Dr. Gottlob Testing

Test of leg machines from *Cybex, Gym 80, Life Fitness, Nautilus, Schnell* and *Technogym*

The first in this series of test reports appeared in FT100 and received very positive feedback and I am now pleased to publish the second part. This time we have chosen to look at leg machines with a particular focus on 3 very important systems for the test - leg extension, leg curler and leg presses.

This second part continues from and builds on the report published in FT100 and I will therefore assume that readers are aware of the terms and test criteria that were set out there. If required, the first part is still available for download from the Fitness Tribune website as a PDF document.

Choice of Manufacturer

As mentioned in the last test report (FT100) the Fitness Tribune editorial department selected the primary product line of the following 3 American and 3 European manufacturers for the first test report. They are:

- *Cybex* with **Eagle**
- *Gym 80* with **Sygnum**
- *Life Fitness* with **Signature**
- *Nautilus* with **Nitro**
- *Schnell* with **Serie 8** and
- *Technogym* with **Personal Selection**

The Test

After a preliminary study the machines were comprehensively analysed, measured and tested on site. All information was recorded, evaluated and presented in the form of photos, a written report and datasheet and finally entered into a pre-prepared evaluation matrix (see report in FT 100).

All the showrooms and fitness centres where we tested the equipment were recommended by the manufacturers or importers themselves. We would again like to express our thanks to all of the fitness centres that offered their hospitality, sometimes over a whole day. They are: Fitness Park Pfitzenmeier in Heidelberg, *Gym 80* Showroom in Gelsenkirchen, Top Fit in Reilingen, *Schnell* Showroom in Peutenhausen, Via Vital. med in Schwetzingen and Sportpark in Bensheim.

The inconvenience of not being able to compare the equipment side-by-side made the actual test considerably more difficult. The testers from "Which" magazine would never consider comparing products that aren't available at the same place and time. Our tests were separated by many miles and we invested a lot of time. This means that all test and movement information must be filed in a manner that allows the results to be evaluated many days later. In some instances it was necessary to re-test machines in order to reach the final result. Bringing together all of the equipment to be tested would, for future reports, be both desirable and not irrelevant to the results.

Test Evaluation - Leg Machines

Due to space restrictions we have only been able to test a selected number of leg machines from the selected manufacturers. A largely complete range of leg machines in the sense of controlled training equipment would have to include at least the following:

- Leg extension
- Lying leg curl
- Seated leg curl
- Seated leg press
- Lying leg press
- Adduction machine
- Abduction machine
- Buttock machine
- Multi hip machine
- Calf machine

Not evaluated are squat equipment, controlled multis, hip rotation machines or pure cable pulls, all of which provide valuable methods of leg training. Of our evaluated manufacturers only *Gym 80* and *Schnell* offered a largely complete range of leg training products! It is noteworthy that the other manufactures do not provide some of the equipment. For example only *Gym 80*, *Schnell* and *Technogym*, offer a multi hip machine! A basic machine that allows 4 main movement ranges for the hip through different force application points; a machine that will enhance the training area of any fitness centre. Manufacturers should rethink their approach and consider upgrading their equipment range. Gym owners on the other hand, should be prepared to "mix and match" machines from different manufacturers (based on functional aspects) to achieve a comprehensive equipment pool.

The Individual Machines

Specifically, the following 3 leg machines were tested:

- Leg extension
- Seated leg curl
- Leg press seated

In the following report I will make general references to a fourth machine, the **lying leg curl**, and arrive at a rough ranking for it without however, proffering the full details of a comparative test.

Leg extension

General

Leg extension machines obviously allow the isolated training of the quadriceps, our most important walking, standing and knee stabilising muscle. Until a decade ago leg extension machines were a primary element in training the leg muscles, but their popularity has declined slightly over the last 5 to 10 years. High stresses on the knee joint during training and the general problem of a wandering pivot axis of the knee joint on a single joint machine means that use is limited particularly in the area of knee rehabilitation. A well thought out leg extension machine nevertheless still has excellent qualities and, as well as in fitness centres, has or should have a place in physiotherapy.

Leg extension is the only exercise where the muscles that extend the knee can be trained in full contraction! None of the variations on leg press and squat exercises offer the quadriceps any notable resistance when the knee is extended. Only with application of radial force from the leg extension machine can

Company Chart

Listed here and in the following tables in alphabetical order

	Cybex	*Gym 80*	*Life Fitness*
Brief company history	Established in 1969; Focus: Isokinetics. Began with strength training equipment in 1983 through the purchase of Eagle Strength Systems	Founded in 1980 by Peter Förster and Walter Herden. Now known as Gym 80 International. Focus: strength training equipment	Founded 1968 by Keene P. Dimick. Focus: cardiovascular training equipment. Began in 1987 with strength training equipment
Main office	Massachusetts, USA	Gelsenkirchen, Germany	Chicago, USA
Production location*	USA	Germany	USA and Hungary
Strength training range	Cybex Eagle VR VR2 VR3 Plate loaded	Sygnum Line Medical Line Dual Plate loaded	Signature Series Pro2 Series Cable Motion MTS Hammer Strength
Address	LMT Loctec AG Daimlerstr. 10/1 78665 Frittlingen www.lmt.ch Phone: 07426 – 600 40	Gym 80 International Vertriebsgesellschaft mbH Wiesmannstr. 46 45881 Gelsenkirchen www.gym80.de Phone: 0209-970 640	Life Fitness Europe GmbH Siemensstr. 3 85716 Unterschleissheim www.lifefitness.de Phone: 089-3177 510
Guarantee*	2 years parts and labour (with the exception of wear parts)	Five years on frame Two years on all mechanical parts One year on seat padding	10 years on frame 5 years on weights, guide rails 1 year on bearings, cables, handles 6 months on seat padding, belts, springs, labour, shipping
Certification*	EN-957 certified	EN-957 certified	EN-957 certified
Delivery*	Machines are delivered using own vehicle fleet, packaged and assembled	Delivery: 95% assembled With the option of full plastic wrapping with edge protectors	Shipped disassembled in crates and is assembled ready for use by Life Fitness upon delivery
Lead time*	8 – 9 weeks	4 – 6 weeks (Sygnum)	8 – 12 weeks

	Nautilus	*Schnell*	*Technogym*
Brief company history	Founded in 1970 by Arthur Jones Focus: strength training equipment. Sold by Jones in 1986. Nautilus Group Inc. since 2004	Founded in 1957 by Joseph Schnell. Focus: strength training equipment. Inherited by Klaus and Achim Schnell in 1992	Founded in 1983 by Nerio Alessandri. Focus: strength training equipment Today known as Technogym-The Wellness Company
Main office	Vancouver, Washington, USA	Peutenhausen, Germany	Gambettola, Italy
Production location*	USA and Asia	Germany	Italy
Strength training range	Nitro Nitro Plus Steel Free Weights	Series 8 Medical training equipment Plate loaded machines Junior-Line	Personal Selection Isotonic Biostrength Kinesis Element
Address	Nautilus Germany GmbH Vürfelser Kaule 53 51427 Bergisch Gladbach www.nautilus.com Phone 02204-610 27	Schnell Trainingsgeräte GmbH Sportweg 9 86565 Peutenhausen www.schnell-online.de Phone: 08252-88 550	Technogym Wellness & Biomedical GmbH Im Geisbaum 10 63329 Egelsbach www.technogym.com Phone: 06103-201 240
Guarantee*	1 year full warranty 3 years on parts	5 year warranty, excepting wear parts	2 years on machines 1 year labour
Certification*	Meets requirements of EN-957, however not actually certified	EN-957 certified	EN-957 certified
Delivery*	Delivered fully assembled, in full plastic wrapping on pallets	Delivered fully assembled and partially packaged on pallet (own delivery fleet) or fully packaged (when sent by courier)	Packed in crates and on pallets, the machines are delivered fully assembled
Lead time*	From immediate up to a maximum of 8-10 weeks	6 weeks	4 weeks

*All details according to manufacturers' or company representatives' statements .

adequate knee protection be introduced. In this case the "vastus medialis" and "vastus lateralis" sections of the quadriceps, which are vital muscles for final knee extension and correct alignment of the kneecap. Only with leg extension training can the muscle contractile elements, when subjected to great stress, also overlap to the maximum. For this reason, both rehabilitation patients and sport users should use this important machine. Furthermore, the leg extension machine provides an excellent training machine for working the quadriceps without unnecessarily loading the ISGs (sacroiliac joints), the lumbosacral junction and the whole of the vertebral column.

In order to counter the issue of the wandering knee pivot point and ensure the stress on the knee joint is as low as possible training the quadriceps is possible on a leg extension machine with a reduced ROM. It is recommended that users carry out knee extension training for the quadriceps over a knee angle range of 60° to 0°. Fitting leg extension machines with a start angle limiter is a useful aid here.

Test results

All manufacturers offer good leg extension machines. *Nautilus* has a slight lead over the rest however. The convincing factor here is the excellent resistance curve offered by the Nitro Leg Extension and its superb padding, particularly in the critical areas of the foot roll and seat upholstery. A very fluid movement quality with minimal inertial resistance results in a "very good", by a narrow margin – well done! Unfortunately, the lack of a start angle adjustment and the limited foot roll adjustment hold this machine back from a higher rating. *Cybex* comes within a tenth of a point behind and books points with its ease of adjustment. *Gym 80*, *Life Fitness*, and *Schnell* follow with an equal rating of again just a tenth of a point behind. All three manufacturers offer good leg extension machines with respectively different plus points (see table). *Technogym* is rated slightly lower due to its thigh padding that is too hard. Nevertheless this machine deserves a "good" as well. All of the manufacturers should incidentally, take a fresh look at their machines' pivot points. None of the machines could be rated "very good".

Lying leg curl

General

Looking back over the history of the fitness industry we see that the first strength training machine for the ischiocrural musculature was the lying leg curler (hamstrings are also known as ischiocrural muscles). Only many years later did the first seated machine appear on the market. Nowadays many fitness centres only offer their members a seated version. Of the manufactures themselves only 4 of the 6 offer the lying version in addition to the seated version! The question therefore arises of whether the lying version has lost its appeal? Is it a relic of the past? Have some manufacturers, perhaps due to training psychology reasons, eradicated the lying version? Or has it more to do with the fact that they are technically more straightforward to manufacture? Seated leg curlers are similar in design to leg extension machines. Cost-effective modular construction techniques are used correspondingly here.

Let's examine the pros and cons of these two types of machine. Firstly, the seated version allows a higher degree of isolation for working the ischiocrural musculature. The gluteal and lumbar erector spinae muscles have no effect here which also leads to complete relief of the strain on the whole vertebral column. Training on such machines is therefore particularly attractive for those with back problems. The lying version is attractive because users can commence training quickly. Simply adjusting the calf roller and climbing in instead of having to adjust the calf roller, positioning the backrest and positioning the legs is considerably faster. In terms of muscle physiology these two types of machine also provide further advantages. The ischiocrural muscles are two-jointed – almost all parts start at the sciatic tuberosity and extend over the knee and hip joint – the hip angle has a considerable influence on training. With the lying version athletes mostly train with

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Machine / Type	
Ergonomics and Comfort	
Anthropometric contact points	
Weights and weight increments	
Suitable for both smaller/larger users	
Adjustment mechanism ergonomics	
Adjustable while seated (in exercise position)	
Test weighting 25%	
Biomechanics	
Movement kinematics	
Pivot axis	
ROM [range of motion]	
Risk of constrained posture	
Load dissipation	
Required adjustments	
Resistance curve	
Inertial resistance	
Friction coefficient minimisation	
Test weighting 75%	
Overall rating Biomechanics, ergonomics and comfort	
Safety features [1, 2]	
Pinch, cut, trip or impact hazards	
Technical details [1]	
Dimentions (LxBxH) [3] [cm]	
Gross weight [3] [kg]	
Price [3] [Euro exc. VAT]	

Equipment Test Table – Leg Extension Machines

						
	Cybex Eagle Leg Extension	***Gym 80*** Sygnum Leg Extension Machine	***Life Fitness*** Signature Leg Extension Machine	***Nautilus*** Nitro Leg Extension	***Schnell*** Leg Extension Machine	***Technogym*** Personal Selection Leg Extension
	☼☼☼	☼☼☼ Calf roller could be softer	☼☼ Somewhat increased pressure on the back of the knee	☼☼☼ Very good calf roller	☼☼☼	☼ Front thigh pad is not optimal
	☼☼☼ Beginner ☼☼☼ Advanced 6 to 138 kg in 2.3 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 135 kg in 5 kg increments (3 kg increments with optional adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 152.5 kg in 2.5 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 9 to 115.5 kg in 2.3 kg increments (2 integrated adapter weight are included)	☼☼☼ Beginner ☼ Advanced Additional weights required! 10 to 100 kg in 10 kg increments (5 kg increments with optional adapter weight)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 97.5 kg in 2.5 kg increments (1 integrated adapter weight)
	☼☼ Backrest support for smaller users somewhat limited	☼☼ Backrest support for smaller users is somewhat limited	☼☼☼ Adequate adjustment of the foot roll and backrest	☼☼ Foot roll adjustment is somewhat limited for taller users	☼☼☼ Adjustment of the foot roll and backrest are adequate	☼☼☼ Foot roll adjustment is a somewhat limited for smaller users
	☼☼☼ Appears rather complicated, but ok	☼☼☼ Everything top	☼☼☼	☼☼ Backrest can only be adjusted using both hands	☼☼ Backrest is very good; start angle is cumbersome	☼☼ Backrest not quite ideal
	Possible; entry is somewhat difficult though	Possible at all machine settings	Possible at all machine settings	Possible at all machine settings	Possible at all machine settings	Possible at all machine settings
	Very good (1,4)	**Very good (1,5)**	**Very good (1,4)**	**Very good (1,4)**	**Good (1,6)**	**Good (2,2)**
	Leg extension is good. Pivot point can be corrected by adjusting the backrest. Scales and markings are very good.	Leg extension is good. Pivot point can be corrected by adjusting the backrest.	Leg extension is good. Pivot point can be corrected by adjusting the backrest.	Leg extension is very good. Pivot point can be corrected by adjusting the backrest.	Leg extension is good. Additional weights should be ordered when purchasing this machine. Unfortunately the handgrips are a too far forward.	Leg Extension is ok, but the hard bench surface hinders training with higher weights.
	☼☼	☼☼	☼☼	☼☼	☼☼	☼☼
	☼☼☼ A valuable starting point limit provides all-important start angle settings. Optional end stop provides additional auxotonic training opportunities	☼☼☼A valuable starting point limit provides all-important start angle settings	☼☼☼ A valuable starting point limit provides all-important start angle settings (an extra adjustment setting in the stretching plane would be advantageous)	☼☼ Unfortunately there is no adjustment mechanism for the starting point limit	☼☼☼ Valuable continuously variable start limit offers important start angle settings	☼☼☼ A valuable starting point limit provides all-important start angle settings
	☼☼☼	☼☼☼	☼☼☼	☼☼ Possible for certain objectives	☼☼☼	☼☼☼
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼ Handles are too far forward when heavier loads are lifted	☼☼☼
	☼☼☼	☼☼☼	☼☼☼	☼☼ No start angle setting	☼☼☼	☼☼☼
	☼☼	☼	☼	☼☼☼	☼☼	☼☼
	☼☼	☼☼	☼☼	☼☼☼	☼☼☼ The opt. counter weight should not be utilised	☼☼
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
	Good (1,7)	**Good (1,8)**	**Good (1,8)**	**Very good (1,5)**	**Good (1,8)**	**Good (2,0)**
	Good (1,6)	**Good (1,7)**	**Good (1,7)**	**Very good (1,5)**	**Good (1,7)**	**Good (2,0)**
	The roller adjustment is a potential impact hazard and there is a potential pinch hazard in the end stop	The adjustment pin of the first weight in the stack could be a possible pinch hazard in connection with the start angle lever	No objections	Weight stack tower covering is not high enough	No objections	Machine stability somewhat reduced
	123 x 117 x 147	127 x 104 x 157	145 x 107 x 162	140 x 91 x 137	124 x 110 x 176	130 x 105 x 148,5
	283	370	291	253	274	257
	5.350,-	3.590,-	3.799,-	3.395,-	4.150,-	3.370,-

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.

Equipment Test Table – Seated Leg Curl

					
Cybex Eagle Seated Leg Curl	***Gym 80*** Sygnum Seated Leg Curl	***Life Fitness*** Signature Seated Leg Curl	***Nautilus*** Nitro Seated Leg Curl	***Schnell*** Seated Leg Curl	***Technogym*** Personal Selection Leg Curl
☼☼ Increased pressure on the back of the thighs	☼☼ Increased pressure on the back of the thighs	☼☼ Thigh pad unnecessarily close to the patella	☼ Shin pad roll applies too much pressure at certain points	☼☼ Increased pressure on the back of the thighs	☼ Shin pad roll applies too much pressure at certain points
☼☼☼ Beginner ☼☼☼ Advanced 6 to 93 kg in 2.3 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 135 kg in 5 kg increments (3 kg increments with optional adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 152.5 kg in 2.5 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 9 to 95.5 kg in 2.3 kg increments (2 integrated adapter weights included)	☼☼☼ Beginner ☼☼ Advanced 10 to 75 kg in 5 kg increments (2.5 kg increments with optional adapter weight)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 97.5 kg in 2.5 kg increments (1 integrated adapter weight)
☼☼☼	☼☼☼ Backrest is somewhat limited for smaller users	☼☼☼	☼☼ Limited calf pad roll adjustment options for larger users	☼☼☼	☼☼☼
☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼ Good except for the start angle adjustment	☼☼☼
Possible for all machine settings	Possible for all machine settings	Possible for all machine settings	Possible for all machine settings	Possible; access however is somewhat difficult	Possible for all machine settings
Very good (1,4)	**Very good (1,3)**	**Very good (1,4)**	**Good (2,2)**	**Very good (1,5)**	**Good (2,0)**
Very good isolating leg curl movement. The resistance curve delivers larger amplitudes even at higher resistances.	Very good isolating leg curl movement. Maximum range of motion movements is possible.	Very good isolating leg curl movement. Both over-reaching start positions should however, not be used.	Leg curl movement only recommended to a limited extent. Knee joint pressure, pivot point incongruent, and shin pressure are present. The optionally available pelvic belt should be offered as standard equipment!	Very good isolating leg curl movement. The factory-set resistance curve should be lighter at the end of the movement range (can be varied).	Leg curl movement can only be recommended to a certain extent Resulting knee joint pressure, pivot point incongruent and shin pressure.
☼☼☼ Accurately adjustable and well scaled	☼☼☼ Accurately adjustable. Unfortunately scales are missing	☼☼☼	☼ At higher resistances fixation is no longer possible	☼☼☼ Accurately adjustable, but scales are missing	☼ At higher resistances fixation is no longer possible
☼☼ Maximum knee flexion is limited	☼☼☼ Maximum range of motion is possible: Very good!	☼☼ Maximum knee flexion is limited	☼☼ Would be ok, but is limited when using higher loads	☼☼ Limited maximum knee flexion	☼ Greatly limited maximum knee flexion
☼☼☼	☼☼☼	☼☼ Start angle can also be set for negative knee angles! Instruction on correct adjustment is necessary!	☼☼☼	☼☼☼	☼☼☼
☼☼☼	☼☼☼ Very good thigh fixation	☼☼☼	● Unfortunately loads can only be dissipated via the shin	☼☼☼	● Unfortunately loads can only be dissipated via the shin
☼☼☼	☼☼☼	☼☼☼	☼ There is no start limit; foot roll is only adjustable to 3 positions	☼☼☼	☼☼☼
☼☼☼	☼	☼	☼☼☼	☼	☼☼
☼☼	☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
Very good (1,5)	**Good (1,6)**	**Good (1,7)**	**Satisfactory (3,3)**	**Good (1,6)**	**Satisfactory (3,4)**

Very good (1,5)	**Very good (1,5)**	**Good (1,6)**	**Satisfactory (3,0)**	**Good (1,6)**	**Satisfactory (3,0)**
No objections	No objections	Ok, but the locking pin on the start angle setting should be longer	The weight stack covering is not high enough	Ok, except for a potential impact hazard at the leg lever	Possible pinch hazard at cable infeed. Machine stability slightly limited
163 x 114 x 147	127 x 104 x 157	157 x 107 x 162	142 x 91 x 137	124 x 99 x 176	130 x 105 x 148,5
257	405	302	255	269	254
5.350,-	3.690,-	3.799,-	3.595,-	4.200,-	3.370,-

	Machine / Type
	Ergonomics and Comfort
	Anthropometric contact points
	Weights and weight increments
	Suitable for both smaller/larger users
	Adjustment mechanism ergonomics
	Adjustable while seated (in exercise position)
	Test weighting 25%
	Biomechanics
	Movement kinematics
	Pivot axis
	ROM [range of motion]
	Risk of constrained posture
	Load dissipation
	Required adjustments
	Resistance curve
	Inertial resistance
	Friction coefficient minimisation
	Test weighting 75%
	Overall rating Biomechanics, ergonomics and comfort
	Safety features [1, 2]
	Pinch, cut, trip or impact hazards
	Technical details [1]
	Dimentions (LxBxH) [3] [cm]
	Gross weight [3] [kg]
	Price [3] [Euro exc. VAT]

a hip angle of 0° whereas on the seated design the angle is 90°. This means that the ischiocrural muscles can only be stretched on the seated leg curl machine whereas the actin-myosin filaments can only be brought to largely overlap on the lying version. This means that only with the use of both machines can the hamstring musculature be worked over the full movement amplitude. Furthermore, from a neuromuscular standpoint, the variation in hip angle in hamstring training represents an improvement in co-ordinative fitness.

Test Results

Only *Cybex*, *Gym 80*, *Nautilus* and *Schnell* offer both a lying and a seated leg curl machine. Congratulations to these four! The other two manufacturers *Life Fitness* and *Technogym* would be well advised to supplement their product range with a lying leg curl machine. Of the four lying leg curl machines the model from *Cybex* takes a clear lead. Close on its heels however, are those of *Gym 80* and *Schnell*. With a pivot point in the wrong place and an unsatisfactory range of adjustment for the calf roller, a barely deserved "satisfactory" means that *Nautilus* takes last place here.

Seated Leg Curl

I already mentioned above that these machines are excellent for the isolated training of the hamstring musculature. The biomechanical challenge here is to ensure proper alignment of the knee axis and the most efficient load dissipation. Two of the manufacturers, *Nautilus* and *Technogym*, solve this problem with a shin strap. The load is transferred from the lower leg and dissipated again through the upper part of the lower leg. Unfortunately such dissipation of the load before it reaches the first joint level cannot be achieved purely mechanically! It can only be achieved by compensating movements such as through the hip muscles and with increased knee stress – not to mention the uncomfortable shin pressure from the pad. We were more advanced 20 years ago! Naturally, with low loads this is barely noticeable – but just try it with a higher weight load! Fortunately most manufacturers offer the thigh strap, including the other four candidates. In terms of belting, the thigh strap on the *Gym 80* machine is ideal due to its wide-range of adjustment and because it pulls the padding towards the middle of the body when tightened. With the other three manufacturers the padding is pulled towards the knee joint and patella when tightening the thigh strap. People that have

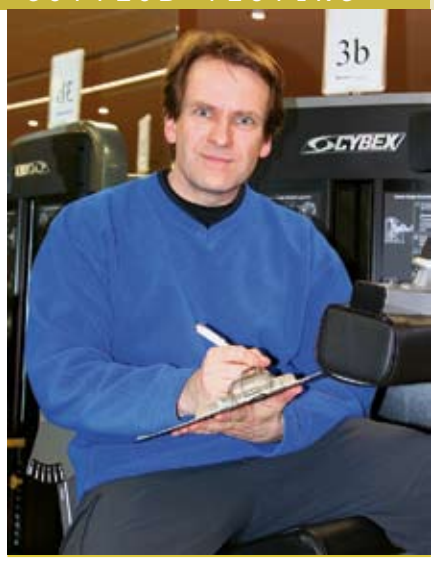
smaller legs therefore workout with the strap fastened unnecessarily close to the kneecap. What a shame!

Because the ischiocrural muscles can be stretched to the maximum during seated leg curls, a start angle limiter should be incorporated into the machine as standard. With the exception of *Nautilus* all manufacturers already fit this. Positions of maximum stretch should generally be avoided when commencing training because at higher weights the resulting constrained posture introduces a higher risk of the onset of tendonitis.

Gym 80 and *Cybex* are the two leaders in seated leg curl machines. *Gym 80* scores highly because of its thigh strap and maximum range of motion. *Cybex* offers a very good resistance curve and guarantees an ideal pivot axis position for all sizes of user. *Schnell* and *Life Fitness* follow closely and, except for some insignificant problems, provide excellent exercise machines of comparable quality. *Technogym* and *Nautilus* are unfortunately beaten here; training on these machines is only satisfactory in the low resistance range. *Nautilus* does offer a pelvic belt (at additional cost) that offers a slight improvement as far as pivot axis congruence is concerned, but this cannot compensate for the poor load dissipation. It wouldn't actually be a bad idea if such basic accessories were included in the base price of the machine, rather than costing extra.

Leg Press Seated

In general one can divide leg press machines into lying and seated categories. With the lying version the user extends his or her hip to almost 0°. With the seated version tested here the hip joint only takes on an angle of 90°. The enormous range of movement and the complex biomechanics of leg presses are so complicated that for space reasons it is not possible to consider these issues in



greater detail here. All of the seated leg press machines tested have achieved the grade "good" and there are only 3 tenths of a point separating them. This means that all of our manufacturers offer truly good training equipment. On five of the machines the user sits on a moving carriage during training. On the *Nautilus* machine on the other hand, the user pushes against a footplate at an adapted angle. With *Gym 80*, *Life Fitness*, *Nautilus* and *Technogym* athletes can take up comfortable positions on nice large footplates. *Life Fitness*, *Nautilus* and *Technogym* should increase their weight stack a little more. None of the manufactures offer any kind of useful aid to easy access which avoids beginning the exercise with an uncomfortable knee joint angle. A feature that was already developed over 18 years ago!

Closing Comments

Following the publication of the results of our first test, *Nautilus* Switzerland contacted us to say that all of their machines sold in German speaking Europe will now automatically be supplied with instructions/placards in German. This was not the case with the two units that we tested and *Nautilus* has now undertaken to supply these free of charge. A quick and commendable response. Should other centres be equipped with English language placards then contacting *Nautilus* in Givisiez, Switzerland, to ask for a free upgrade would be well worthwhile.

All information is provided in good faith, however no responsibility is accepted for the correctness of this information.

Dr. Axel Gottlob
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Dr. Gottlob Testing

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 Gottlob INSTITUT whose courses such as MASTER training rate among the absolute top for instructors and therapists.

We therefore look forward to this new joint venture and to the important stimulus it will bring for the fitness industry.

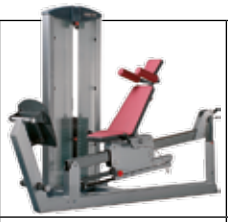
Jean-Pierre L. Schupp

Dr. Gottlob Institut

Machine / Type	
Ergonomics and Comfort	
Anthropometric contact points	
Weights and weight increments	
Suitable for both smaller/larger users	
Adjustment mechanism ergonomics	
Adjustable while seated (in exercise position)	
Test weighting 25%	
Biomechanics	
Movement kinematics	
Pivot axis	
ROM [range of motion]	
Risk of constrained posture	
Load dissipation	
Footplate	
Target muscles	
Required adjustments	
Resistance curve	
Inertial resistance	
Friction coefficient minimisation	
Test weighting 75%	

Overall rating Biomechanics, ergonomics and comfort	
Safety features [1, 2]	
Pinch, cut, trip or impact hazards	
Technical details [1]	
Dimentions (LxBxH) [3] [cm]	
Gross weight [3] [kg]	
Price [3] [Euro exc. VAT]	

Equipment Test Table – Seated Leg Press

						
	Cybex Eagle Leg Press	***Gym 80*** Sygnum Seated Leg Press	***Life Fitness*** Signature Seated Leg Press	***Nautilus*** Nitro Leg Press	***Schnell*** Functional leg press V2	***Technogym*** Personal Selection Leg Press
	☼☼ The lower edge of the backrest padding exhibits slight pressure points in some places	☼☼☼	☼☼☼	☼☼☼	☼☼☼ (Only as an option. Shoulder pads are too thin in the lying version)	☼☼☼
	☼☼☼ Beginner ☼☼☼ Advanced 6 to 229 kg in 2.3 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 5 to 245 kg in 8 kg increments	☼☼☼ Beginner ☼☼ Advanced 5 to 202.5 kg in 2.5 kg increments (3 integrated adapter weights	☼☼☼ Beginner ☼☼ Advanced 9 to 225 kg in 2.3 kg increments (3 integrated adapter weights)	☼☼☼ Beginner ☼☼☼ Advanced 10 to 180 kg in 10 kg increments (in 5kg increments with opt. adapter weight)	☼☼☼ Beginner ☼☼ Advanced 5 to 190 kg in 10 kg increments (from 10 kg)
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼ Possible, however for smaller users the ROM is somewhat limited
	☼☼ When adjusting the footplate the greater mass gives a slight disadvantage	☼☼☼	☼☼☼ Very comfortable	☼☼ Good, but in the machine tested slight binding was determined during rearward movement of the carriage	☼☼☼ Very comfortable	☼☼☼
	Except for the backrest	Except for the backrest	Possible at all machine settings	Except for the backrest	Possible at all machine settings inc. backrest (except shoulder pad for lying version	Possible at all machine settings
	Very good (1,5)	**Very good (1,4)**	**Very good (1,3)**	**Good (1,6)**	**Very good (1,3)**	**Good (1,5)**
	Good leg press action with a slightly rearwards-tilting, linear carriage movement. The 5-way adjustable angle of the back rest should ideally be used in the erect positions 1 to 3.	Good leg press action with linear carriage movement. Weight is transferred 1:1 with immediate effect.	Good leg press movement with linear carriage movement. The carriage weight is slightly heavy for beginners working only one leg.	Good leg press action with linear footplate motion that migrates slightly downward during the movement, slightly increasing the ROM of the hip. With a single-leg design a greater ROM is possible.	Good leg press action with linear carriage movement. Upon the last repetition a gas strut allows release of the weight before reaching the end position.	Good leg press action with linear carriage motion. The large foot platform offers a variety of different foot positions.
	☼☼☼ Linear with a small slightly rearwards-tilting movement carriage	☼☼☼ Linear on a slightly inclined plane	☼☼☼ Linear on a more inclined plane	☼☼☼ Footplate moves forward in a linear fashion with a slight tilting action and a slight downwards displacement	☼☼☼ Linear, on a slightly inclined plane	☼☼☼ Linear on a slightly inclined plane
	☼☼☼ Slight improvement in movement through tilting seat design	☼☼☼	☼☼☼	☼☼☼ Slight improvement in movement through the downward moving footplate	☼☼☼	☼☼☼
	☼☼☼ Start angle setting possible	☼☼☼ Start angle setting possible	☼☼☼ Start angle setting possible	☼☼☼ Start angle setting possible	☼☼☼ Start angle setting possible	☼☼☼ Start angle setting possible
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
	☼☼ Footplate approx. 62 x 47cm; antislip synthetic surface	☼☼☼ Footplate approx. 67 x 67cm; sufficiently large, corrugated steel surface	☼☼☼ Footplate approx. 76 x 46 cm; sufficiently large; antislip synthetic surface	☼☼☼ Footplate approx. 70 x 50 cm; sufficiently large, antislip synthetic surface	☼☼ Footplate approx. 65 x55 cm; corrugated steel surface	☼☼☼ Footplate approx. 80 x 70 cm for a whole range of foot positions. Antislip synthetic surface
	☼☼☼ All knee/hip extension muscles	☼☼☼ All knee/hip extension muscles	☼☼☼ All knee/hip extension muscles	☼☼☼ All hip/knee extension muscles	☼☼☼All hip/knee extension muscles	☼☼☼ All hip/knee extension muscles
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
	☼☼ Generally consistent	☼☼ Consistent	☼☼☼ The resistance curve shows an increase, however due to the increased carriage weight this only becomes noticeable at higher weights	☼☼ Largely consistent	☼☼ Consistent	☼☼ Largely consistent
	☼☼☼	☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼	☼☼☼
	Good (1,8)	**Good (1,9)**	**Good (1,7)**	**Good (1,7)**	**Good (1,8)**	**Good (2,0)**
	Good (1,7)	**Good (1,8)**	**Good (1,6)**	**Good (1,7)**	**Good (1,7)**	**Good (1,9)**
	No objections	No objections	No objections	No objections	No objections	No objections
	180 x 104 x 190	220 x 125 x 157	201 x 109 x 178	191 x 99 x 170	250 x 120 x 198	207 x 120 x 180
	469	560	368	441	465	572
	7.690,-	4.690,-	6.049,-	4.995,-	6.400,-	6.370,-