

# Construction ergonomics: A support work manufacturer's perceptions and practices

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## Objectives

The objectives were to determine the:

- Importance of ergonomics during seven temporary works stages of projects;
- Extent to which construction ergonomics could be influenced during seven temporary works stages of projects;
- Frequency at which construction ergonomics is considered on various occasions, and relative to various temporary works design related aspects;
- Extent to which various temporary works design related aspects impact on construction ergonomics, and
- Respondents' perceived knowledge of ergonomics.

## Theoretical review

According to the South African Construction Regulations (Republic of South Africa, 2014), designers must take cognisance of ergonomic design principles during the design stage to minimise ergonomic related hazards in all phases of the life cycle of a structure. 'Designing for safety' is "The consideration of construction site safety in the preparation of plans and specifications for construction projects." (Behm, 2006), and Thorpe (2006) contends that design is an important stage of projects, as it is at this stage that conceptual ideas are ideally converted into constructable realities.

## Research method and sample stratum

A questionnaire survey was administered among staff of a major international temporary works designer and supplier attending an in house 'designing for construction ergonomics' workshop presented by the author. 23 Responses were included in the analysis of the data.

## Results

The results are presented using mean scores (MSs) between 1.00 (lower limit) and 5.00 (upper limit), based upon percentage responses to a five-point Likert scale.

**Table 1: Importance of ergonomics to respondents' organisations during seven temporary works stages of projects (MS = 1.00 – 5.00)**

Stage	MS	Rank
Supply of equipment	4.62	1
Detailed design	4.55	2
Concept and feasibility	4.50	3
Project initiation and briefing	4.47	4
Construction documentation and management	4.33	5
Project close out	4.30	6
Tender documentation and procurement	4.25	7

**Table 2: Respondents' self-rating (limited to extensive) of their knowledge with respect to aspects (MS = 1.00 – 5.00)**

Aspect	MS	Rank
Ergonomics	2.77	1
Designing for construction ergonomics	2.77	2
Construction ergonomics	2.73	3

**Table 3: Frequency (never to always) at which the respondents' organisation considers construction ergonomics on various occasions (MS = 1.00 - 5.00)**

Occasion	MS	Rank
Design (U)	4.68	1
Detailed design (U)	4.59	2
Discussions with the principal contractor (U, M, D)	4.45	3
Site visits / inspections (D)	4.41	4
Working drawings (U)	4.32	5
Equipment delivery (M)	4.29	6
Client (Contractor) meetings (U, M, D)	4.19	7
Project progress meetings (D)	4.00	8
Design coordination meetings (U)	4.00	9
Project close out reports (D)	3.88	10
Deliberating project duration (U)	3.86	11
Preparing project documentation (M)	3.68	12
Constructability reviews (U)	3.56	13
Discussion of H&S plan (M)	3.33	14

**Table 4: Frequency (never to always) at which the respondents' organisation considers construction ergonomics on various temporary works design related aspects (MS = 1.00 - 5.00)**

Aspect	MS	Rank
Method of connecting	4.33	1
Method of fixing	4.33	2
Details	4.32	3
Specification	4.24	4
Mass of components	4.24	5
Design of temporary works (general)	4.19	6
Surface area of components	4.05	7
Finish of components	4.05	8
Elevations	4.00	9
Position of components	4.00	10
Plan layout	4.00	11
Sectional area of components	3.95	12
Site location	3.71	13
Edge (s) of components	3.63	14
Texture of components	3.39	15

**Table 5: Extent (minor to major) to which various temporary works design related aspects impact on construction ergonomics (MS = 1.00 - 5.00)**

Aspect	MS	Rank
Details	4.45	1
Method of connecting	4.43	2
Method of fixing	4.43	3
Specification	4.29	4
Plan layout	4.27	5
Design of temporary works (general)	4.27	6
Mass of components	4.23	7
Elevations	4.14	8
Surface area of components	3.85	9
Finish of components	3.75	10
Site location	3.71	11
Position of components	3.65	12
Sectional area of components	3.58	13
Edge (s) of components	3.56	14
Texture of components	3.43	15

**Table 6: Extent (minor to major) to which the respondents' organisation could influence construction ergonomics during seven temporary works stages of projects (MS = 1.00 – 5.00)**

Stage	MS	Rank
Detailed design	4.68	1
Supply of equipment	4.45	2
Concept and feasibility	4.27	3
Construction documentation and management	3.90	4
Project close out	3.89	5
Project initiation and briefing	3.76	6
Tender documentation and procurement	3.60	7

## Conclusions and Recommendations

- Construction ergonomics is important to the respondents' organisation during all project stages
- The respondents' organisation considers construction ergonomics on various occasions and relative to temporary works design related aspects
- The respondents' organisation understands and appreciates that ergonomics can be influenced more during the upstream than downstream stages
- The respondents appreciate the extent to which various temporary works design related aspects impact on construction ergonomics
- The respondents' actions reflect rational thinking
- Respondents are in need of ergonomics related continuing professional development (CPD)
- Tertiary built environment education should address temporary works design and construction H&S and ergonomics
- Designing for construction H&S and ergonomics, temporary works design included, should be introduced and more importantly, embedded in tertiary built environment education programmes
- Temporary works design standards should highlight designing for construction H&S and ergonomics, and practice notes, and CPD should be evolved