Training and practical requirements to set up a gem industry

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Training and practical requirements to set up a gem industry

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Dept. of Geosciences
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Institute of Gemstone Research,
Idar-Oberstein,
Germany

→ INCENTIVS (http://www.incentivs.uni-mainz.de/)
International Centre of Ivory Study

→ EurAsia-Gemnet
(Austria, China, France, Italy, Russia, Sri Lanka, Thailand, Vietnam)

→ IMA
International Mineralogical Association

→ University of Applied Sciences, Idar-Oberstein
Gemstone design

→ DEL (http://www.gemcertificate.com/)
(German Diamond and Gemstone Laboratories Idar-Oberstein)

DSEF	German Foundation for Gemstone Research
DPL	Diamond Grading Laboratory
DEGEB	German Association for Gemstone and Jewellery Evaluation
FEE	Research Institute for Gemstones and Precious Metals
DGemG	German Gemmological Association

International experience:

Madagascar | Sri Lanka | Thailand | Vietnam












Training and practical requirements to set up a gem industry

Why is it necessary to increase the knowledge in gemstone industry?

Example Madagascar:

Based on the official export statistic from 1999 to July 2001
97 % of the rubies left Madagascar in the raw state!!
99,9% of the sapphires left the country in the raw state!!

From small scale mine to market
Example Vietnam

Mine → Processing → Local market → Int. market

Ruby mine near Luc Yen

Ruby cutting in Hanoi

Market in Luc Yen

Market in (e.g.) Thailand

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Knowledge in gemstone industry:

Mining

Geology of gem deposits
primary
placers
paragenesis of gems
Prospection and exploration

Legalization of operations
Exploitation of gemstones
Planning of the mine
dry and wet exploitation
equipment and processes
safety and health
environmental protection
financing
Sorting and concentration
By-products

Gem evaluation/marketing
Gem identification
Gemstone enhancement
Gemstone cutting
Price of the local market
Price of the int. market
Packing and transport of products

Closure of mines

Knowledge in gemstone industry:

Processing - market/marketing:

Where to get gems
Where to get the money
Gem valuation
Gem identification
(kind, synthetic, imitation,
kind of treatments)
Gemstone enhancement
Gemstone cutting
Price of the local market
Price of the international market
Rules of the target market
Tax and laws for the gem trade
Tax and laws for the import of goods (e.g. cutting equipment, gemstones, furnaces, diamond powder, …..).

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Material knowledge

Gem identification (gemmology) with simple methods

How to determine the physical properties (hardness, density, refractive index, birefringence, pleochroism,……)?

Sticks with different hardness

Balance to determine the density

Refractometer

Material knowledge - Gem valuation

The price of a certain Gem is determined by the 4 C's

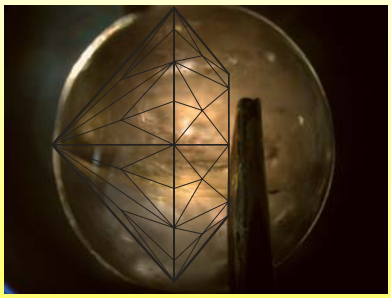
Cut
Carat
Colour
Clarity

All these criteria can be determined easily in case of cut gem, but difficult in the case of rough material

Material knowledge

Gem valuation

Basic knowledge of gemstone cutting
-direction of best colour



Bowl of a Cordierite (Iolite) with different colours in two different directions

How to find the direction of best colour in a "geuda" sapphire with irregular shape?

Looking for the distribution of the certain inclusions

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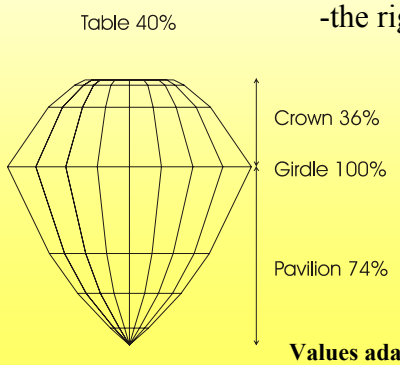
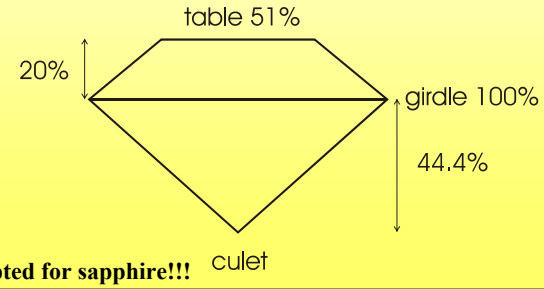
Material knowledge

Gem valuation

Basic knowledge of gemstone cutting
-direction of best colour
-kind of cut (e.g. step cut or brilliant)
-the right proportion of a certain cut





Values adapted for sapphire!!!

Material knowledge

Gem valuation

Basic knowledge of gemstone cutting
-direction of best colour
-kind of cut (e.g. brilliant or step cut)
-the right proportion of a certain cut
-identification of inclusion in rough stones

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Material knowledge - Gem valuation

Basic knowledge of gemstone cutting
-direction of best colour
-kind of cut (e.g. brilliant or step cut)
-the right proportion of a certain cut
-identification of inclusion in rough stones

Basic knowledge of gemstone enhancement
-what kind of quality will result after a certain treatment?

Manipulation of Gemstones / Clarity

Fracture Filling of Emerald
with oil of cedar wood

Conditions:
~300 bar
~70°C

Manipulation of Gemstones / Clarity

Fracture Filling of Emerald with oil of cedar wood

before treatment

after treatment

Manipulation of Gemstones / Clarity

Fracture Filling of Emerald with oil of cedar wood

before treatment

after treatment

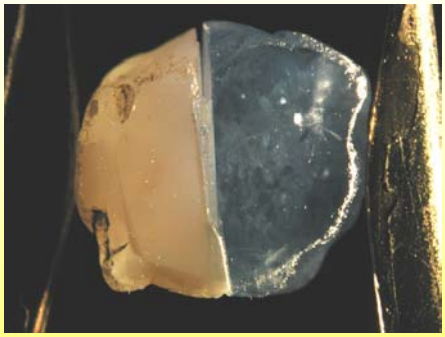
Manipulation of Gemstones / colour

Physical treatment: Heat treatment

Sapphires from Ilakaka Madagascar heat treated in the same run and same crucible at 1750°C and oxidizing atmosphere. Right side of each sample is treated.

Manipulation of Gemstones / colour-clarity

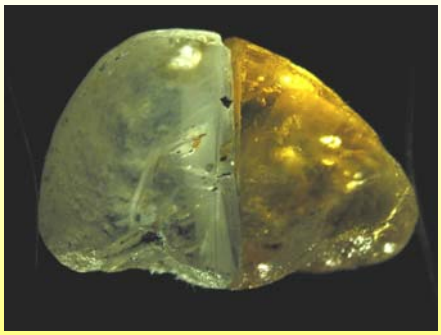
Heat treatment of a sapphire from Sri Lanka



The blue side was heat treated 15 hours at 1800°C in air to develop the blue colour

Manipulation of Gemstones / colour-clarity

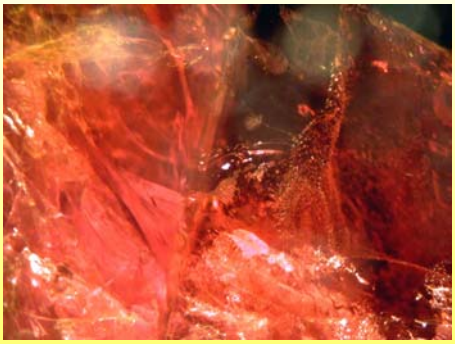
Heat treatment of a Sapphire from Sri Lanka



The intense yellow side (right) has been heat treated 15 hours in air at 1800°C. Left side is the original state.

Manipulation of Gemstones / colour and clarity

Fracture filling - fracture healing with Borax based substances in a Ruby from Madagascar

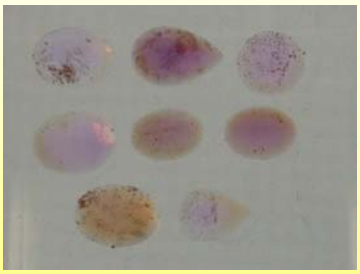


Left side is untreated, the right side is treated.

Manipulation of Gemstones / colour

Be-diffusion treated pink Sapphires was treated by 1800°C in air with Chrysoberyl to turn orange.

Stones in Air



Stones in a liquid

With this material knowledge you know:

-what kind of clarity will result after treatment and cutting
-how many carats will result after cutting
-what kind of colour will result after cutting
-what kind of cut will be done

and you are able to determine the price in your target market

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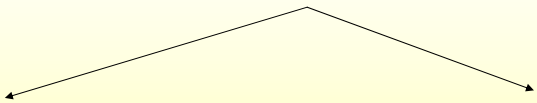
Target groups of the training:



Gem miner
Gemstone cutter
People who deal with Gemstone treatment
Gemstone trader
Custom
Gemmologist

Teacher and Trainer

Where to get the knowledge?

Where to get the knowledge?

Mining:	Universities, priv. companies
Processing: cutting	private companies, schools
enhancement	only theoretical
Gemmology:	everywhere
Market / management:	private companies Universities

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Further thoughts: How to support the local gem industry

1. Transfer of "Know How" from the countries with long tradition in gemstone industry to the newcomer countries.
2. Support of the gem industry by reduction of import tax for cutting machines and all accessories.
3. Supporting of the gem industry with credits.
4. Supporting the gem industry by marketing events and booth on international fairs.
5. Reduce the export of the rough stones and treatable material by increasing of the export tax for rough material to finance point 1, 2, 3 and 4.
6. An export stop of rough and treatable material supports only the illegal export!

Further thoughts: Is it useful to set up a public office for gem identification, valuation and treatment?

In Sri Lanka we learned from several small scale miners, that it is not useful!

Informal Miners with only the running licence can not go to such an office!

If the public office knows the amount of the production, the miners have to pay more tax!

Co-worker of the state organisation may have their own interests (trading with gems) and therefore they do not trust them!

With the basic knowledge presented above and a support of the gem industry:

-the gem producing countries are able to earn more money
-value will be edit in the countries of origin
-labour for the people in the countries of origin

and therefore reduce poverty