



Strength in swimming

Alberto Castagnetti –
Technical Director
Italian Swimming Federation



Arms Action



Angles and movements

Joint	Excursion	Muscles
Glenohumeral	180° - 90°	Latissimus dorsi, major pectoral, major rotund, minor rotund
Adduction	90°-10°	Latissimus dorsi, major rotund, minor rotund
	180°-10°	Latissimus dorsi, major pectoral, under scapular
Internal rotation		
Elbow	90°-10°	Brachial triceps
Extensor	60°-30°	Latissimus dorsi, rhomboid, trapezium
Scapular	30°-0°	Rhomboid



Exercises

Exercises	Movement	Muscles
Anterior “last machine” with prone anterior grip	Abduction	Latissimus dorsi, major pectoral, major rotund
Pull down or pull over	Abduction, internal rotation	Latissimus dorsi, major pectoral, major rotund, sub scapular r
Push down		Brachial triceps
Rower under bench or pulley machine	Scapula adduction	Scapula fixer



Methodology

Methodology	Target	series	Notes	Load %
R.M. maximal repetitions	Maximal dynamic strength	3-5	Never under 4 repetitions	80-90%
Pyramidal	Strength consistency	3-5	Between 6-12 reps	80-65%
High repetitions over 12	Resistant strength	2-4	Between 12-20 reps	65-50%
Real Power	Power	3-6	Between 6-8 reps	50-60%



Land adaptation

Exercise	Transformation
Push down	Throwing Basket (m. b. 3-5 Kg)standing up
“Lat machine” anterior with prone grip	Throwing (m. b. 3-5 Kg) standing up
“Pull down” or “pull up”	Throwing (m. b. 3-5 Kg)supine like pull over



Legs Action



Exercises

Exercises	Movement	Muscles
Leg extension (knee flexion 90°-0°)	Leg extension	Femoral quadriceps
Gluteus machine	Limb extension	Gluteus and ischio perineum tibialis



Methodology

Methodology	Target	serie	Notes	Load %
R.M. maximal repetitions	Maximal strength dynamic	3-5	Never under 4 repetitions	80-90%
Pyramidal	Strength consistency	3-5	Between 6-12 reps	80-65%
High repetitions over 12	Resistant strength	2-4	Between 12-20 reps	65-50%
Real Power	Power	3-6	Between 6-8 reps	50-60%



Land adaptation

Exercise	Transformation
Leg extension (knee flexion between 90°-0°)	10 meters strong legs in the water
Gluteus machine	10 meters strong legs in the water



The start and the turn



Movements

Movement	Main muscles
Trunk extensors	Lumbar quadrates, spinalis lifters
Pelvis extensors	Gluteus, ischio peroneus tibialis
Legs extensors	Quadriceps
Ankle extensors	Sural triceps, soleus



Exercises

Exercise	Movement	Muscles
1/2 Squat or parallel Squat	Extension trunk, pelvis, leg, ankle,	All the previous muscles
Leg press 45°		
Squat Jump with reaction		
Squat Jump		
Pliometric jumps		
Calf machine standing up	Ankle extension	Sural triceps
Calf machine seated	Ankle extension	Soleus



Methodology

Methodology	Target	Series	Notes	Load %
RM Maximal reps	Maximum dynamic strength	3-5	Never under 4 reps	80-90%
Pyramidal	Strength consistency	3-5	Between 4-8 reps	80-65%
Real Power	Power	3-6	Between 6-8 reps	50-60%



Land adaptation

Exercise	Transformation
Leg press	High jumps
1/2 Squat	Pliometric jumps from the top
Leg press	4 hurdles 40/50 cm following
Orthostatic calf machine	8 hurdles 20/30 cm following