

Dr. Gottlob Testing

New Ab Coaster Equipment Test

More than 12 years ago Don Brown designed the Ab Roller. That ubiquitous ab frame which was introduced into the 'crunch departments' of many a gym, enriched abdominal exercises using the "wandering pivot axis". Sales of over 12 million devices underlined the success of intensive TV marketing aimed at the home fitness sector in particular. At IHRSA 2006, Brown presented its latest innovation: the **Ab Coaster**. An apt name indeed, because it looks as if roller coaster parts, including the seat, have been brought together to make a machine suitable for abdominal training. The equipment looks promising, its flowing, curved design is visually attractive and the movement downright eye-catching. Since November 2007, **Pulse Fitness** has been appointed exclusive sales agent for the Ab Coaster.

Pulse Fitness was originally founded by the *Johnson brothers* in England in 1980 and the company was first involved in the development, planning and management of leisure centres. Its equipment range then expanded to include cardio and, later on, strength training machines too. In 1994 *Jimmy Andrew*, together with the owners of the English parent company, established their German office in Bochum, Pulse Deutschland, which was later renamed Pulse Fitness GmbH. Today, the parent company in England employs 100 staff whilst there are 9 staff at the offices in Bochum. Pulse Fitness achieves a respectable annual turnover of nearly 20 million euros.

Test

For the purposes of the test, Pulse Fitness provided a professional **Ab Coaster CS 2000** gym version of the machine at the Pfitzenmeier Fitness park in Heidelberg, where the equipment was put to the acid test over the course of a whole week. As usual, aside from recording all of the relevant measurement data, particular attention was paid to gathering information on the machine's ergonomics and kinematics and this was subsequently analysed and evaluated. We'd like to take this opportunity to thank Pulse Fitness and owner Jimmy Andrew for providing the equipment. Thanks also

go to Fitness park Pfitzenmeier and especially to gym manager, *Markus Beck*, and his staff, *Miriam Mantey* and *Marco Fasano*, who assisted during photography and carrying out the test.

Delivery and assembly

The Ab Coaster is delivered in a sturdy cardboard box. After unpacking, the customer must assemble the 5 individual parts using the 16 Allen screws provided. The assembly instructions are clearly laid out, making assembly child's play. The complete equipment is stable and has a rubber-coated base plate. By lifting the device on the side where the curve runs out, the two front rollers come into contact with the floor, making for easy moving of the Ab Coaster around the room.

The Ab Coaster's movement capacity

The user kneels on the leg sled and moves it in an arcing motion upwards from the resting position. Before commencing the action it is possible to position the leg sled level or at an angle of 40° to the right or left. The sled therefore always moves around the pivot axis which is situated at the centre of the arc described by the guide tube.

Exercise with level sled position:

Over the lower portion of the arc this exercise solely works the hip flexor musculature. In contrast to the notes contained in the user instructions the abdominal muscles can neither raise the legs nor the knees! These act only on the pelvis and become dynamically active only when the pelvis is raised. For example, all leg raise exercises on the chinning bar or on a vertical leg raise actually exercise the hip flexor muscles. Nevertheless, a large number of athletes notice a high tension in their abdominal muscles during this exercise and performing an EMG confirms this feeling. What's the explanation? It's actually quite simple! When the legs are raised using the hip flexor muscles the lumbar spine arches into a lordotic position, in other words the back becomes increasingly hollow. The hip flexor muscles are all arranged in front of the lumbar spine and therefore, when they act on the pelvis



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 multimotion 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



Machine / Type	Ab Coaster CS 2000
Ergonomics & comfort	
Contact points anthropometric?	☉☉ Cushion contact is good
Grips	The hand grips are relatively thick in diameter
Weights and weight increments	<p>Beginners ☉☉</p> <p>Advanced users ☉☉☉</p> <p>The relatively high weight of the leg sled itself (approx. 13 kg) quite considerably limits the lift height for beginners and heavier users. Advanced users can add up to 20 kg in additional weight discs via 2 laterally mounted weight mandrels.</p>
Suitable for both smaller/larger users	☉☉ Somewhat limited for smaller athletes because the grip and elbow rest can no longer be held simultaneously. No problem for larger users.
Adjustment mechanism ergonomics	The leg sled can easily be angled to the left or right by 40° and locked in place
Test weighting 25%	Good (1.9)
Biomechanics	
Movement kinematics	<p>The leg sled describes a largely arc-shaped path.</p> <p><u>Straight leg sled setting:</u> This primarily provides a dynamic hip flexor exercise with mostly static involvement of the abdominal muscles. If the user is able to move the sled further upwards the lower lumbar spine is gradually flexed and the whole abdominal muscle group begins to act dynamically. A very effective dynamic abdominal- / hipflexor musclechain exercise results if the machine's movement path is utilised fully.</p> <p><u>Angled leg sled setting:</u> As a result of the pelvis being angled here, the lateral abdominal muscles are dynamically activated as soon as the exercise is commenced. The combined lumbar spine flexion/lateral flexion movement is accomplished through the ipsilateral action of the lateral abdominal muscles and the ipsilateral strand of the rectus abdominis muscle.</p>
Pivot axis	☉☉ The pivot axis is the central point of the arc described by the leg sled. With the classic knee position, as illustrated in the manual (knee angle 90° to 120°), the pivot axis then lies somewhere in the area of the hip joint (depending upon body size). If the thighs are shorter or if the user's thigh contacts his/her lower leg (knee angle between 120° and 150°), then the pivot axis is located in the area of the lower spine.
ROM [Range of motion]	<p>The ROM is primarily dependent upon the strength of the user!</p> <p>☉ <u>Straight leg sled setting:</u> Certain hip flexor ROM with absolutely no abdominal muscle amplitude or slight abdominal muscle amplitude depending upon the length of the stroke.</p> <p>☉☉ <u>Angled leg sled setting:</u> Depending upon the length of the stroke a medium to large abdominal muscle amplitude is produced.</p>
Risk of constrained posture	☉☉ There is a risk of constrained posture only if the user moves the sled backwards too quickly with an eccentric motion. Users should avoid this exercise form anyway.
Load dissipation	☉☉ Via the leg sled and the armrest/hand grips. However, with a long stroke and therefore improved use of the available ROM the latissimus muscle has to provide greater support. This can lead to a loss of effectiveness for female users.
Target muscles	<p><u>Straight leg sled setting:</u></p> <p>☉☉ The hip flexor muscles are the number one target muscles here. The rectus abdominis and lateral abdominal muscles have to provide highly concentrated support in order to permanently counter the continuous lordosis forces acting on the lumbar spine. Users perceive high abdominal muscle activity for this reason. As soon as the athlete is able to push the sled higher the lateral abdominal muscles and lower rectus abdominis compartment come dynamically into play too. This converts the exercise into an interesting abdominal- / hipflexor musclechain exercise. If the pivot axis is immediately oriented on the lumbar spine region then a dynamic abdominal/hip flexor muscle exercise is produced on both sides.</p> <p><u>Angled leg sled setting:</u></p> <p>☉☉☉ The lateral abdominal muscles (Obliquus externus and internus) are worked effectively to very effectively, depending upon the length of the stroke.</p>
Required adjustments	☉☉ The armrest cannot unfortunately be adjusted to suit smaller users or for carrying out the exercises on the level of the lumbar spine pivot axis.
Resistance curve	☉ Increases quite considerably due to the increasing flexion caused by longer strokes.
Inertial resistance	☉☉ Ok.
Friction coefficient minimisation	☉☉☉ Good
Test weighting 75%	Dependent upon the exercise, length of stroke and leg sled position: Good (between 1.6 and 2.3)
Overall rating	Good (1.9)
Biomechanics/ergonomics/ comfort	Good (1.7) for stronger, medium sized to big people, good (2.2) for weaker or smaller people
Safety features ^{1, 2}	
Pinch, cut, trip or impact hazards	Practically none to consider; just in cases where a strong athlete accelerates the leg sled upwards his/her knees could contact the assembly screws.
Technical data ¹	
Dimensions (LxWxH) ³ [cm]	155 x 84 x 147
Gross weight ³ [kg]	68
Price ³ [Euro exc. VAT]	1,249.00

they generate a resulting torque which tends to tip the pelvis and cause the lumbar spine to take on that lordotic position. Lordosis can only be avoided with a high tension over the whole of the abdominal muscle area (which of course connect the pelvis to the ribcage), or in other words, the tension holds the tipping action of the pelvis within limits. The feeling of tension in the abdominal muscles, which is confirmed through the measurements, is real, but generated by purely isometric forces. The abdominal muscles do not actually raise the legs – this can solely be achieved by the hip flexor muscles. But the purpose of the abdominal muscles here, is to ensure that the posture of the lumbar spine is held constant. Does this mean therefore, that carrying out this exercise on the Ab Coaster machine could be detrimental? No, not at all in fact! Fear of hip flexor activity is completely unfounded, and has been for years. Only when hip flexor extension generates an uncontrolled hollow back when carrying out exercises does exposure to detrimental loads cause a problem. Due to the axial direction with which the forces are applied when using the Ab Coaster, this has no effect, assuming of course that the exercise is carried out smoothly. We maintain that the motion is partly a dynamic hip flexion exercise with the abdominal muscles acting statically.

Only if the athlete has sufficient strength to enable him or her to raise the sled high enough and in doing so raise the pelvis towards the front, then – and only then – does the abdominal musculature become dynamically involved. Now the athlete is undertaking an abdominal- / hipflexor musclechain exercise.

Assuming the athlete carries out the exercise in a controlled manner whilst avoiding any appreciable build up of vibrations then there is certainly value in this exercise.

In the two illustrations of the exercise you can see the user in firstly a higher kneeling and secondly a lower kneeling position. The manual only deals with one position however, therefore we would like here to briefly explain the other variant of this exercise. In the higher kneeling position the movement axis lies at around the position of the hip joint. Here, at the beginning of the exercise, as shown above, only the hip flexor muscles are worked. Only when raised further (see the final position) do the abdominal muscles also come dynamically into play. In contrast, in the lower kneeling position the pivot axis localises itself in the region of the lower lumbar spine, causing the abdominal muscles to be worked dynamically right from the beginning of the movement. In this way various dynamic degrees of abdominal muscle activation can be achieved.

Many users will not be able to raise up so far because they are not strong enough. But even then the Ab Coaster still provides a very constructive exercise. On the one hand users can slowly improve the mobility of their lumbar spine. On the other, training the abdominal muscles with forces applied from below (a well known difficult situation) becomes possible, at least statically.

Exercise with angled sled position:

Here, the hip flexor muscles play no dynamic role at all. The correspondingly rotated pelvis is really raised by the abdominal muscles now. In this situation the ipsilateral connected lateral abdominal muscles,

namely the Obliquus externus and the Obliquus internus, are performing together in a kinetic chain. These are supported by the strand of muscle located on the same side, the rectus abdominis muscle. It is an effective lateral flexion training method for the lumbar spine, and the motto once again is: as high as possible whilst keeping it smooth!

Technical details

Surface finish

The surfaces of all metal parts are powder coated and receive a final clear varnish coat. In this respect, the test equipment did indeed exhibit superior quality. Having undergone rigorous use in the gym for 1 week, only light friction wear on the guide tubes was visible, and this was caused by the black plastic rollers of the leg sled. These marks can however probably be attributed to the initial "running-in" of the rollers, and will most likely stop after the first couple of weeks. The leg sled cushions, made of polyurethane foam, are excellent. A softer surface for the arm restraint would be the only desirable addition.

Resistance selection

The resistance is controlled by the weight of the leg sled itself – which weighs in at approx. 13kg, together with the weight of the user. Unfortunately, lower resistances cannot be set. If beginners, particularly those with a high body weight, wish to carry out this exercise then the only option is to significantly reduce the amplitude of the motion. Tension in the abdominal muscles is still perceivable and the movement can be recommended as an initiation. It is however, possible to increase the resistance by adding weight plates. Weightslevers on the side allow weights of up to a maximum of 20kg to be loaded.

Minimising the friction coefficient

The leg sled is guided by 6 plastic rollers on the curved round guide tubes. The maintenance-free ball-bearing rollers allow for a movement delivering extremely low friction values.

User instructions

The Manual and the instructions placed on the machine, including training and safety tips, are extremely detailed and perfectly comprehensible. The training info should however be updated in the light of the above comments.

Conclusion

The **Ab Coaster** cannot replace either abdominal muscle exercises with load application from above, or the various other useful abdominal exercise machine designs. The Ab Coaster does however, represent an excellent addition for every training facility. The execution of the exercises offers beginners a certain improvement in mobility and an increase in their static abdominal muscle power. Advanced users profit from highly effective partial amplitude abdominal- /hip flexor muscle chain exercises. With angled leg sled position dynamic abdominal muscle exercises can be generated for anyone, whilst working with different knee angles provides a further variation on the exercise. Finally, this machine offers a fun factor that should also not be overlooked, bringing a motivational angle to abdominal muscle training.

All of the test results were arrived at in good faith, however no responsibility is accepted for the correctness of this information.

Dr. Axel Gottlob

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The Ab Coaster exercises in the higher kneeling position (two photos on left) and sitting lower with initial dynamic abdominal muscle activity (two photos on right).

Pulse Fitness – company profile

Pulse Fitness		
Brief company history	1980	Pulse Fitness established by brothers Dave and Chris Johnson in England.
	1994	<i>Pulse Deutschland office opened by Jimmy Andrew and the Johnson brothers.</i>
	1995	First cardio machine produced.
	1996	<i>Pulse 225 Group Cycles market launch</i>
	1999	Renaming of Pulse Deutschland into Pulse Fitness GmbH
	2000	<i>Launch of the Elliptical Cross trainer 280F</i>
	2001	<i>Equipment manufacture moves to Asia</i>
	2006	Don Brown develops and presents the Ab Coaster at the IHRSA in the USA for the first time.
	2007	Start of exclusive Ab Coaster distribution in Germany through Pulse Fitness GmbH.
Main office	Pulse Fitness: Congleton, England Ab Coaster LLC: Chester, New Jersey, USA	
Production location	Pulse Fitness Cardio machines in Taiwan Pulse Fitness Strength machines in China Ab Coaster in China	
Key data	Approx. 100 employees in England; 9 staff at Pulse Fitness GmbH in Germany	
Equipment lines	<ul style="list-style-type: none"> - Strength: Evolve Line - Cardio: Freedom Line - Ab Coaster (Exclusive distribution) - Free weights - Line suitable for children: Vibe Line - plus training support: Smart Centre 	
Contact address	Pulse Fitness GmbH Rombacher Hütte 10 D – 44795 Bochum www.pulsefitness.de www.abcoaster-europe.com Tel: 0234 – 43623	
Guarantee	Ab Coaster: 5 years on frame and bearing plus 90 days on upholstery.	
Certification	Ab Coaster is CE and TÜV certified. Pulse equipment is manufactured to ISO 9002 and meets assorted safety standards, e.g. CE, GS, TÜV and EN-957.	
Delivery	The Ab Coaster is delivered in a cardboard box by a freight forwarding agent. It contains 5 individual components which must be assembled by the customer. Thanks to the clear instructions, the parts can be quickly and easily assembled.	
Lead time	2 to 7 weeks, depending on stock on hand Delivery from Bochum, Germany	



Ab Coaster shown with angled leg sled position

All details according to manufacturers' or company representatives' statements & media reports.

Ratings: ○○○ very good, ○○ good, ○ satisfactory, ● unsatisfactory, ●● poor

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

The machine was analysed impartially and in good faith, however no guarantees of any type are given or implied.