



presents

Dr. Gottlob Testing

Dr. Gottlob
Institut



Born in 1960, **Dr. Axel Gottlob** studied physics and law before graduating from the University of Stuttgart with a degree in mechanical engineering (majoring in biomedical technology and applied computer science). After working in the areas of ergonomics and occupational physiology at the Fraunhofer Institute, he went on to specialise in biomechanics. In 2002, Gottlob graduated magna cum laude from the University of Heidelberg with a doctorate degree in sports science (Dr. phil.). Having practically grown up in gyms (his father, Peter Gottlob, opened his first gym in 1959) he worked in the fitness industry as his main profession for 30 years and for many years as successful fitness trainer and gym manager. After 7 years in performance sports he became German Bodybuilding Champion in 1982; he won both his class and the overall title and at 22 years of age became the youngest ever title-holder in the men's rankings. Today he is still a regular sportsman with strength training and running as his primary activities.

Since 1982, Gottlob has been involved in the research and development of professional training machines (he has four patents in his name and is the inventor of multi-motion technology) and differentiated exercise kinematics. Until the sale of his family business Galaxy Sport in 1992, Gottlob was one of the market leaders in the field of professional training equipment in Europe and Japan. Since 1997 he has been holding the position of associate professor at the Institute of Sports Sciences of the University of Heidelberg. Textbook author, columnist for trade magazine *Fitness Tribune* and tester of professional training equipment, he writes regular highly regarded articles for the fitness industry and for the therapy sector. With his specialist knowledge, critical questioning and new approaches he is now considered one of the leading strength training and back experts in Germany.

After several years as sales and general manager, studies in psychology in the United States and a one-year EU management training course in Japan, he then specialised, alongside strength training, in motivational training as well as customer-oriented company management. Over recent years his expert knowledge in these areas has become sought after too.

Since 1993 he has been training trainers and therapists on the highest level at his Dr. Gottlob INSTITUT. He acts as consultant to companies, fitness centres, associations and therapeutic establishments. Furthermore, he advises elite athletes, managers, physical therapy groups and patients with back and other joint problems. For over 15 years he has become known at both national and international conventions as a highly motivating speaker and recognised expert in his field.

Holder of the internationally recognised Strenflex GOLD fitness test badge

Dr. Gottlob Testing

Equipment test – MATRIX Line from Johnson Health Tech

Our Institute has this time been engaged by *FITNESS TRIBUNE* magazine to undertake an equipment test on machines from a single manufacturer. A rising company that had battled its way to become the 4th largest fitness equipment manufacturer in 2006. We are talking here about *JOHNSON HEALTH Tech. Co.*, an enterprise operating from the centre of the island of Taiwan. Johnson was established in 1975 by Peter Lo in the city of Taichung. Today the company is listed on the Taiwan Stock Exchange and employs a total of 6,000 workers in Taiwan and at two further factory sites in the metropolitan area of Shanghai, China.

It all started in the mid 1970s with the manufacture of weight disks. The strong work ethic and unbelievable industriousness of the Taiwanese, the lack of legal requirements, limitations and over regulation of all types, together with low wage costs provided Johnson with the ideal conditions for achieving low-cost manufacturing for world-wide sales. At the same time Taiwan, a country dependent upon exports to the whole world, had gained a name for delivery reliability, the correct and efficient processing of business transactions and short lead times. Johnson too, had these attributes at the heart of its corporate culture. The firm became a contract producer for US companies like IVANKO and went on to dominate the US market for weight disks in just a few short years. In the years that followed Johnson advanced to eventually become the world's biggest supplier of weights.

During the 80s Johnson began to manufacture cardio machines for firms such as Universal and Schwinn and to produce other types of sporting goods. Soon, manufacturing dumbbells, barbells and other simple equipment in Taiwan was no longer competitive and Johnson moved production to China. Here the firm established its own manufacturing facilities in the Shanghai metropolitan area. In 1996 Johnson began to market products under its own brand for the first time through the acquisition of the fitness product line of the American Trek Bicycle Co. This equipment, the VISION line, was aimed at the upper end of the home-user market. This was

followed in 1999 with the Horizon line of home-user cardio machines. The increasing and consistent implementation of quality standards together with a strict but motivating personnel management policy allowed Johnson to grow further. The MATRIX line of equipment was introduced in 2001 as the company's top line for the professional fitness sector. Following some initial quality problems this product line developed into a complete range of 28 strength training and 17 smaller machines.

The test

For the actual equipment test the *Fitness Tribune* editorial team directed us to the show gym of the Swiss Johnson dealer in Birmensdorf close to Zurich. There, in the Sanapark sports centre, we were able to evaluate and test the complete range of MATRIX equipment. Sanapark is a multifunction gym with roomy tennis and squash courts, indoor golf course, course rooms and a training area completely equipped with MATRIX machines. In Mr. Schneider's gym we found absolutely ideal conditions for testing, and the team of instructors under the guidance of gym manager Kevin, made sure that we were impressed by their on-site logistics. Once again, many thanks to all concerned for the warm welcome extended to us. The equipment itself was procured as part of a full renovation of the training area in October 2006, which means that the machines had been in use for 10 months before the date of testing. Our tests took almost two days to complete. Thereafter, the results of our measurements, movement information, weights and all of the technical details were evaluated, analysed and finally rated.

Individual technical details

The external appearance of the MATRIX equipment line is dominated by rounded curves and oval tubular profiles. The resulting soft shapes give the machines a certain 'easy on the eye', transparent sort of look. The weight stack tower has been arranged on an angle on most of the machines so that users can easily change the weights from the seated position and always has them in their field of view during the exer-



Company profile

Johnson Health Tech. Co., Ltd.	
Brief company history	<p><i>JOHNSON</i> was established in Taiwan in 1975 by Peter Lo.</p> <p>Since 1976 – manufacture of weight disks and accessories for the American firm <i>IVANKO</i>.</p> <p>Since 1980 – production of cardio equipment for several manufacturers.</p> <p>1996 – purchase of the fitness products sector from customer <i>American Trek Bicycle Co.</i> Development and marketing of the form's own <i>VISION</i> equipment line.</p> <p>1999 – Sale of home-use equipment under the newly established brand <i>HORIZON</i> in the USA.</p> <p>From 2001 – The <i>MATRIX</i> professional range was introduced for the gym sector.</p> <p>2002 – Johnson Health Tech. Deutschland GmbH established.</p> <p>2006 – <i>JOHNSON</i> advanced to become the 4th largest manufacturer of fitness equipment in the world and markets its products in 60 countries.</p>
Main office	Taichung Hsien, Taiwan
Production location	In China and in Taiwan (5,972 employees)
Strength training range	<ul style="list-style-type: none"> - MATRIX (professional strength and cardio line) - Johnson Fitness (strength and cardio line) - Vision (semi- professional strength and cardio line) - Horizon (cardio line for the home-user market)
Address	<p>Johnson Health Tech. Deutschland GmbH</p> <p>Technologiepark Ahrensburg</p> <p>An der Strusbek 60-62</p> <p>D-22926 Ahrensburg</p> <p>www.johnsonhealthtech.de</p> <p>Tel: 04102 – 457 202</p>
Guarantee	<p>10 years on frame</p> <p>2 years on mechanical components</p> <p>6 months on moving and wearing parts, cushions, labour costs and collection/delivery</p>
Certification	<p>EN-957 and CE certified</p> <p>Manufacturing certified to ISO 9001 and to ISO 14001 (environmental compliance).</p>
Delivery	According to the sales department equipment is either shipped fully assembled or, if required, disassembled and packed, followed by assembly on-site (e.g. in case of narrow access ways).
Lead time	2 – 8 weeks depending upon choice of colour



All details according to media reports, advertising material and manufacturers' or company representatives' statements.



Dr. Gottlob
Institut

cise. Johnson has provided an effective solution for the angled belt guide required for this arrangement. The lines of the weight stack tower together with the upturned top of the tower and the half-height Plexiglas surround make this a good looking machine. With the exception of the cable machines all of the weight stack towers of these machines have one of three height profiles; 150cm, 175cm or 185cm. This allows a pleasant looking arrangement, as at Sanapark, of training 'islands' with machines of the same height. The rubber-clad multi-point base provides excellent stability for the machines, is anti-slip and dampens vibrations.

Surface finish

According to the manufacturers' information all of the MATRIX machines are finished with a double powder coating. The classic coloured powder coating is applied after the pre-baking of a second clear coat and this leads to increased durability of the finish and greater colour saturation. This surface finish, similar to that used by the automotive industry, is particularly resistant to scratches and various other environmental influences. We were honestly unable to detect any blemishes on the finish of these machines after 10 months in service and therefore award the rating "very good" for the surface coating.

Upholstery fabrics

Well formed cushion pads have been used for most of the MATRIX line. However,



Machine / Type	Matrix MX-S50 Abdominal machine	MATRIX G3-S52 Back extension machine
Ergonomics & comfort		
Anthropometric contact points	☼☼ Seat base and pelvic support good; chest cushion rather hard	☼☼ Seat good, pelvic support unusable; back roller limited
Weights and weight increments	☼☼☼ Beginners ☼☼ Advanced users 4.5 to 71kg in 1.1kg increments (3 integr. adapter weights)	☼☼☼ Beginners ☼☼☼ Advanced users 4.5 to 139kg in 2.3kg increments (2 integr. adapter weights). The adapter weight on the test machine was binding a little because the mandrel was not properly aligned
Suitable for both smaller/larger users	☼☼	☼☼ Slightly limited for smaller users
Adjustment mechanism ergonomics	☼☼☼	☼☼ Backrest and start angle setting ok.
Adjustable while seated (in exercise position)	Provided for start angle weight adjustment	Weight and start position good, footplate ok
Test weighting 25%	Good (2,1)	Good (2,1)
Biomechanics		
Movement kinematics	Classic abdominal flexion exercise with isolated load application via a chest cushion. Using the foot stirrup as a step provides good stabilisation of the pelvis, this does however limit ROM. Using the footrest as a pulling device by working with the hipflexors if the user is sitting further forwards, the ROM can be improved.	Machine designed for dynamic hip extension exercises! Only useable for static back extension exercises and an upright posture must be ensured here, so that the high shear forces can be dissipated with no problems, especially at the lower lumbar region! High weights can no longer be stabilised. The user handbook is clear, however the notes on muscles are incomplete.
Pivot axis	☼ Good height adjustment but horizontal adjustments are unfortunately awkward.	●●
ROM [Range of motion]	☼☼	● Only for hip extension
Zwangslagengefahr	☼☼☼	☼☼☼ No problem due to start setting
Load dissipation	☼ At lower weights ok; at higher / high weights the only remedy is the changed usage of the footplates	● Front foot stirrups set too low; pelvis support to far back; safety belt does not hold at high weights (belt only locks at high speed)
Target muscles	☼☼☼ Lateral abdominal muscles and, depending upon the seat height setting, the 1st to 3rd rectus abdominis compartment	☼ Hip extensor musculature, the erector spinae muscles are only statically involved
Required adjustments	☼☼ Seat height adjustment and start angle settings present; no chest cushion adjustment to suit larger or smaller users	☼ No seat height adjustment. Footplate and back roll settings limited; pelvis support and safety belt ineffectual
Widerstandskurve	☼☼	☼☼
Widerstandsträgheit	☼☼☼	☼☼
Reibwertminimierung	☼☼☼	☼☼☼
Test weighting 75%	Satisfactory (2,6)	Fair (3,7)
Overall rating Biomechanics/ ergonomics/ comfort	Good (2,5)	Satisfactory (3,3)
Safety features ^{1,2}		
Pinch, cut, trip or impact hazards	There is a potential pinch hazard between the counterweight and bracket	No objections
Technical data ¹		
Dimensions (LxWxH) ³ [cm]	137 x 94 x 150	137 x 102 x 173
Gross weight ³ [kg]	183	271
Price ³ [Euro exc. VAT]	3.599,-	3.599,-

Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S10 Chest Press Machine
 Test score: **GOOD (2,2)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 Test result valid until: 10/2008



Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S20 Shoulder Press Machine
 Test score: **GOOD (1,8)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 Test result valid until: 10/2008



Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S31 Seated Row Machine
 Test score: **GOOD (1,8)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 Test result valid until: 10/2008



Machine / Type	Matrix G3-S10 Chest press	MATRIX G3-S20 Shoulder press	Matrix G3-S31 Seated row machine
Ergonomics & comfort			
Anthropometric contact points	☆☆ Seat very good; backrest unnecessarily hard at shoulder blade level	☆☆☆	☆☆ Chest cushion somewhat hard
Grips	Grips are very good – the large diameter is very welcome. In the maximum extension phase the grips place some strain on the wrists; different grip angles are possible.	Grips are very good – the large diameter is very welcome.	For a pulling exercise the grips are relatively thick
Weights and weight increments	☆☆☆ Beginners ☆☆ Advanced users 4.5 to 118kg in 2.3kg increments (2 integr. adapter weights)	☆☆☆ Beginners ☆☆ Advanced users 4.5 to 94kg in 1.1kg increments (3 integr. adapter weights)	☆☆☆ Beginners ☆☆ Advanced users 4.5 to 139kg in 2.3kg increments (2 integr. adapter weights)
Suitable for both smaller/larger users	☆☆	☆☆☆	☆☆☆
Adjustment mechanism ergonomics	☆☆☆ Comfortable	☆☆	☆☆☆
Adjustable while seated (in exercise position)	Seat height and weights very comfortable; grip starting position good	Possible	Only for chest support and weights
Test weighting 25%	Good (2,0)	Very good (1,4)	Good (1,8)
Biomechanics			
Movement kinematics	Linear chest press machine with permanently coupled arms. Neutral and pronated grip positions are possible. The positioning of the pivot axis at the top provides a movement path that describes a section of a circular arc.	This is a front press machine with permanently coupled arms. The press movement commences in the anterior position and leads slightly to the back such that the weight rests above the pectoral girdle when in the extended position. An adjustable or slot-in backrest would be desirable because the grips are located relatively far to the front.	Horizontal, linear back extension exercise with a very good movement path. The arms are permanently coupled. Two grip variants offer full ROM.
Pivot axis	☆☆	☆☆ Permanently coupled grip; movement path leads slightly to the rear.	☆☆☆
ROM [Range of motion]	☆☆	☆☆☆	☆☆☆
Risk of constrained posture	☆☆☆	☆☆☆	☆☆☆
Load dissipation	☆☆☆	☆☆☆	☆☆☆ Via chest cushion
Required adjustments	☆☆ The two most important adjustments are available; an entry aid would be a valuable addition	☆☆ Yes for seat height, none for backrest	☆☆☆ Yes for both seat and chest cushion
Resistance curve	☆☆☆	☆☆☆ Constant	☆
Inertial resistance	☆☆☆	☆☆☆	☆☆☆
Friction coefficient minimisation	☆☆ The belt/ pulley guides on the pressing arm increased the friction coefficient on the test machine	☆☆☆	☆☆☆
Test weighting 75%	Good (2,3)	Good (1,9)	Good (1,8)
Overall rating Biomechanics/ ergonomics/ comfort	Good (2,2)	Good (1,8)	Good (1,8)
Safety features ^{1,2}			
Pinch, cut, trip or impact hazards	No objections	No objections	No objections
Technical data ¹			
Dimensions (LxWxH) ³ [cm]	155 x 124 x 185	145 x 142 x 150	152 x 94 x 211
Gross weight ³ [kg]	275	219	279
Price ³ [Euro exc. VAT]	3.599,-	3.599,-	3.599,-

Rating: ☆☆☆ very good, ☆☆☆ good, ☆ satisfactory, ● fair, ●● unsatisfactory

The categories, with the percentage score stated, are incorporated into the calculation of the overall score.

¹ Evaluations/results were not used in calculating the overall score.

² In terms of safety, only problems that could be visually detected by users were taken into consideration. Equipment was for example, not tested for load capacity, nor was compliance with binding European Standard EN 957, concerning the safety of stationary training equipment, checked.

³ According to manufacturer's information

All machine tests were carried out impartially and in good faith, however no guarantees of any type are given or implied.



Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S70 Leg Press Machine
 Test score: **GOOD (1,9)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 valid until: 10/2008



Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S71 Leg Extension Machine
 Test score: **GOOD (2,3)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 valid until: 10/2008



Strength Equipment Test®
 Manufacturer: Johnson Health Tech
 Product: Matrix G3-S72 Seated Leg Curl Machine
 Test score: **SATISFACTORY (2,7)**
 Conferred by: fitnesstribune.com & dr-gottlob-institut.de
 valid until: 10/2008

Machine / Type	MATRIX G3-S70 Leg press	MATRIX G3-S71 Leg extension machine	MATRIX G3-S72 Seated leg curl machine
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Ergonomics & comfort

Anthropometric contact points	☉☉☉ Seat/ backrest very good	☉ Seat surface and leg roll exhibit increased pressure	●●● Seat surface, thigh strap and leg roll are much too hard
Weights and weight increments	☉☉☉ Beginners ☉☉☉ Advanced users 4.5 to 180kg in 2.3kg increments (2 integr. adapter weights)	☉☉☉ Beginners ☉☉☉ Advanced users 4.5 to 119kg in 2.3kg increments (2 integr. adapter weights)	☉☉☉ Beginners ☉☉☉ Advanced users 4.5 to 119kg in 2.3kg increments (2 integr. adapter weights)
Suitable for both smaller/larger users	☉☉	☉☉	☉☉☉
Adjustment mechanism ergonomics	☉☉☉	☉ Backrest slightly tilted, leg roll adjusts automatically, this hinders the adjustment of weight and start position in certain circumstances.	☉☉
Adjustable while seated (in exercise position)	☉☉☉ Seat height and weights	Yes for backrest. Getting onto the machine is less comfortable because of the very wide leg roll	Only for weights and thigh strap
Test weighting 25%	Good (1,7)	Good (2,2)	Satisfactory (3,2)

Biomechanics

Movement kinematics	Horizontal leg press movement with moving sled and fixed, largely upright seating position. The wide pressure plate allows different foot – and therefore hip – positions.	Very good leg extension exercise. The pivot axis can be modified via the backrest. The leg roll adapts automatically (irritating at first). Hand grips are well positioned.	Good leg curl exercise. Its effect is however limited due to the hard cushions. The pivot axis can be adjusted approximately via the backrest and thigh pads.
Pivot axis / movement path	☉☉☉ Quasi linear with a slight upward movement	☉☉	☉
ROM [Range of motion]	☉☉☉ Full ROM possible in line with hip mobility	☉☉☉ Useful start limit provides important start angle settings	☉☉☉ Useful start limit provides important start angle settings
Risk of constrained posture	☉☉☉ Start angle setting provided. Only if used for rehabilitation purposes is the start angle too high for tall users.	☉☉☉	☉☉☉
Load dissipation	☉☉☉ Via seat surface and backrest	☉☉	☉ Good thigh strap but point pressure too great
Footplate area	☉☉ There is a good useable width of 75cm available to the user. At 45cm the height is still acceptable.	–	–
Target muscles	☉☉☉ Overall knee and hip flexor musculature emphasis the adductors and proximal insertion zone of the hamstring muscles	☉☉☉ Quadriceps	☉☉☉ Hamstring muscles (biceps femoris muscles)
Required adjustments	☉☉ Entrance aid would be helpful	☉☉☉	☉☉☉
Resistance curve	☉ Somewhat heavy at the beginning of the movement	☉☉	☉☉
Inertial resistance	☉☉☉	☉☉	☉☉
Friction coefficient minimisation	☉☉☉	☉☉☉	☉☉☉
Test weighting 75%	Good (2,0)	Good (2,3)	Good (2,5)

Overall rating Biomechanics/ ergonomics/ comfort	Good (1,9)	Good (2,3)	Satisfactory (2,7)
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Safety features^{1,2}

Pinch, cut, trip or impact hazards	No objections	No objections	No objections
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Technical data¹

Dimensions (LxWxH) ³ [cm]	201 x 107 x 183	122 x 112 x 173	160 x 112 x 173
Gross weight ³ [kg]	417	258	259
Price ³ [Euro exc. VAT]	4.699,-	3.599,-	3.599,-



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Machine / Type	MATRIX G3-FW52 45° back extension bench	MATRIX G3-FW50 Abdominal crunch bench
Ergonomics & comfort		
Anthropometric contact points	☆☆☆ Very good thigh pads	☆☆☆
Arrangement of cushions	☆☆☆ Very good alignment and user fit	☆☆☆
Suitable for both smaller/larger users	☆☆ When used by shorter persons the adjustment of the hip position can be a little limited	☆☆ With taller users the hand grips may come into contact with the pectoral girdle. If this occurs, slide further down and train the upper rectus abdominis compartments.
Adjustment mechanism ergonomics	☆☆☆ Height adjustment good	–
Possible movement kinematics	The complete range of back extension and hip extension exercises can be carried out.	Interesting, enriching abdominal crunch machine that trains the abdominal - latissimus muscle chain. Two designs are available: 1) That selected by the majority of users where the latissimus muscle chain is dominantly trained with only minimal dynamic abdominal muscle activity. 2) Exercise form with maximum flexion of the lower chest and upper lumbar region. This causes considerable dynamic involvement of the abdominal muscles with only a minimum pulling motion of the arm. Assistance with the exercise: There must always be contact with the lower edge of the moving cushion!
Pivot axis of the arms	–	☆☆
Risk of constrained posture	☆☆☆	☆☆☆
Load dissipation	☆☆☆	☆☆
Required adjustments	☆☆☆	☆☆☆
Overall rating	Very good (1,5)	Good (2.1) for the second variant otherwise satisfactory (2.7)
Safety features^{1, 2}		
Pinch, cut, trip or impact hazards	There is a potential pinch hazard if the hand grip on the sled is not used.	No objections aside from the highlighted arm bearings (pinch hazard)
Technical data¹		
Dimensions (LxWxH) ³ [cm]	181 x 77 x 77	180 x 76 x 98
Gross weight ³ [kg]	43	65
Price ³ [Euro exc. VAT]	1.099,-	1.399,-

on half of the machines, including the leg curler, the abdominal machine and the seated rowing machine, the unpleasant, hard surfaces stand out as a negative issue. There are justified grounds for improvement on the respective machines here.

Resistance selection mechanism

Choosing the required resistance is achieved as usual using a selector pin. The pin is tethered to the first weight plate with a cable so that it does not get lost. Because of this storage feature on the first weight plate the pin is subject to vibration and rocking when the machine is used to exercise with only one weight plate loaded.

Resistance selection is considerably improved as a result of the 2 to 3 adapter weights that are included as standard. Depending upon the machine this means that, instead of the typical 20 or so resistance levels, there are now 60 to 80 weight settings in 2.3kg or even 1.1kg increments. Only a simple mechanical system of



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Fitness Tribune has exclusively commissioned the Dr. Gottlob INSTITUT to carry out equipment tests (first test was published in FT 100).

There has always been a wide range of tests available in the fitness industry but these have never really delved into greater depth than listings of catalogue information and the obvious technical details. Our requirement stipulates a “true comparison” that includes all the components of a real test, i.e. assessment criteria, further neutral information, points of criticism, assistance in making purchasing decisions and most importantly, a test rating. These requirements do however conceal two rather tricky issues. First, a true and honest test means that there are bound to be losers. The problem here is that we risk

alienating potential advertisers in the case of an “unfavourable” result. Second is the question of the right “tester”. The qualities we are looking for here include a reputation for integrity and commercial impartiality together with a combination of expert knowledge in a wide range of specialist subject areas.

We are pleased to have found a partner for this highly challenging task in Dr. Axel Gottlob; one of Germany's leading strength training experts for many years now. Dr. Gottlob's reputation and straightforwardness is well known in many circles and as a qualified mechanical engineer, graduate sports scientist and biomechanics expert he is certainly the best person to whom we can entrust this complex subject with all of its wide-ranging facets. He was not only a successful strength training athlete himself (German Champion, 1982) and gym

owner, but is also a much quoted author of specialist books (reference book “Differentiated Strength Training”) and since 1997 associate professor of biomechanics and strength training at the University of Heidelberg. In his family business “Galaxy Sport” he spent over 12 years developing strength training equipment together with his father, Peter Gottlob. The firm patented several designs and had become market leader in Germany by the time it was sold in 1992. Last but not least, we should highlight the training offered at his Dr. Gottlob INSTITUT whose courses such as the MASTER fitness trainer education program rate among the absolute top for instructors and therapists.

Jean-Pierre L. Schupp



sliding weights with mandrel is employed for the adapter weight system, but this is good for the purpose. In addition to the advantage of more precise selection of the required resistance this arrangement allows for a gradual increase in performance both from the training progression and from the motivational point of view. Every small increase improves a user's training motivation. Weaker beginners and rehabilitation patients in particular, will profit from these gradual step-ups in resistance because otherwise the next step up in resistance could mean an increase of between 20 and 50%. Overall, this good solution must be lauded.

Force transmission

The resistance, in the form of the weight that is lifted, is transmitted by a 25mm wide, flat Kevlar/urethane belt. For the continuous reversed bending stresses applied to the transmission disks, eccentrics and pulleys this type of belt technology is among the most durable and is particularly suitable in this application. There are no details available regarding the belt's tensile strength therefore we cannot make any statements regarding its service life.

Friction coefficient minimisation

The self-lubricating Teflon weight stack bushes and pulleys with ball bearings generate minimal friction coefficients on almost all of the tested machines. For all of the *MATRIX* machines therefore – with the exception of one – the exercise action is smooth and friction free.

Adjustments

The adjustable start angle setting, found on all of these machines, should be highlighted. This allows the ROM to be optimised and possible constrained postures to be avoided. The seat cushion and start angle setting are both adjusted using a robust snap pin. The start angle setting and the backrest adjustment were however, somewhat difficult to move on the tested machines. In some case the

mechanism exhibited “sticking” in its movement. Seat height adjustment is good. It could however be improved a little on the abdominal and rowing machines. Unfortunately not all of the machines are suitable for users that are of above or below average height.

All settings are clearly marked on an easy to read scale, allowing accurate training plans to be developed. For better recognition and location, all of the adjustment levers, pins and snap pins are clearly colour coded in yellow and the pivot axis position on the single joint machines is marked in red. This is a particularly good feature for less experienced users because it allows them to set the machine up quickly. Altogether the design falls into the “good” category, although the adjustments for the larger components such as the backrests and start angle positions ought to allow greater ease of movement.

Accessories

All of the weight stack exercise machines in the *MATRIX* range are supplied as standard with a drinks and towel holder. Now a towel holder on any machine that is used in a seated or prone position is pretty useless because the towel is naturally used as a hygienic cover for the sitting or lying surface. On the other hand the drinks holder is a welcome useful accessory because it keeps the floor free of drinks containers that may even be knocked over and spilled.

The individual machines

The following 10 strength training machines were explicitly selected and tested. For this year's AWARD presentation the first 6 machines were compared with the results of the last test published in FT 107 in which machines from *DAVID*, *Panatta* and *SportsArt* came under scrutiny.

Abdominal machine
Back extension machine
Chest press
Shoulder press
Seated row machine
Leg press

The other 4 machines are not participating in the AWARD scheme because they are not comparable. They can however be compared with last year's results from the two test reports that appeared in FT 100 and FT 101.

Leg extension machine
Seated leg curl machine
45° back extension bench
Abdominal crunch bench

Abdominal machine

With the *MATRIX* line abdominal machine Johnson offers the classic abdominal exercise machine with chest pad. This type of exercise is independent of bodyweight and it therefore offers every fitness beginner the correct choice of resistance. The height adjustable seat and start angle setting stand out as positive features. Unfortunately, despite a good pelvis support, stabilisation with the hip extension muscles can only be achieved for a very limited range of motion because of the position of the footrest and pivot axis. If, on the other hand, the user stabilises himself with the hip flexor muscles by using the footrest as a pulling device and places himself in front of the hip support he will achieve a largely complete ROM for the various rectus abdominis compartments. As a result of this second possibility the machine is only just able to reach a rating of “good”.

Back extension machine

The *MATRIX* range unfortunately gets a low score for this machine. This is primarily a hip extension machine with static involvement of the erector spinae muscles. It's not just that the pivot axis is poorly located, but the useless pelvis support and the footrests that are set too low also mean that the user cannot find a stable position. The safety belt fitted to the machine is also of no help here because, as with car safety belts, it will only arrest in a high speed fall. Under these circumstances hip extension training can only be recommended if low weights are used. At the moment this performance means that this machine only just scores “satisfactory”.

Chest press

The press and cable machines in the *MATRIX* range do however fare better. Johnson may perhaps not yet have embraced independent arm action technology which means that equal training stimulation for the left and right sides cannot be achieved. However, the pivot axis suspension on the *MATRIX* chest press does provide a pleasant motion path. The diameter of the grips has been well selected but the rigid arrangement of the grips does cause certain bending moments at the end point of the motion. The relatively hard back cushion also produces some unpleasant pressure points on the shoulder blades at high weights. This comfortable to use machine just scores a “good”, giving it a high placing in the ratings.

Shoulder press

A consistently good shoulder press exercise here boosts Johnson through the 2.0 barrier for the first time. This is a front press machine with a fixed pressing arm, pleasant to hold grips and a height-adjustable, comfortable seat. Independent arm action and, in particular, an adjustable backrest would still be desirable attributes. The grips are positioned relatively far to the front so the gym owner should place an additional back cushion next to the machine from the very beginning, so that customers can make use of it if required.

Seated row machine

Alongside the shoulder press the seated row machine deserves particular attention. Excellent kinematics combined with a very good pivot axis position offer the user an ideal rowing motion. As far as improvements are concerned; the resistance curve is not quite ideal, the hand grips are too thick and the chest pad is relatively hard. As mentioned

above, incorporating an independent arm action would also be worth considering here. With this machine Johnson is placed in the top league and the seated row machine receives a well deserved “good” (1.8).

Leg press

In the MATRIX seated leg press the user pushes the sled away from him with a large hip-thigh angle. The exercise particularly works the gluteal muscle groups. The resistance curve is not quite ideal and there is no aid to easy access which score minus points here. On the positive side are the very good upholstery, a large footplate a good movement path and convenient adjustments. Category “good”.

Leg extension machine

This machine provides a good leg extension exercise with useful start angle adjustment and an adjustable backrest for positioning of the pivot angle. Negative points on the other hand are the hard cushioning and the over-sized foot roll pad which should be replaced with an anthropometric foot roll pad that is adjusted for the correct width. Despite having good hand grips the machine only just gets a “good” rating.

Seated leg curl machine

On first sight this appears to be a very well designed seated leg curl machine with adjustable thigh stabilisation pads and well thought out start angle adjustment. However, as a result of its awkward pivot angle position and extremely hard leg cushions it unfortunately slides down into the “satisfactory” category. This machine needs revision in respect of its ergonomic and biomechanical attributes.

45° back extension bench

With this machine MATRIX just achieves entrance into the exclusive “very good” category. Excellent cushioning and good overall arrangement allow the full range of back extension exercises to be carried out. There is one potential safety concern that should be ironed out – adjustments should be adapted to cater for smaller users too. Aside from that we can only say ‘excellent!’

Abdominal crunch bench

This machine from the MATRIX line is an abdominal workout bench with a fixed pivot axis to train the abdominal - latissimus muscle chain. As noted in the evaluation table the abdominal crunch



bench is available in two different versions and the second, where the exercise involves curling the spine, is clearly more effective. For this reason the evaluation depends upon the machine version and ranges from “good”, to “satisfactory”.

Conclusion

The MATRIX line from Johnson is a range of equipment that has grown to become a respectable name over just a few years. It cannot yet compete with the premier league of top equipment although individual machines already possess really good training qualities. With its production capacity and the profits made over the past years Johnson is however in a good position to further optimise its range. The Asian location and the strong work ethic there are huge advantages which, if they were to be combined with the not yet fully developed benefits of biomechanical and ergonomically optimised know how, would make a very powerful alliance. At future exhibitions and fairs it will be exciting to see how the next generation of MATRIX equipment has developed. All of the test results were arrived at in good faith, however no responsibility is accepted for the correctness of this information.

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