Wuhan University of Technology

Blasting Engineering

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Excellent course in China

武漢理工大学
WUHAN UNIVERSITY OF TECHNOLOGY

爆破工程
BLASTING ENGINEERING

2008年国家精品课程
National Excellent Course in 2008

- Home page
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- Teaching team
- Course description
- Teaching effect
- Construction planning
- Exercise
- Network resources
- Journal of Blasting
- Gold mine in South Africa
- Diamond mine in South Africa
- Communication BBS

Include: Basic information | Teaching situation | Subject research |

ded teaching achievement prize in hubei province in 2009||A letter of enthusiastic netizen and professor Wang Yujie's reply|| A thank

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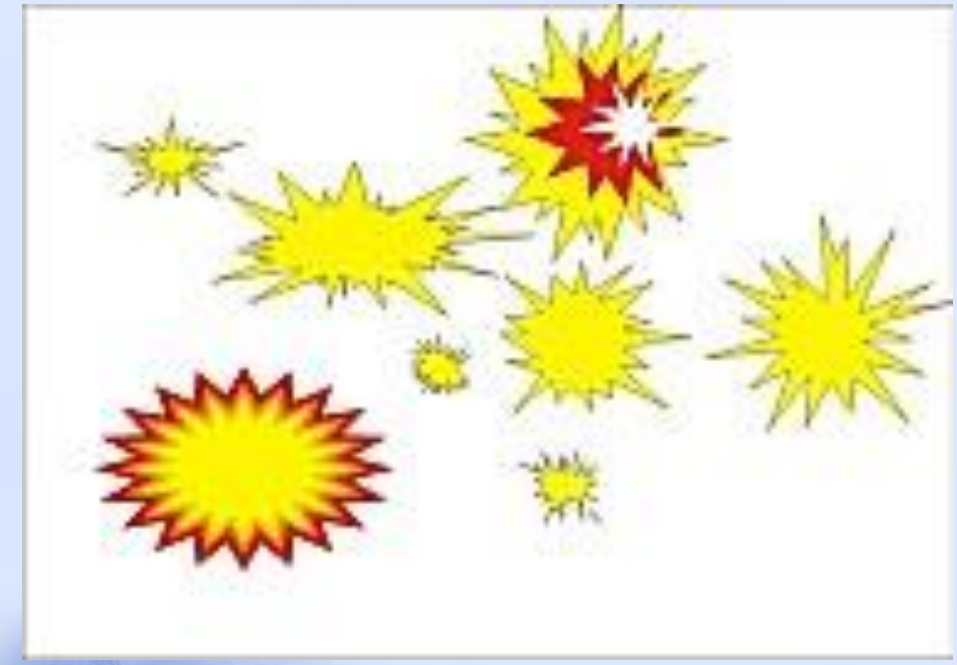
Introduction & Overview OF

BLASTING ENGINGEERING



what comes to mind first?

Fire crakers

Fire works

Terroristic explosion

CONTENTS

SECTION 1 HISTORY of EXPLOSIVE & BLASTING

Black Powder

Foundation stage

Modernization stage

1. Black Powder （Century 7th-18th ）

- Saltpeter or “Nitre”
- Chinese as early as the 10th Century
- Roger Bacon published formula in 1242
- Berthold Schwartz invented Gun ~ 1300

（1）Black Powder Evolving

- **140-86 BC, The formula of the gunpowder was first discovered by Taoist alchemist of ancient China when trying to make pills of immortality, which aimed to keep the king live forever.**
- **The medicaments was composed of saltpeter, sulpher and carbon originally. When the mixture of three components got heated or incited, the explosion and fire would happen, and finally produced the arsenic trioxide(As_2o_3).**

- Due to the explosion and fire accidents from the alchemy procedure, the explosion function of the mixture was applied in **military strategist in ancient China firstly. Then the primitive gunpowder was obtained, ironically**……
- Before 1956 in China, the eruption mixture with mainly deflagration behavior was called as powder，while the one with detonation was called as explosive.

（2）History of the Black Powder

In 800 A.D, the formula of the powder was put forward. One may make in accordance one sulfur, two saltpeter and three charcoals means.

$$1S+2KNO_3+3C=K_2S+N_2+3CO_2$$

- In 10th century, the jump fire, fire gun and fire arrow began to be applied in military cases.
- Since the Industrial Revolutionary in 17th century, the blasting technology began to be used in some engineering fields, such as the application in mineral extraction with black powder.
- The black powder dominated the explosive field as the only one in the word until the 18th century.

The discovery of fulminate in 1799 put the BP to an end.

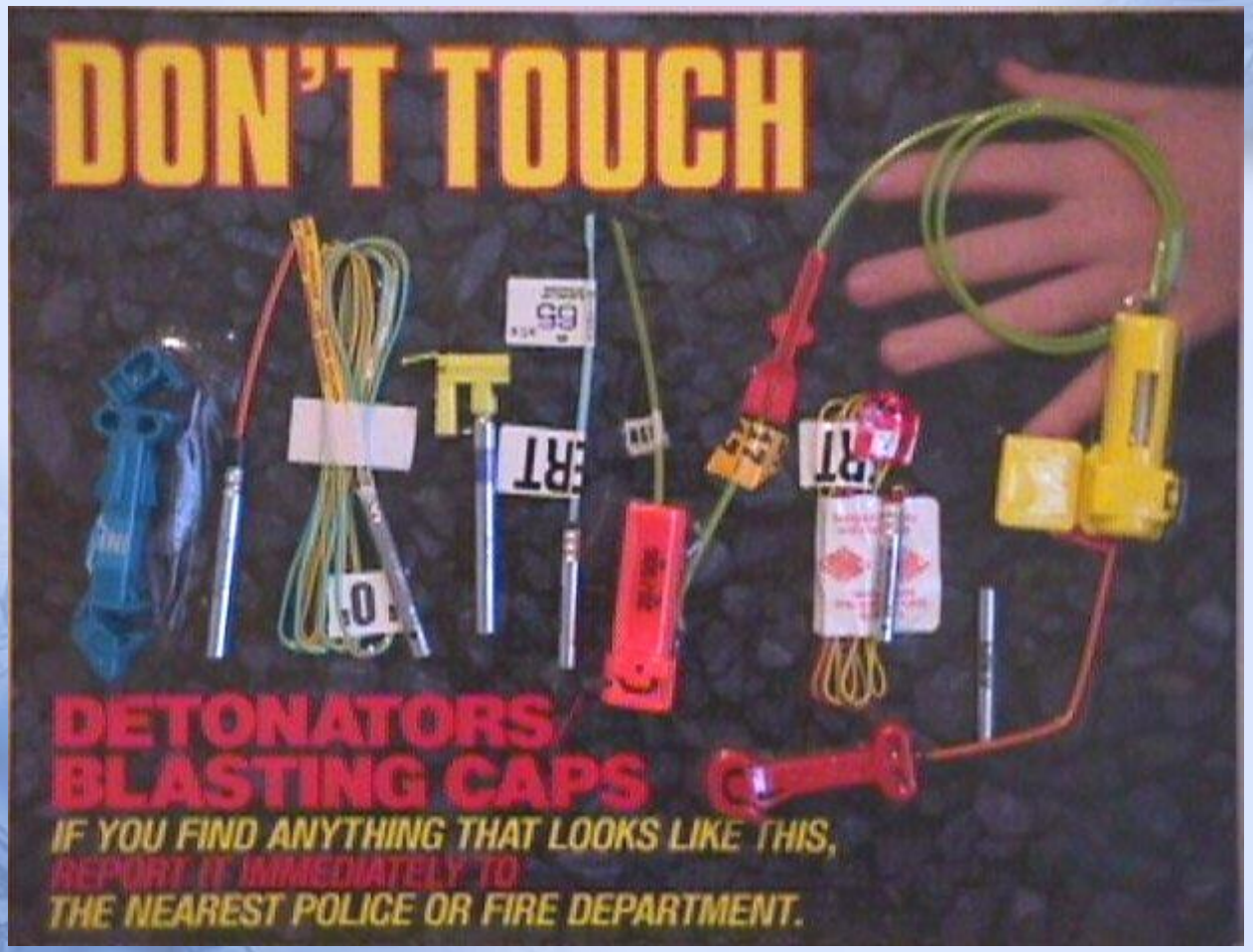
2. Foundation stage of explosive

（1800~1949）

Since 19th century, the industrial explosive---

- 1867~1875, Nobel invented nitroglycerine explosive, nitro-cotton explosive and detonator, all which promoted the blasting technology application in production and construction greatly.

- In 20th century, two World Wars motivated the explosive research and manufacture, and further helped to promote blasting technology, especially for the application of detonator, fire fuse and detonating cord.


DON'T TOUCH
DETONATORS
BLASTING CAPS
IF YOU FIND ANYTHING THAT LOOKS LIKE THIS,
REPORT IT IMMEDIATELY TO
THE NEAREST POLICE OR FIRE DEPARTMENT.

- 1871, the formula $Q=kf(n)w^3$ was put forward to calculate the charge quantity with semi-emperical and semi-theoritical means.

3. Modernization stage of explosive and application (1950-）

Representative

Millisecond blasting

Nonel ignition system

Emulsified oil explosive

Static blasting

Controlled blasting

- Industrial explosive variety- more than hundreds of kinds of explosives
- Initiating technology-fire exploder, electric detonator, detonating cord, Nonel pipe, wireless initiating method.

The initiating time can be controlled within ms interval.

- Blasting size：several kg- thousands of tons

① Zhuhai city, China, to remove mountains and fill seas with 12,000 tons explosive.

② Japan, a mini-explosive bag was placed in body to treat bladder stone (1mm diameter, 5-10mm long,5 gram)

Blasting technology

- **Directional throwing blasting：the rock or ore was thrown to specified place with blasting technology.**

- **Micro-interval blasting, squeezing blasting, presplit blasting, smooth surface blasting, hydrostatic blasting, demolition blasting.**

smooth blasting


山东博莱高速公路
高边坡光面爆破

Rock blasting video

Roadbed blasting engineering

Microsecond blasting

Bench blasting in surface mining

Video of blasting engineering

Bench blasting

Static blasting

SECTION 2 BLASTING TECHNOLOGY APPLICATIONS

- Mining engineering,
- Transport base,
- Aerospace,
- Military project,
- Hydroelectric construction,
- Construction engineering,
- Demolition engineering

Seattle gym demolition

High building demolition

SECTION 3 PROSPECT OF BLASTING TECHNOLOGY

- **Disaster rescue and relief**
- **Explosion wielding**
- **Medical treatment**

SECTION 4 DRILLING TECHNOLOGY AND EQUIPMENT

- Drilling process & Drilling machine

Videos of drilling machine running

Drilling machine running

SECTION 5 EXPLOSIVE MATERIALS

More and more new explosive variety promoted the blasting technology and made it much simple and safe, such as the plastic Nonel pipes substitute for the detonation cord.

Blasting course
Regulations and requirements

- Explosive characteristic (component, initiating and detonation mechanism)
- Rock breaking mechanism (geology and rock mechanics , elastic-plastic stress, fracture mechanics)
- Blasting technology (design and operation)

REQUIREMENTS

- SAFETY

Blaster Qualifications and safety regulations

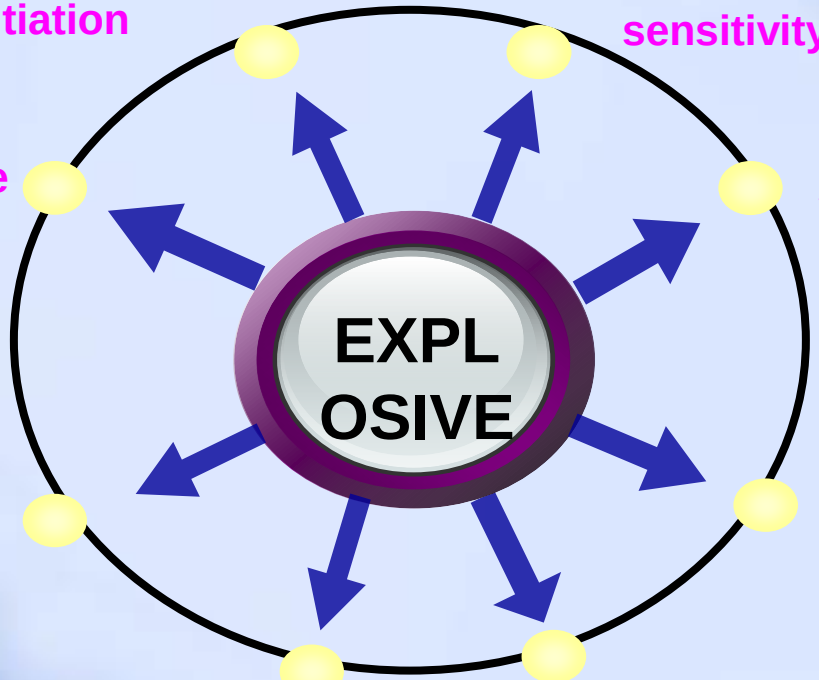
- KNOWLEDGE

Combination of basic course & professional course

- LESSONS STUDY

Preview and group discussion

Discussion



sensitivity to initiation

sensitivity to flame

sensitivity to shock wave

sensitivity to friction

electrostatic sensitivity

sensitivity to impact

sensitivity to heat

Other sensitivity


Thanks for
your attention!