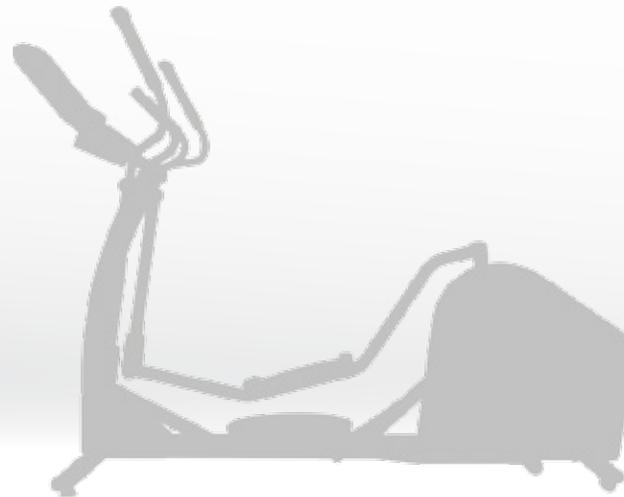




Arc Trainer[®] vs Elliptical vs AMT[®]: The Ultimate Fitness Test

Top 5 factors for making an informed purchase decision



Too Many Choices, Not Enough Facts

With all the different products and competing claims, choosing a non-impact cardio trainer can turn into one long, dizzying exercise. It doesn't have to be.

For a category that represents over 25% of all fitness equipment purchases², it's surprising that there's never been a straightforward, systematic method for evaluating your options. Until now.

Today, selecting a non-impact cardio trainer isn't just a difficult decision. It's potentially very costly.

As you're well aware, these products represent a substantial investment. And once you've bought a solution, you're likely to

keep it for a long, long time. In fact, for every 100 ellipticals and cross-trainers purchased in a year, only three are traded in¹.

What you may not know is that the three main types of non-impact cardio trainer deliver very different results. Consequently, the choice you make can have a significant impact on member satisfaction, and ultimately, your bottom line.

For a category that represents over 25% of all fitness equipment purchases², it's surprising that there's never been a straightforward, systematic method for evaluating your options.

Until now.





FINALLY, A FACTUAL, FIVE-PART TEST TO HELP YOU CUT THROUGH THE CONFUSION

In this white paper, you'll discover the five key factors that can help make your choice clear.

1. **Beyond the Hype** raises the questions you need to ask in order to determine whether the facts support a manufacturer's product claims.
2. **Cardio Exam** provides unbiased data about which option delivers the greatest cardiovascular benefits.
3. **Cross-Training Challenge** helps you look beyond cardio and analyze what else a machine can do for your members.
4. **Pain vs. Gain Evaluation** explains how the comfort factor enters into the overall value equation.
5. **Flexibility Test** reveals the machine that targets the widest range of members, goals and fitness trends.

By the end of this white paper, you'll know how the leading options stack up side by side. And you'll have the facts you need to make the best purchase decision for your fitness center.

FACTOR #1

Beyond the Hype

Are the machine's design and the manufacturer's claims based on science... or marketing?

Flip through any trade publication and you'll be barraged with equipment ads promising everything from bulging biceps to a 20-inch waistline. So how can you tell which claims are grounded in fact?

Demand to see the evidence behind the advertising. You'll not only get to the truth about the product, you'll also learn a lot about the substance of the manufacturer.

Look into the company's background. In the case of Cybex International, you'll find a company whose heritage is rooted in sports medicine and rehabilitation. Those are fields where scientific evidence is a requisite for purchase consideration, and where the bars for quality, precision, safety and effectiveness are set exceptionally high.

Find out how – and why – new products are developed. Some manufacturers may be focused on reacting to the latest fad. Others may take a relatively simplistic approach to solving a problem: for example, assuming that by replicating a running motion and removing impact, a machine will eliminate knee stress. Cybex, on the other hand, starts with the goal of helping the human body work better, and follows a rigorous, science-based approach to developing innovations.



Cybex is also the only fitness equipment company with its own world-renowned research institute, founded to ensure that designs are optimized for the best fitness results. Nearly 95% of the more than 90 patents Cybex holds are based on their in-house design, engineering, and intellectual property development.

All of which means that if you ask to see the evidence behind a Cybex product claim, the answer will come in the form of thoroughly-researched facts, not unverified claims.

FACTOR #2

Cardio Exam

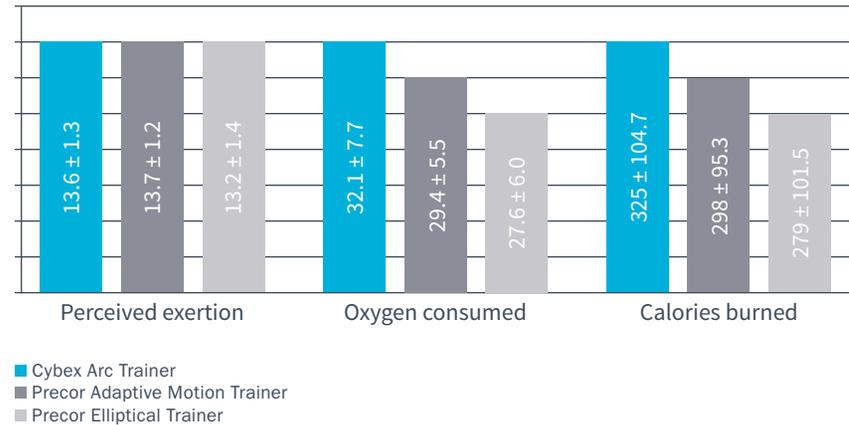
Are all non-impact cardio workouts created equal? Not according to recent research. In fact, the benefits your members derive can vary widely depending on the type of machine they use.

The University of Wisconsin – Lacrosse is among the world’s most respected centers of fitness research. One of their top research teams recently investigated which type of non-impact cardio trainer provides the most effective cardio workout.³

The researchers asked individuals to work out at the same rate of perceived effort on a Cybex Arc Trainer, a Precor Adaptive Motion Trainer and a Precor Elliptical Trainer.

The team’s findings were very enlightening.

They discovered that although the test subjects thought they were working out just as hard on all three machines, they burned a lot more calories and consumed much more oxygen while on the Cybex Arc Trainer.



In other words, they burned **16% more calories** on an Arc Trainer than on a Precor Elliptical Trainer and 9% more than on a Precor AMT – in the same amount of time, with the same amount of effort.

That’s like burning an extra **26,000 calories** a year.

Or to put it in terms your members can really relate to, switching to an Arc Trainer could help them get rid of an extra **7 pounds of fat per year**.⁴

THAT’S

500

**MORE CALORIES
IN A WEEK, OR...**

26,000

**MORE CALORIES
IN ONE YEAR, OR...**

**7 POUNDS
OF FAT!**

(1 lb of fat equals
3,500 calories)

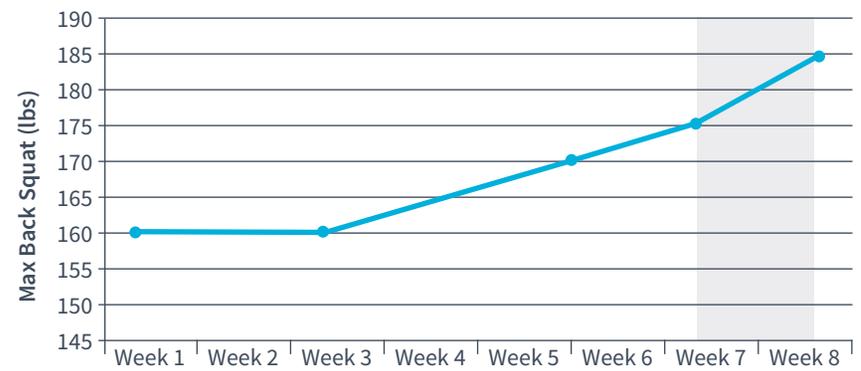
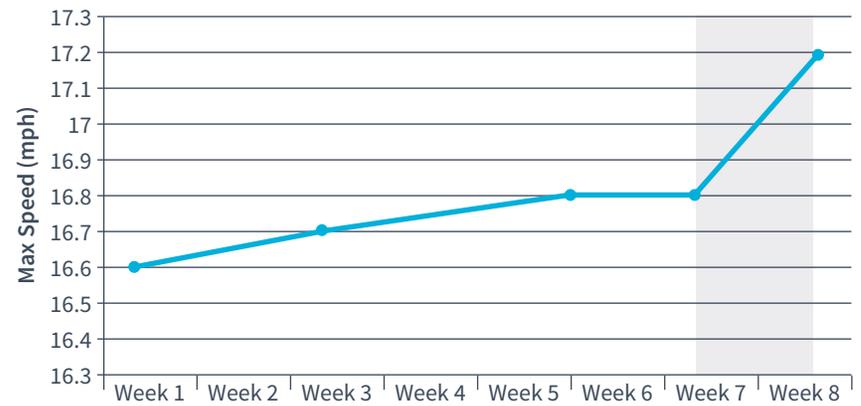
FACTOR #3

Cross-Training Challenge

When selecting a non-impact cardio machine, it pays to look beyond cardio. Ask the manufacturer: What cross-training benefits does your machine deliver? Can it be used to enhance speed and muscular endurance? Where is the research to back up your claims?

To decide which machine provides the greatest cross-training benefits, first look at what the Cybex Arc Trainer has to offer. Then, ask other manufacturers if they can provide the same kind of research-based evidence of improved performance.

Increased speed and power. Can an Arc Trainer help make you faster and stronger? AthleteFIT, a training and research facility devoted to improving athletic performance, introduced Arc power training to the regimens of two very different athletes: an elite female high-school soccer player and a 25-year-old male recreational athlete. Within eight weeks, the soccer player experienced these changes in her running speed and lower body strength:⁵



FACTOR #3 (CONTINUED)

Cross-Training Challenge

For the recreational athlete’s training program, AthleteFit introduced a leg press/Arc sprint session. Six weeks later, he was jumping significantly higher as well as running faster:

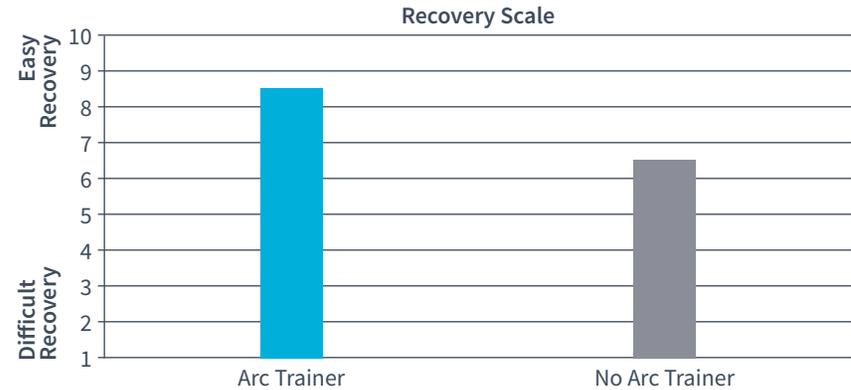
	Vertical Jump (in)		40 yard dash (sec)	
	Average	Maximum	Average	Maximum
Before	22.95	24.26	4.86	4.83
After	25.25	27.3	4.82	4.78

What’s more, the athlete reported that weeks after the study ended, he still felt he was performing at a much higher level on the playing field. ⁶

Enhanced running fitness. Can a person improve his or her overall running fitness by using the Arc Trainer and light strength training instead of running? AthleteFIT’s eight-week study produced these four-mile interval test results (note the 1+ minute drop in total running time).⁷

	Time (min.)	Avg. speed (mph)	Max. speed (mph)
Before	35:54	6.69	16.44
After	34:47	6.94	17.05

Quicker recovery rates. Can cross-training on an Arc Trainer help high-mileage runners bounce back faster? Fischer Sports Physical Therapy and Conditioning took an ultramarathoner’s training program and substituted high-intensity Arc intervals for high-intensity running. On a scale of 1 to 10, with 10 being total recovery, here’s how the ultramarathoner rated his recovery times: ⁸



Improved muscular endurance. Could high-intensity training on the Arc Trainer lead to gains in work output and muscular endurance? To quote the Centers for Athletic Performance’s conclusions:

“Despite its classification as a cardio device, the Cybex Arc Trainer will improve one’s workload capacity while increasing lower body endurance. These will have direct benefits in performing daily activities, participating in athletic events, and reducing injury risks.”⁹

FACTOR #4

Non-Impact vs. Non-Stress

It's simple logic: the better your members feel when exercising, the more they'll be willing to push themselves, and the better their results and satisfaction. So which type of machine encourages the most intense workout and does non-impact mean non-stress?

There's actually a scientific way to measure how hard a workout feels when she or he is working out. It's called the Borg Rating of Perceived Exertion (RPE) Scale, and it measures one's sense of effort expended while exercising.

Researchers at the University of North Carolina – Charlotte's Department of Kinesiology wanted to see if there was any difference in people's RPE responses while using the Arc Trainer and an elliptical trainer. They found that:

“When exercising at the same level of effort, the RPE responses were lesser with the Arc.”

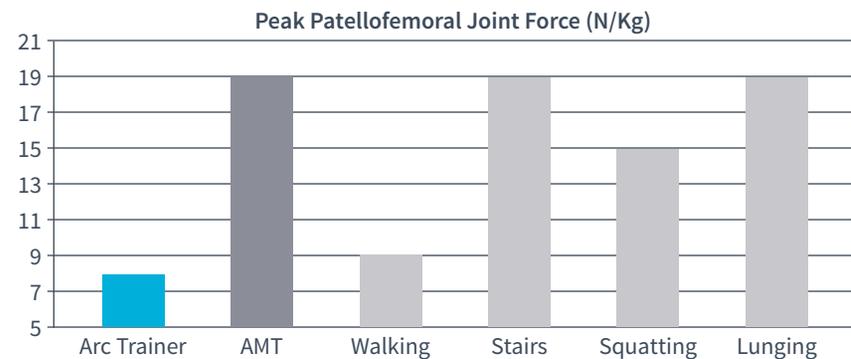
And they emphasized that:

“...these differences in discomfort are likely to influence the fitness participant's program adherence and goal accomplishment.”¹⁰

So why would exercising on an elliptical or AMT seem more uncomfortable?

Contrary to popular opinion, not all non-impact cardio trainers are non-stress. Ellipticals attempt to simulate the foot's path of motion when a person is running in a non-impact environment. However, independent studies have found that the result is a loading pattern that is drastically different, resulting in significant knee stress.

For example, research conducted by the University of Wisconsin – LaCrosse showed that while an Arc Trainer “allows users to exercise at relatively high workloads with insignificant levels of knee stress,” working out on an AMT produces almost as much knee stress as climbing stairs or lunging.¹¹



FACTOR #4 (CONTINUED)

Non-Impact vs. Non-Stress

After studying Precor, Life Fitness and Cybex machines, a research group led by Dr. Graham Caldwell of the University of Massachusetts – Amherst warned:

“... athletes with anterior knee pain may wish to avoid the higher patellofemoral force and eccentric knee power associated with Precor and Life Fitness exercise...”¹²

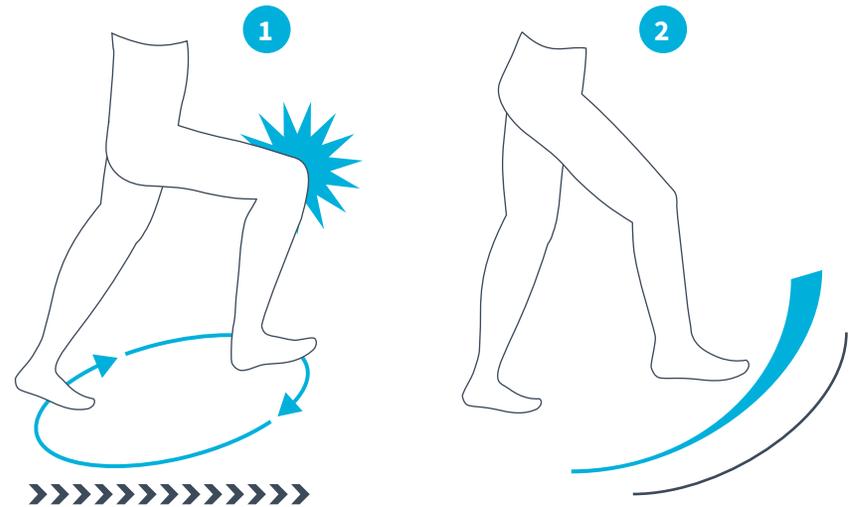
And when Florida Atlantic University researchers analyzed how the different machines cause your lower body to move, they discovered something that may well explain how using an elliptical trainer can lead to knee pain.

It turns out that when someone’s on an elliptical, there’s a split-second between the time the knee starts extending and the hip is fully flexed. It’s just enough lag time to load the knee and transfer downward forces from the hips to the knee. Result: significant stress on the knee joint.¹³

Over time, excess stress can lead to overuse syndromes such as runner’s knee.

To state the obvious: when members feel uncomfortable exercising on your machines, it isn’t good for your bottom line.

In other words, their pain can hurt your gain.



- 1. Elliptical motion requires a constant pushing forward which may cause overuse issues on the knees
- 2. The Arc motion is down and back. It’s controlled direction of force increases energy demand, oxygen consumption, and calorie burn

ELLIPTICAL KNEE STRESS IS COMPARABLE TO LUNGING.

ARC TRAINER KNEE STRESS IS COMPARABLE TO WALKING.

The Arc Trainer delivers a more comfortable workout, so you can exercise longer and recover faster.

FACTOR #5

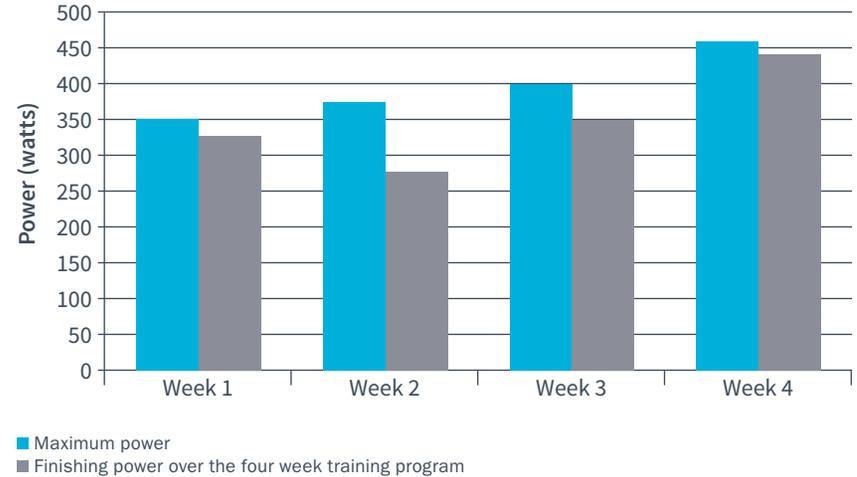
Flexibility Test

Problem: your members have a myriad of needs, goals and interests. But you don't have unlimited floor space in your facility. Which machine has the versatility to help the most diverse range of members in the most different ways?

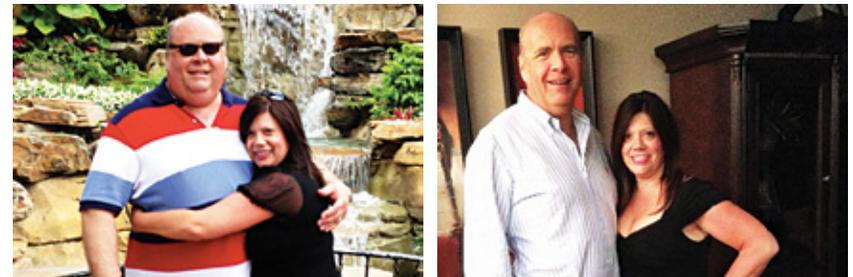
IT TAKES A VERSATILE MACHINE TO EMBRACE MEMBER DIVERSITY

In all likelihood your membership is made up of a spectrum of segments. Let's take three very distinct types of members and see how the Arc Trainer works for them in these real world stories.

All-out competitor: He's a high school sprinter, specializing in one of the most grueling of all track and field events, the 400 meters. Using an Arc Trainer, he combined high-intensity intervals and a ladder-style program, while constantly increasing resistance. In just four weeks, he achieved 35% greater average power and 32% more finishing power, and lopped 1.16 seconds off his personal best 400m time.¹⁴



Heavyweight life-changer: He's a retired veteran who suffered from psoriatic arthritis and weighed 357 lbs. Instead of undergoing gastric bypass surgery, he hit the gym, and soon found his answer in the Arc Trainer. In his own words: "Elliptical trainers represent an excruciating ordeal for people like me with arthritis in the knees, ankles, and/or hips. The Arc Trainer, with its arc motion, provides excellent support and stability for the leg joints." He's since dropped 140 lbs. and reduced his waist size by an entire foot.¹⁵



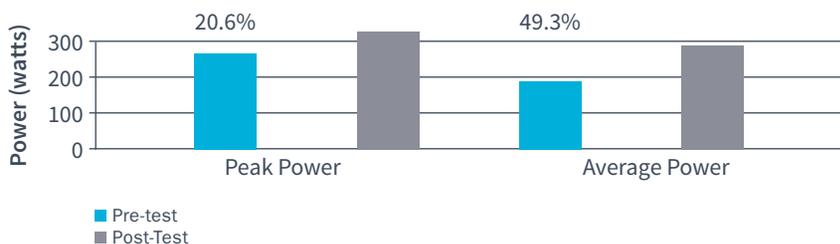
Billy Martin "Before" and "After"

FACTOR #5 (CONTINUED)

Flexibility Test



Strong, steady senior: She hadn't exercised regularly for months before engaging in a 12-week University of Miami study. With the Arc Trainer, she was able to start at relatively low resistance and incline settings, and build up progressively. The researchers found "substantial increases in isolated leg strength and power, as well as in anaerobic mechanical power" and concluded that the "data strongly support the use of the Arc Trainer as a device for training middle-aged and older individuals for the purpose of maintaining independence and reducing falls."¹⁶



HERE'S HOW THE ARC TRAINER HELPS MEMBERS HIT A WIDE RANGE OF GOALS

Different people want different things out of their fitness facility. Look how the Arc Trainer addresses an array of goals.

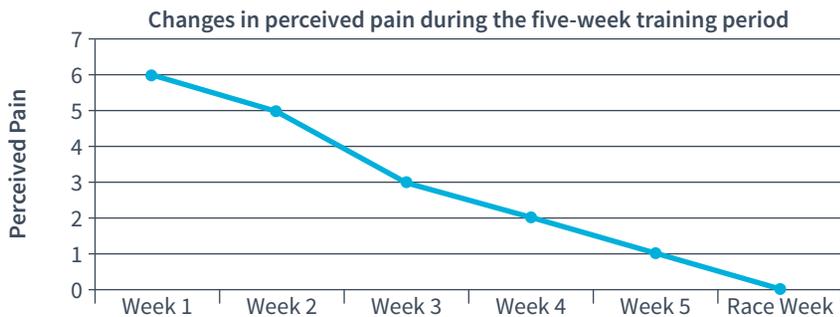
Beach body wannabe: Suppose a member wants to strengthen her glutes and shape her bottom. That calls for a mix of strength training and cardio. Unlike with ellipticals, she can do both on the Arc Trainer. And since the machine offers a near-limitless variety of settings, she can adjust her stride rate, resistance and incline to target the glutes. She can even use the Arc Trainer's Muscle Map feature to visually zero in on the right muscle groups.¹⁷



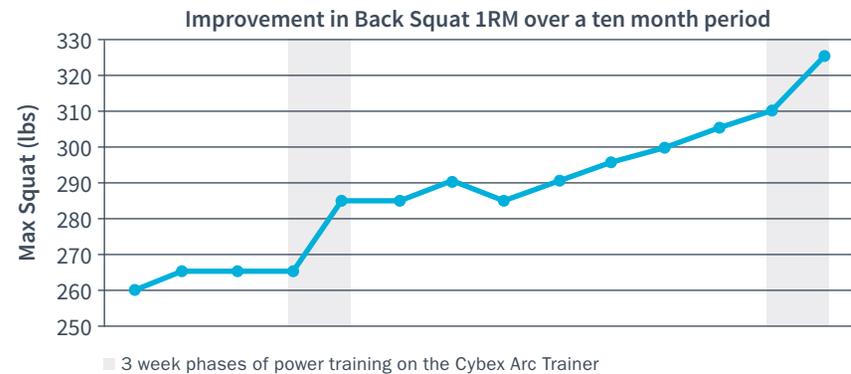
FACTOR #5 (CONTINUED)

Flexibility Test

Rehab road warrior: Let's say it's five weeks before the big marathon and a first-timer limps in with sore knees. This actually happened to a forty-something male runner. He swapped out his "long run" day each week for an Arc Trainer power and endurance training workout, choosing resistance settings that were challenging but tolerable. The Arc Trainer sessions proved effective in helping him maintain both his strength and cardio conditioning. He went on to finish his marathon in the top 25% of his age group, with no knee pain.¹⁸



Bad-luck weightlifter: Here's another real-world story. First a 36-year-old man got hit by a car. Then, he fell off a roof. Next, he got hurt playing basketball. Not surprisingly, he ended up with a completely degenerated disk in his spine that limited how much he could do in the gym with weights. He turned to power training on the Arc Trainer, figuring he'd lose strength but at least might gain some muscular endurance. In fact, after three power sessions a week for three weeks, his maximum back squat went from 265 to 285 lbs. After 10 months, he was up to 325 lbs. – a near-20% net improvement.¹⁹



FACTOR #5 (CONTINUED)

Flexibility Test

THE ARC TRAINER HELPS YOU KEEP PACE WITH THE LATEST TRENDS

“New” never gets old. People are always looking for the latest ways to work out. Of course, you can’t re-equip your facility every time a new fad crops up. But you can leverage the flexibility inherent in the Arc Trainer’s design to capitalize on what’s hot, on the spot. Consider these top fitness trends for 2015.

High Intensity Interval Training: If someone set out to build a HIIT machine, they’d probably come up with the Arc Trainer. Its virtually unlimited choice of progressions and digressions makes it ideal for varying the intensity of intervals. And since the Arc Trainer lets your members work at higher intensities with lower rates of perceived exertion than other machines, they can crank up their metabolisms, burn calories and melt fat faster.²⁰

Exercise and Weight Loss: By engaging the muscles that demand the most energy, the Arc Trainer optimizes calorie burn with minimal knee, hip and back stress. It can be integrated into every step of a weight loss program, from building a base of strength and work capacity to maintaining ideal body weight over time. Its highly adaptable design lets your members custom-tailor settings for optimum and achievable results, every step of the way.²¹

Power Training: Two of the best ways to improve strength are adding resistance while maintaining velocity, or increasing velocity while keeping resistance constant. With the Arc Trainer, you can increase resistance and velocity, thus improving leg power and strength from both ends of the spectrum. The Arc Trainer has a unique feature called Constant Power. As a user speeds up or slows down, it decreases or increases resistance automatically, so they’re always working at a steady, effective level.²²



Executive Action Plan

Here are the five key criteria you should focus on to help you make an informed, intelligent purchase decision:

1. **Credibility:** Find out whether a manufacturer's claims are based on scientific research or marketing strategy.
2. **Cardio performance:** Know which machine delivers the greatest cardiovascular benefits for your members.
3. **Cross-training effectiveness:** Determine if a given product can help enhance speed, power, running fitness, recovery rates and muscular endurance.
4. **Comfort:** Get the facts on whether a machine is truly non-stress, and how perceived discomfort may affect workout results and member retention.
5. **Comprehensive flexibility:** Know which cross-trainer can address the widest variety of member segments, fitness goals and popular trends.

Non-impact cardio trainers are not created equal. The choice you make can have a major impact on workout quality, member satisfaction and ultimately, your bottom line. Look at all your options. Ask tough questions. Demand proof. You'll discover there's only one machine that aces the ultimate fitness test.

Get the facts on the fittest non-impact cardio trainer

For full details on the Cybex Arc Trainer, contact us at +1.774.324.8000 or at sales@cybexintl.com.

REFERENCES

¹Fitness Industry Suppliers Association, N.A. Fifteenth Annual Market Trend Report Global Commercial Fitness Equipment Sales January 2013 through December 2013, p. 16.

²Fitness Industry Suppliers Association, N.A. Fifteenth Annual Market Trend Report Global Commercial Fitness Equipment Sales January 2013 through December 2013, p. 15.

³Hendrickson, K., Porcari, J. P., & Foster, C. "Relative exercise intensity, heart rate, oxygen consumption and caloric expenditure when exercising on various non-impact cardio trainers." Cybex International, Inc. University of Wisconsin-La Crosse. 22 October 2014.

⁴1 lb. of fat = 3,500 calories

⁵Moody, S. "The Effects of an Eight-Week Training Program Using the Cybex Arc Trainer on Maximum Sprinting Speed of an Elite Female Soccer Player." AthleteFIT. Overland Park, KS.

⁶Moody, S. "Improvements in Speed and Jumping Ability after a Six-Week Cybex Arc Trainer and Leg Press Protocol in a Recreational Athlete." AthleteFIT. Overland Park, KS.

⁷Moody, S. "Enhanced Running Fitness on the Arc Trainer." AthleteFIT. Overland Park, KS.

⁸Gosewisch, C. "Incorporating the Cybex Arc Trainer into an Ultramarathon Training Program." Fischer Sports Physical Therapy and Conditioning. Phoenix, AZ.

⁹Moody, S. Research Summary: "The Effects of High-Intensity Training on the CYBEX Arc Trainer on Muscular Endurance and Work Capacity." Centers for Athletic Performance. Overland Park, KS.

¹⁰Turner, M.J., Williams, A.B., Williford, A.L., Cordova, M.L. "A Comparison of Physiologic and Physical Discomfort Responses Between Exercise Modalities." University of North Carolina - Charlotte. Charlotte, N.C., p. 803.

¹¹Department of Physical Therapy, University of Wisconsin - LaCrosse. Research Summary: "Patellofemoral Joint Forces Between Two Non-Impact Cardio Machines." University of Wisconsin - LaCrosse. LaCrosse, WI.

¹²Caldwell, G.E., Frayne, D., Muir, B., Umberger, B.R. "Biomechanical Characteristics of Exercise Machine Training." University of Massachusetts, Amherst, and Purdue University, West Lafayette, Indiana.

¹³Graves, B.S., Juris, P.M. "A Comparative Kinematic and Biomechanical Analysis of Two Gait Simulators." Florida Atlantic University. Davie, FL. pp. 4-5.

¹⁴Moody, S. "Case study: a Cybex Arc Trainer power endurance protocol improved 400 meter time in a high school sprinter." AthleteFIT. Overland Park, KS.

¹⁵Martin, B. and Corey, B.J. "From Fat to Fit on the Arc Trainer." cybexintl.com

¹⁶Signorile, J.F. "Strength and Power Training for the Aging." University of Miami, Department of Kinesiology and Sport Sciences. Coral Gables, FL.

¹⁷Lawrence, D. "Ask the Expert: Hot to Use the Arc to Shape Your Glutes and Bottom." cybexintl.com

¹⁸Moody, S. "The Effects of a Cybex Arc Trainer Power and Endurance Training Program on Perceived Knee Pain and First-time Marathon Performance." AthleteFIT. Overland Park, KS.

¹⁹Moody, S. "The Effects of a Three-Week Power Training Program Using the Cybex Arc Trainer on Maximum Back Squat Strength." AthleteFIT. Overland Park, KS.

²⁰"High Intensity Interval Training." cybexintl.com

²¹"Weight Loss Training: Burn Fat, Not Time." cybexintl.com

²²Moody, S. "Arc Trainer Exercise Series: Improving Strength." cybexintl.com



WORLD HEADQUARTERS

10 Trotter Drive
Medway, MA 02053 USA
T + 1.508.533.4300
F + 1.508.533.5500
cybexintl.com

CYBEX INTERNATIONAL UK LTD

Premier House
Beveridge Lane
Bardon Hill
Coalville, LE67 1TB UK
T + 44.845.606.0228
F + 44.845.606.0227

©2015, Cybex International, All rights reserved.
Specifications subject to change.

Cybex Products are Designed & Built in America.

