
Lower and unhook
Raise

LOADING AND UNLOADING ONTO A RAISED PALLET

LEVEL OF FORCE USED:
vertically: NONE
in motion: GENTLE

MOVING CASES USING LIFTRONIC EASY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A PALLET ON THE GROUND

NET LOADING OR UNLOADING TIME: 48 SEC

GROSS LOADING AND UNLOADING TIME: 50 SEC

FREQUENCY: 4.8 ITEMS PER MINUTE

MOVING CASES

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right = 6

Take handle
Lower
Push down
Raise
Lower and unhook
Raise

LOADING AND UNLOADING ONTO A PALLET ON THE GROUND

SEE STANDARD EN 1005/4

SUMMARY TABLE FOR CASES

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INTELLIGENT DEVICES FOR HANDLING

CASES

EQUIPMENT TYPE	CYCLE TIME	ITEMS/MIN.	PRODUCTIVITY	TECHN. ACTIONS
PN ERGO	76 sec.	3.2	-36%	8
PN FLEX	76 sec.	3.2	-36%	8
LIFTRONIC EASY	48 sec.	5	<*>	6
MANUAL **NIOSH = 3.83**	60 sec. (continuous 480 min.)	5	- -	3
MANUAL **NIOSH = 1.40**	60 sec. (continuous 60 min.)	1	-80%	3

MOVING REELS USING PN ERGO

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 56-48 SEC

GROSS LOADING AND UNLOADING TIME: 58-50 SEC

FREQUENCY: 4.1 ITEMS PER MINUTE

WEIGHT 11 KG

MOVING REELS USING PN ERGO

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right= 8

Take handle
Lower
Push down
Press button
Raise
Lower
Push down
Raise

LOADING AND UNLOADING ONTO A PALLET ON THE GROUND

LEVEL OF FORCE USED:
vertically: MODERATE
in motion: GENTLE/MODERATE

MOVING REELS USING PN FLEX

INDEVA
INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 53 SEC

GROSS LOADING OR UNLOADING TIME: 55 SEC

FREQUENCY: 4.5 ITEMS PER MINUTE

WEIGHT 11 KG

MOVING REELS USING PN FLEX

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right= 8

Take handle
Lower
Push down
Press button + raise
Lower
Press button
Push down
Raise

LOADING AND UNLOADING ONTO A RAISED PALLET

LEVEL OF FORCE USED:
vertically: GENTLE/MODERATE – STRONG
in motion: GENTLE

MOVING REELS USING LIFTRONIC EASY

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INTELLIGENT DEVICES FOR HANDLING

LOADING AND UNLOADING ONTO A RAISED PALLET

NET LOADING OR UNLOADING TIME: 40 SEC

GROSS LOADING OR UNLOADING TIME: 42 SEC

FREQUENCY: 5.7 ITEMS PER MINUTE

MOVING REELS USING LIFTRONIC EASY

INDEVA
INTELLIGENT DEVICES FOR HANDLING

ACTIONS on the right = 6

Take handle
Lower
Push down
Raise
Lower and unhook
Raise

LOADING AND UNLOADING ONTO A RAISED PALLET

LEVEL OF FORCE USED:
vertically: NONE
in motion: GENTLE

SUMMARY TABLE FOR REELS

INDEVA
INTELLIGENT DEVICES FOR HANDLING

REELS

EQUIPMENT TYPE	CYCLE TIME	ITEMS/MIN.	PRODUCTIVITY	TECHN. ACTIONS
PN ERGO	58 sec.	4.1	-28%	8
PN FLEX	55 sec.	4.5	-21%	8
LIFTRONIC EASY	42 sec.	5.7	<*>	6
MANUAL NIOSH = 3.31	60 sec. (continuous 480 min.)	6	- -	3
MANUAL NIOSH = 0.93	60 sec. (continuous 60 min.)	1	-82%	3

MOVING REELS USING LIFTRONIC EASY

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INTELLIGENT DEVICES FOR HANDLING

LOADING ONTO A RAISED PALLET, INITIAL EQUIPMENT ENHANCEMENTS

SWITCH FROM PINCH HOLD TO OPTIMUM HOLD: GRIP

MOVING REELS USING LIFTRONIC EASY

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INTELLIGENT DEVICES FOR HANDLING

LOADING ONTO A RAISED PALLET, INITIAL LAYOUT/ORGANISATIONAL ENHANCEMENTS

NET LOAD TIME: 45 SEC

NET LOAD TIME: 45 SEC (same as before: WHY?)

PROPOSED WORKFLOW FOR CHOOSING ASSISTANCE

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LAYOUT ANALYSED WITH CUSTOMER

WORK TIMES ANALYSED WITH MTM

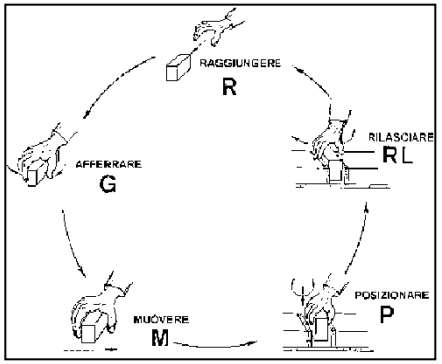
PRODUCTIVITY VERIFIED WITH CUSTOMER

NO

YES

ORDER PROCESSED

Definition
The MTM system is a procedure used to analyse manual work in terms of its basic movements. A time allocated in advance is set for each basic movement, which depends on the circumstances and conditions under which the movement is performed.



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