Condition Training by Jan Pospisil / CZE

Some people may be surprised that a track-and-field coach wants to talk to handball coaches about track and field athletics. However, track and field is one of the sports where the development of physical abilities plays a dominant role. Unlike team games, in track and field athletics there is only little room for the substitution of physical abilities with technique, player's intelligence and strategy.

That is why training methods and drills in track and field are elaborated in great detail and we are still searching for ways of improving them.
That is why many other sports can draw on the experience of track-and-field coaches, especially in the field of physical exercise.

But REMEMBER: I do not recommend track-and-field practice to handball players; I only recommend them to APPLY track-and-field experience in handball!
There are no differences in training process organization. We have to create perfect conditions to meet the desired goals.

I think that at the general and methodological level there are no differences between physical training in track and field and in handball.
The tasks for individual periods of the training years are clearly set – development of physiological factors necessary for handball: cardiovascular endurance, general strength, special strength, speed, dexterity, agility and reaction.
By the way – each of these tasks would be worth a separate lecture!

There are no problems in the drills as such, but the main thing is to transform the achieved level of development of partial physical factors to the special skills required from the player in the field!

Last year in fall I had a lecture at the Pre-Olympic Coaches' Conference in Loughborough, England. My lecture was focused on physical practice and I accompanied it with videos shot during training camps with the athletes I coach.
The response was such that Steve Backley, whom I coach, and I have prepared some full scale documentation, which I would like to show you today.

The film received the main award in the category of methodological films at this year's Liberec Film Festival and was nominated to participate in the prestigious sports film festival that will take place in Milan, Italy this fall.

And now please watch and see for yourself how much the javelin thrower's general drills and the handball player's practice have in common.
F I L M – 50 minutes

Alternative weight training

All human movements are the expression of muscular strength. The quality of its development is one of the key conditions of human existence and one of the crucial conditions for sports performance. In handball the development of strength in all of its forms is perhaps the most important of all physical skills.

You probably know that through professionally controlled weight training it is possible to achieve a 350% to 400% increase in strength. That is why it is necessary to pay as much attention to its development as possible.

Scientists that specialize in this field are therefore keenly trying to get a detailed knowledge of all strength aspects and relations.
Thanks to this fact our findings in the field are among some of the most comprehensive. However, a large set of partial observations possessed by coaches does not necessarily guarantee successful weight training. Their utilization is contingent upon the planned process of compilation of a compact weight-training program. This applies in every sport.

This planned process can have different time horizons, but now I would like to talk about a one-year period. During this one-year training cycle we have to respect the uniformity of the weight training process. It means a continuous sequence of general weight training, purposeful all-round training and special training.

What is the training content for these individual elements?
General weight training – keeps the necessary healthy level of general strength development and contributes to the regeneration of athletes' special working abilities, regardless of specialization, during the season. In advanced athletes its goal is the maintenance of the previously achieved standard and the functional stimulation of all muscle groups that lose strength due to the long-term utilization of special exercises.

D r i l l s – any exercise with resistance
Purposeful all-round training – develops the strength of the muscles that carry the main and supporting stress during special exercises.
This training results in the improvement of specific motional indicators and the functional set-up of the main parts of the musculoskeletal system.

D r i l l s – have the nature of neuromuscular stress, just like in special exercises, but the motion structure is different.
Special weight training – focused on the development of the strength of the muscles that carry that main stress during special exercises, with the simultaneous development of other motional skills typical for the specialization.

D r i l l s - keep the external and internal motion structure
The content clearly determines the tasks that are aimed at developing strength in all forms.
It means – maximum power, fast power, power endurance.

As for methodology, we have enough instructions on how to proceed at individual weight training stages.
The nature of the sport and the athlete's goals determine the training drills and exercises that we will use.
And their suitable choice and practical utilization are crucial for achieving satisfactory results

see VIDEO example enclosed

What strength development drills can we use in general?

DRILLS: Exercise using the trainee's own body weight, exercise with light loads and resistance exercise, exercise with additional load – barbell, exercise on workout stations.
They all have their importance and cannot be substituted at a given training stage, but all have their shortcomings, too.

> Of course I assume that in choosing them the coach will not make the mistakes I have shown before.
> However, given today's demands in high-level sports it is not just a matter of mechanically picking those that work; it is necessary to search for those that are multifunctional.
> These drills hugely increase training efficiency and provide more time for solving other tasks.
> Let's try to evaluate those I have mentioned from this point of view.

Workout station exercise:

B e n e f i t s: Variable load allows using almost all weight training methods. Stable posture caused by the workout station's design largely eliminates the risk of any health damage. We can easily focus the training on specific muscle groups.

D i s a d v a n t a g e s: Set of exercises depending on the station's design. The artificially restricted, merely linear motion that only works on an isolated muscle group prevents the activation of the complex of supporting muscle groups – low engagement of postural muscles. Does not develop motional stereotypes-example: knee function – knee function is theoretically provided by two antagonists – extensor – musculus quadriceps femoris and a group of flexors. Coaches often work on them on machines in the belief that they will improve knee function. They forget or do not know that the function of these muscles (e.g. in squat) is not just antagonist, but in motion they become synergists (i.e. they cooperate). And they secure the main function of the knee as such synergists. This applies to the knee strength when walking and running, which we achieve by "locking" the knee using the simultaneous activation of both of the mentioned muscle groups as synergists.
They do not develop coordination. They do not develop balance. The weight lifting program has to be complemented with many other activation and compensation exercises = extends the training time.

As you can see, the disadvantages outnumber the benefits, so we have to be careful when using them in training.

In every case they have their place at the beginning of the training stage. They provide an ideal way of adaptation to power stress during multistation training.
They also play an important role during rehabilitation and to remedy muscular dysbalance.

Training with additional load – barbells
If we analyzed the use of barbells, we would find out that their importance in the weight training of performance-driven athletes is significantly higher than that of workout stations.
B e n e f i t s: The exercise intensity is unlimited and depends on the individual's physical abilities. Postural muscles are better engaged. It leads to the development of intermuscular and intramuscular cooperation and allows using all training methods.

D i s a d v a n t a g e s: An excellent knowledge of the technique is essential. Excessive enthusiasm in combination with uncontrolled technique could be harmful to the health – especially in team game players. The resistance movement is largely linear, which means that it develops unidirectional muscular strength. The loads used by top athletes are so big today that they constitute a permanent danger of damage to the supporting locomotive system. The weight-training schedule has to be complemented with many activation and compensation exercises, which are more significant for barbell exercises than for workout stations. The set of drills is limited and the level of coordination stimuli low.

This brief summary clearly shows the high importance of using barbells during training. But, once again, barbells do not solve all of the problems associated with weight training. And the same applies to all of the other mentioned drills.
Therefore we have to look for alternative weight training forms that would be able to efficiently complement common training routines.

I have shown one of them in the film – weight training using sand-filled bags.
The handling of this unstable load requires not only the power engagement of key, efficient muscle groups and intense involvement of postural muscles, but also a high degree of coordination skills.

These extraordinary demands result in the same level of physical activation that is required for exercises with significantly heavier loads if conventional tools are used.
I have practical experience with an athlete who is able to lift 80kg ten times in one series.

However, ten repetitions are his maximum if he uses a 40kg bag!
Mobile handles that make it possible to change the width and gripping style multiply the amount of exercise variants and allow the functional involvement of muscles within the framework of the muscular loop.
I would like to demonstrate the importance of the gripping style with the results of an electromyographic examination of the throwing posture of a javelin thrower that we

made. The picture of muscular engagement in that posture if a javelin is used is completely different than if the thrower is in the same posture and uses a medicine ball. The changed grip is the difference.

The functionality of this tool has been proven by 4 years of training and sporting results.

In practice we were using 3 types of bags with the weight of 25, 30 and 40kg, which significantly restricted mobility, especially where we needed them most, i.e. at training camps. After many trials and tests I managed to replace sand with water. This change eliminated problems with transport and hygiene and opened new, never-thought-of possibilities for use.
In training we use two types of tools – a bag fully filled with water and a partly filled bag.

Workout bag fully filled with water

This bag kept the same functional properties as the tested bag with sand:

- Unstable load – high muscle activation, large demands on coordination and balance
- Benefits of mobile grips – changes in functioning and muscle activation of various segments of the human body
- Possibility of exercise in all directions, under any angle and in any position
- Possibility to train virtually all muscle groups
- Possibility to carry out throwing exercises

Partly filled workout bag

The shape of this bag is kept by air pressure. Its size is so small that we fill it by blowing air orally. This exercise requires strength activity focused on overcoming the weight of water and balancing the load of this moving weight.

Benefits of this tool:

- Special filling valve allows adjusting the weight based on the athlete's physical abilities.
- Adjustable load size makes it possible to determine the optimum exercise intensity with regard to the athlete's physical abilities, the trained muscle group and the focus of the drill. Physical abilities for snatch and for training shoulder muscles are different.
- Incomplete filling with water and reinforcing the bag by adding air leads to a completely new tool with an extraordinary training effect.

The water movements inside lead to impacts on the bag wall in case of change of direction.

These impacts result in the same muscle prestress and the subsequent activation of many muscle fibers as in case of application of the reactive (impact) method.

Just to clarify this term – training drills in case of this method include for example leap from an elevated podium and subsequent jump over an obstacle, or throwing a medicine ball to the air and subsequent throw-off. The impact activates many muscle fibers, which results in the higher-quality performance of the subsequent jump or throw-off.

We know that plyometric, or reactive method is the most efficient form of developing explosive power. However, impacts that create the necessary muscle prestress restrict the scope of its use for reasons of health. The physical properties of water at the time of impact in a closed area eliminate this danger and make it possible to use these exercises in a larger scope.

This also opens a huge room in the field of rehabilitation.

- The easy change of working weight allows using a majority of the known weight training methods for complex workout, local focus as well as training of small segments of our body.

- The possibility to use the reactive method for throw-off exercises – in all directions, angles and positions - is unique.

- The tool's structure and function make it possible to work out with more complex dynamic stereotypes, which we can choose according to the given sport or game – this is very important, in particular for special exercises, when we are trying to keep the external and internal structure of muscle engagement.

- The moving load in a closed area puts higher demands on coordination and balance than for example ordinary activities during sports games.

- The tool can be also used for stretching exercises, where it can be used instead of an assisting colleague.

- The exercise supports the establishment of kinesiologically correct motion stereotypes.Although the intensity of the exercise is high, the tool's low absolute weight reduces the risk of health damage.

- Exercises focused on key muscle groups also result in the functional stimulation of areas that are excluded, and thus weakened, during conventional workout.

- The universal requirements of any exercise include a complex activation of the muscular system to such extent that they simultaneously stimulate compensation mechanisms.

- The bags have multiple uses during the training unit – for warm-up, workout, coordination exercises, throw-off and special exercises.

- They replace many training tools and instruments and the requirements on training equipment are therefore lower – it is in fact a workout room in a single "bag".

- The training practice in individual sports will certainly show other possible applications.

- You can really get to know the possibilities of this tool if you have your own motional experience with it.

- Exercises with bags with moving load are not a universal solution, but they are a multipurpose complement that will certainly contribute to higher training efficiency.