

Mecmesin

testing to perfection

job task evaluation

safety

ergonomics
& occupational therapy

Force & Torque
Test Solutions for

manual handling

what is manual handling?

Manual handling is a term used to describe the transporting or supporting of loads by hand or by bodily force when lifting, lowering, pushing, pulling, carrying or otherwise moving, holding or restraining a person, animal or object. This force can be applied directly or indirectly, for example, carrying a crate or activating a control. Introducing mechanical assistance, such as a sack truck or powered hoist, helps reduce the level of manual handling involved for an individual, however, some human effort is still required to move, steady or position the load.

manual handling affects all industries...

From the office to the factory floor and from health assessment facilities to surveyor practices, everyone is affected by manual handling to a greater or lesser extent, with the potential to create serious ergonomic hazards impacting those involved.

Across the globe major manufacturers working with manual handling use Mecmesin test equipment to:

Maintain safety...

Are you able to ensure continued safety in the workplace by regularly testing task strength requirements, equipment and accessibility? How easily can you test the force to open a power-assisted door, the force required to perform daily routines for those with reduced strength capabilities?

Minimise costs, reduce injuries, and improve production...

Do you know the precise force required to lift a crate, push a trolley, open a door, turn a handle? Are you able to optimise tasks by assessing the strength of your workforce to better match their capabilities? Have you undertaken initiatives to minimise ergonomic risks to staff and help reduce the possibility of compensation claims?

Maintain a professional reputation...

Are you able to perform accurate tests to ensure regulatory compliance for your clients? Can you adequately assess recovery from injury ensuring patient health is not compromised through inappropriate testing techniques and inaccurate results?

Conform to all relevant standards...

Can you guarantee that your manual handling tasks comply with all applicable legislation and safety standards, year after year? Are you able to perform tests in line with legislation to ensure disability access compliance? **



push



pull



carry



lift

** Disability Discrimination Act UK 1995 (amendment) Regulations 2003, which came into force 1st October 2004

how can manual handling risks be identified?

It is essential to test manual handling in order to identify potential hazards that could cause harm. Equipment, which is susceptible to gradual wear or corrosion of wheels, bearings or hinges, may be regularly checked using force or torque testing instruments. This will highlight defects which can be addressed before they cause unnecessary accidents to operators or damage to products being transported.



Mecmesin Basic Manual Handling Kit shown in use

For over 35 years Mecmesin has provided cost-effective quality testing solutions to ergonomists and health & safety professionals working with manual handling across a range of industries including, automotive, aerospace, construction, manufacturing, medical, production, retail and regulatory authorities (HSE - Health & Safety Executive).

Mecmesin standard ergonomic kits provide the correct tools to assess a wide variety of manual handling applications to a high level of quality & force measurement requirements.

Mecmesin ergonomic kits can be used to analyse and document the output for,

- Accessibility & DDA auditing
- Functional & Physical Work Capacity evaluation
- Rehabilitation assessment
- Job Task evaluation
- Isometric muscle strength assessment
- Ergonomic risk analysis



turn



hold/repeat



steady



support

Manual Handling Testing Kits

Mecmesin manual handling kits offer versatility and precision measurement for a wide range of applications, eliminating the subjective nature of testing by providing clear, objective, accurate results.

Advanced Manual Handling Kit

The Advanced Manual Handling kit comprises the following elements,

Recognises data from a range of external force & torque transducers, e.g. pinch sensor and hand gripper (see below)

RS232 data output for easy data transmission

View the 1st peak and ultimate peak readings. On-board memory stores up to 100 readings

Accurate to $\pm 0.1\%$ full-scale - far superior to old-fashioned spring balances

Audible & visual pass/fail alarms. Set a threshold for immediate alert when limits are exceeded

Clear digital display shows readings in Newtons (N), kilograms-force (kgf), or pounds-force (lbf)

Reversible display. View readings even when the gauge is positioned away from you

Rugged metal housing. Ideal for factory or outdoor use

Internal loadcell stud for quick and easy change of accessories and fixtures



Gripping Cradle

The dual-handle cradle allows the comfortable application of push/pull loads



Chain Link Assembly

The versatile chain assembly is used to grip a variety of objects, which are otherwise difficult to hold



Pinch Sensor

Used in conjunction with an Advanced Force Gauge, this sensor is suitable for clinicians and therapists to determine pinch strength



Hand Gripper

Used in conjunction with an Advanced Force Gauge this sensor is suitable for clinicians and therapists to determine grip strength

External Sensors (sold separately)

Basic Manual Handling Kit



RS232 data output for easy data transmission

Clear digital display shows readings in Newtons (N), kilograms-force (kgf), or pounds-force (lbf)

Rugged metal housing ideal for factory or outdoor use

Accurate to $\pm 0.25\%$ full-scale



Transit Case

The contents of the Advanced or Basic Manual Handling kit can be neatly stored in the rugged transit case for added protection and easy portability

The kit is supplied as standard with,

- Force gauge incl.
- Rechargeable batteries
- Mains adaptor/battery charger
- Gripping cradle
- Chain link assembly
- 50mm rubber-faced compression plate
- Test hook

Optional extras



Pistol Grip

For applications that require single-handed operation, the Pistol Grip can be attached to a gauge instead of the standard Gripping Cradle

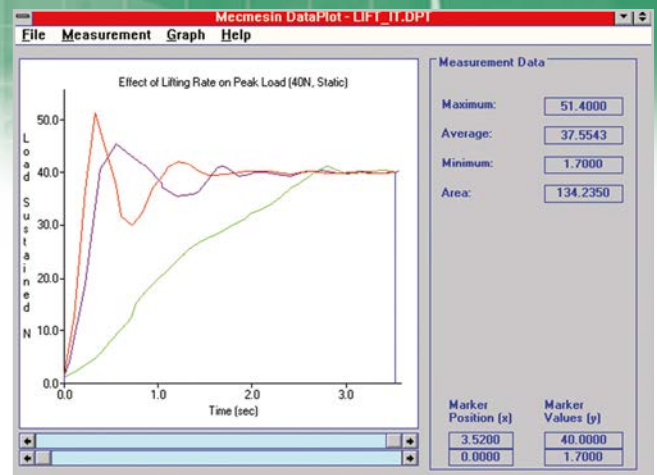


Padded Radiused Probe
Suitable for physical assessment applications, such as leg extension tests

DataPlot Software

This simple Windows package is used for logging, plotting and analysing the force and torque data generated from our push/pull gauges, providing you with a graphical representation of each test for analysis possibilities. Suitable for use with both Advanced & Basic Manual Handling Kits. Features include;

- Auto-ranging
- Zooming/re-scaling
- Overlaying of test traces
- Printout of graphical data
- Data export to spreadsheets



Job Task Evaluation

Job Task Evaluation is a comprehensive analysis of a person's physical ability to perform tasks in the workplace and provides important information regarding the demands of the application. It is essential to match the capabilities of personnel with the requirements of the task to;

- maximise occupational health and safety
- gain improvements in productivity
- reduce costs incurred through injuries to personnel
- comply with relevant regulations

“ The National Institute of Occupational Safety & Health estimates that at least 23% of all work injuries are caused by manual handling tasks. ”*

* extract from the NIOSH website

Musculoskeletal disorders are most likely to occur in the workplace as a result of inappropriate, repetitive handling tasks. These types of disorders affect millions of workers across a range of industries and cost employers billions in lost man hours and compensation claims. To reduce the likelihood of musculoskeletal injury, the risk factors must be identified and suitable alternative practices incorporated into day-to-day work routines.

Handling Task Examples

- **Health service:** pushing a wheelchair, assisting patients to walk or move
- **Retail:** loading/unloading stock, moving trolleys, stocking shelves
- **Construction:** operation and handling of heavy machinery
- **Transport:** baggage/cargo handling, operating controls, moving equipment
- **Manufacturing:** repetitive handling of machinery & assembly line work
- **Office:** workstation logistics, opening/closing drawers, lifting heavy stationery items

pushing



pulling



pushing



lifting & carrying



Physical Work Capacity (PWC) evaluations ensure that staff are able to cope adequately with the level of demanding tasks placed upon them. It also enables employers to measure a potential applicants ability to perform tasks prior to recruitment, ensuring only those candidates capable of safely undertaking the work are hired.

From pushing a wheelchair to lifting & carrying heavy goods, testing the force required to overcome the initial inertia and the subsequent force needed to keep an item in motion will enable a quantitative assessment to be made as to whether the task is feasible, safe to perform and if the candidate is suitable to perform the job.

Solution

Mecmesin can provide quality testing solutions to assess,

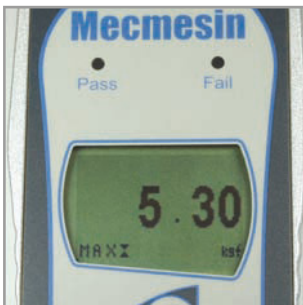
The demands of the task upon the individual

Mecmesin equipment can measure the force required to push, pull, lift and rotate (twist & turn) an object to determine the level of strength needed to perform the task, and whether the force required is within the guidelines and rules set out by governing bodies.

The capacity of the person to perform the task

Two different methods apply to the changing circumstances under which such tests may be performed,

- **Physical Work Capacity** (PWC) tests assess a person's ability to undertake physically demanding tasks to ensure they can meet the needs of the work involved.
- **Functional Capacity** (FC) tests are used when personnel return to work after injury, rehabilitation or an extended leave of absence, often resulting in strength and fitness limitations. Undertaking this test will enable them to perform tasks at the correct level.



Mecmesin Advanced Manual Handling Kit displaying average force over time reading

Mecmesin provides easy analysis tools to evaluate job tasks and the capabilities of personnel insitu. Where the task involves exertion over a given period of time, continuous measurements are recorded and the average force, over the time period, is automatically calculated in addition to the peak strength required to perform the task.

Legislation & Regulation

- ISO 11228-1:2003 Ergonomics - Manual Handling
 - Part 1 Lifting & Carrying
 - Part 2 Pushing & Pulling
 - Part 3 Handling of low loads at high frequency
- European Council Directive 90/269/EEC - Health & safety requirements for the manual handling of loads

- Manual Handling Operations Regulations 1992 •
- Health & Safety at Work Act 1974 •
- Management of Health & Safety at Work Regulations 1992 •
- Occupational Health & Safety Act 1984 •
- Occupational Health & Safety (Manual Handling) Regulations 1999 •
- Code of Practice for Manual Handling 2000 •



pushing



testing force to pull loaded trolley



testing force to close cabinet drawer



testing force to push cargo dolly

" As a leading handling agent in the air cargo industry our staff are often called upon to move heavy and unusual loads. We were seeking a tool that could help us measure the force for pushing and pulling aircraft pallets and trailers to ensure our teams health and safety. Mecmesin provided good assistance with helping us select a suitable product and have always been on hand to tackle any technical questions which we have had. " Servisair UK Limited

Safety Regulations

The physical effort required to open a door or window is often the single most important barrier to overcome and can be the most vital when threatened with imminent danger. From pushing a door to activating an automatic gate or barrier, the force employed to gain access and the ensuing force used to close the access must be measured to ensure compliance with legislation, and more critically, safety.

- Manual doors
 - swing doors
 - sliding doors
 - folding doors
 - lifting doors
 - tilting doors
 - aircraft doors
- Self-closing doors
- Lift doors
- Powered doors
- Fire doors
- Turnstiles
- Revolving doors
- Automatic gates, barriers & garage doors
- Windows

“ Children, the elderly and the disabled are the most vulnerable when it comes to access provision and are more likely to suffer the consequences of poor access and lack of safety. ”

The safety implications of industrial & commercial doors and gates are especially significant due to the substantial amount of users and increased likelihood of incidents arising, such as injuries caused through faulty closing mechanisms, or the risk that poorly specified self-closing devices create impassable barriers for the disabled.

Building Hardware

Building hardware components, as well as, the physical elements of doors and windows are also open to scrutiny from regulatory bodies. These include,

- | | | |
|-------------|---------------------|-----------------|
| • Levers | • Handles | • Push-bars |
| • Hinges | • Locks | • Latches |
| • Push-pads | • Emergency devices | • Power-closers |
| • Switches | • Remote controls | • Panic devices |

“ Regular testing is essential as part of a maintenance routine to ensure every component stays within the required tolerance, whilst minimising the risk of faults arising. ”

emergency handle



automated gate



emergency exit



door activator



Two of the most important legal requirements to comply with are,

- Approved Document M (UK Building Regulations 2003)

Approved Document M states the minimum standards for access provision, including opening forces for manually-operated, powered and self-closing doors and the special force requirements for fire doors.

- UK Disability Discrimination Act (DDA)

The UK Disability Discrimination Act brought measures to prevent discrimination against the disabled, for example, making reasonable adjustments to premises to overcome physical barriers to access.

* (Known also as the Americans with Disabilities Act (ADA) in the United States of America).

Mecmesin has extensive knowledge regarding the current standards and test methods employed when evaluating building hardware components and accessibility. Having gained valuable expertise through membership of the Doors Hardware Federation (DHF), Mecmesin products offer exceptional performance for precision quality control measurement.

Standards

Mecmesin products enable you to test access hardware components whenever and wherever necessary to ensure that standards are adhered to. The majority of applications require no more than a force gauge and appropriate accessory, providing a low-cost, easily portable measurement solution, suitable for testing to the following standards,

- EN 12217
Doors - operating forces
- EN 1154
Building hardware. Controlled door closing devices
- BS 8424
Building hardware. Pull handles
- EN 1125
Panic exit devices operated by a horizontal bar (release & re-engagement force and abuse resistance)
- EN 12453
Industrial, commercial and garage doors & gates. Safety in use of power-operated doors
- EN 179
Building hardware. Emergency exit devices operated by a lever handle or push-pad
- ANSI/BHMA A156.10 (US)
Automatic doors
- ANSI A156.19 (US)
Slow opening, low-powered automatic doors and power-assisted doors

In the context of doors, gates and barriers, for example, Mecmesin ergonomic kits can be used to test,

- the force an operator must apply to a manually operated or power-assisted door, gate or barrier to ensure it opens or closes
- the force an automatic or power-operated door, gate or barrier applies before the safety cut-out stalls the motor mechanism

Information gained from these tests can prove vital in determining potential hazards by highlighting areas that produce inconsistent results, before an incident occurs.

Typical Test Applications

- measuring the maximum opening force required for unpowered doors
- maintaining building regulatory compliance for fire door self-closing mechanisms
- assessing the closing force of automatic doors
- measuring the torque / force required to operate handles, levers or push-pads
- evaluating force used to trigger automatic access buttons, lift terminals or activate emergency devices
- assessing the force needed to initiate movement of unpowered revolving doors or turnstiles
- testing the quality of locks, latches and hinges
- maintaining DDA/ADA* compliance testing of all access components, including windows, doors & remote control activators



revolving door



automatic barrier



testing release force of safety bar



testing force to open fire door

Ergonomics & Occupational Therapy

Force measurement equipment plays a vital role in evaluating a person's physical strength capabilities and is an important aid when undertaking,

- Patient health assessment
- Sports performance / Fitness assessment
- Rehabilitation / Vocational assessment
- Medical diagnostic assessment
- Physiotherapy
- Occupational therapy

When a person's health is concerned it is crucial to gain the correct data in order to be able to,

- diagnose injury or disease by detecting muscular weakness
- recommend alterations to a rehabilitation programme
- continually monitor a client/patient to prevent injury
- assess the suitability of a patient's home during recuperation or long-term illness
- predict the training needs and fitness level of an athlete

Physical medicine

Health professionals must often make critical decisions regarding treatment based on a variety of information and analysis data. This will often include an assessment of mobility by testing **isometric muscle strength**, using a push/pull gauge combined with appropriate accessories. A patient's maximal strength can be determined by measuring the force they produce against a resistance. This method is beneficial to both patient and health assessor as it causes minimum disruption, whilst providing quick, precise results for instant analysis possibilities, and archiving options for in-depth diagnostic assessment.

Sports medicine

Musculoskeletal force measurement is an effective method of evaluating muscle endurance, recovery and post-injury rehabilitation, aiding the process of planning a suitable training programme and tracking an athlete's progress during training.

recovery



physiotherapy



endurance



training



Occupational medicine

An important concern for occupational therapists is to ensure a patient's safe recuperation and enable them to perform normal activities of daily living by modifying their environment and adapting processes to more ergonomic principles. An assessment of a patient's home can identify hazards and potentially problematic applications, for example, using door handles, twisting lids off containers or using controls on electrical equipment.

An analysis of their work environment will also help determine problem areas for personnel after they return to work. Suitable adjustments can then be made to minimise the risk of injury to staff through inappropriate task delegation and poor ergonomic design.

Solution

Mecmesin provides measurement solutions that easily form part of a diagnostic assessment routine, thereby enabling health professionals to analyse essential aspects of a person's physical strength and identify the muscle groups that are affected. Our portable manual handling kit offers the freedom to undertake tests in the office or at a client/patients location with minimum set-up time, whilst providing credible analysis data to enhance and maintain precision quality health assessments.

Isometric Muscle Strength Testing

Mecmesin products are extremely versatile and flexible, enabling you to test a variety of functional muscle groups including the following applications,

- abduction & adduction
- internal & external rotation
- extension & flexion
- pronation & supination
- grip & pinch strength

Mecmesin Advanced Manual Handling Kit testing shoulder abduction



Padded Radiused Probe



Hand Gripper



Pinch Sensor

Ergonomic Applications

For those who have limited strength capabilities due to ill health or age-related degenerative muscular disorders, it is important to measure a variety of applications in the home and at work to ensure they are able to perform the normal tasks of day-to-day living.

Mecmesin products are successfully employed to test a variety of ergonomic applications including,

- accessibility for wheelchairs, walkers, and those with limited strength capabilities
- the effectiveness & safety of household aids and assistive devices (automated door access, remote controls, motorised wheelchairs)
- suitability of handles, grips, switches
- workplace environment and job applications



home health care



testing lumbar extension



testing knee extension



testing elbow flexion

Mecmesin

testing to perfection

Mecmesin - a world leader in affordable force and torque testing solutions

Since 1977, Mecmesin has assisted thousands of companies achieve enhanced quality control in design and production. The Mecmesin brand represents excellence in accuracy, build, service, and value. In production centres and research labs worldwide, designers, engineers, operators, and quality managers endorse Mecmesin force and torque testing systems for their high performance across countless applications.

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