MATERIALS & DEVELOPMENT NEWS

Your link to the World of Materials

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IN THIS ISSUE.....

China Railway in US$ 683 million Nigeria deal

Construction » Construction News » China Railway in US$ 683 million Nigeria deal

Written by Helen Wright

Chinese state-owned contractor China Railway Construction Corporation (CRCC) has won a CNY 4.3 billion (US$ 683 million) contract in Nigeria to construct five passenger airport terminals and six cargo terminals.

China Civil Engineering Construction Corporation, a subsidiary of the company, was awarded the contract by the Nigerian Federal Ministry of Aviation. The new passenger and cargo terminals will be located in the Nigerian cities of Abuja, Lagos, Kano, Port Harcourt and Enugu, while an extra cargo terminal will be built in Asaba.

CRCC said construction was scheduled to take 18 months.

Original Link...

New Golf Lighter Thanks to Advanced Steel

Volkswagen's new Golf is up to 220 pounds lighter than its previous model thanks to the use of an increased amount of advanced steel grades in its design. The seventh-generation Golf also offers more features, improved performance and better safety than earlier models. The vehicle uses high- and ultrahigh-strength steels in its electrical architecture, engine and body-in-white. The share of overall high-strength steel jumped to 80% in the new version, up from 66% in the sixth-generation car. The lighter weight is expected to improve fuel economy. Read the whole story and see a video on the 2013 Golf here.v

New Welding Technology Allows More Aluminum Use

General Motors Research & Development invented an industry-first aluminum welding technology that is expected to enable more use of the lightweight metal on future vehicles. GM's new resistance spot-welding process uses a patented multi-ring domed electrode that does what smooth electrodes are unreliable at doing – welding aluminum to aluminum. By using this process, GM expects to eliminate nearly 2 pounds of rivets from aluminum body parts such as hoods, lift gates and doors

Massachusetts Hosts Blacksmith Festival

The Ninth Annual Blacksmith Art & Music Festival will be held Saturday at Riverfront Park in Fitchburg, Mass. Skilled blacksmithing professionals from all over New England are expected to attend. Participating blacksmiths will work on practical items, but the event's organizers - Achla Madan and Ashok Hingorany - will showcase large, forged metal sculptures. Read all about the festival here.

In related news, Old World Wisconsin in Madison is offering blacksmithing classes on Oct. 13, 20 and 27. Students will receive a training manual and will be trained with 19th-century tools and a coal-fired forge. For more information...

Reliance Steel & Aluminum Acquires Sunbelt Steel Texas

Reliance Steel & Aluminum Co. announced that it has acquired all the outstanding limited liability company interests of Sunbelt Steel Texas, a value-added distributor of special-alloy steel bar and heavy-wall tubing products to the oil and gas industry. Sunbelt is headquartered in Houston, Texas, and has an additional location in Lafayette, La. Sunbelt will operate as a wholly owned subsidiary of Reliance Steel & Aluminum Co., and current management will remain in place.

Nippon Steel, Sumitomo Metal Industries Merge

Nippon Steel Corp., Japan's largest steelmaker, merged with Sumitomo Metal Industries, the nation's third-largest steelmaker, to form Nippon Steel & Sumitomo Metal Corp. The merger creates the world's second-largest steel company, behind only ArcelorMittal. The new business, which has a combined annual capacity of 46.1 million metric tons, plans to expand global operations in China, India and other emerging countries while consolidating its operations in Japan

ArcelorMittal to close Gijon coke batteries:

London—ArcelorMittal has told its workers in Spain it intends to shutter the Gijon coke batteries from October 2013, focusing production at the nearby Aviles site, which would feed the two blast furnaces it has in the region, a source close to trade unions said Tuesday.

The company's Spanish coke production has until now been used to feed local furnaces, and exported to other facilities. Should Gijon close, local coke production would feed local steelmaking alone, it us understood.

In 2011, ArcelorMittal announced its intention to invest some Eur150 million to build a new 700,000 mt/year coke plant in Gijon, which would concentrate coke production. However, this plan was abandoned because of the weak economic situation.

Last week ArcelorMittal announced the closure of another European coke plant, located in Belgium. It said the plant was "no longer viable due to the excess supply of coke in Europe."

The company refused to comment on the Spanish coke plant closure.

Boeing 787 Dreamliner Grounding

The 787, a twin-aisle aircraft that can seat 210 to 290 passengers, is the first large commercial jet with more than half of its structure made of composite materials (carbon fibers meshed together with epoxy) rather that Aluminum sheets – 50% Composites, 20% Aluminium, 15% Platinum, 5% Steel and 5% other materials. It is also the first large commercial aircraft to involve persuasive use of electrically powered systems involving lithium-ion batteries.

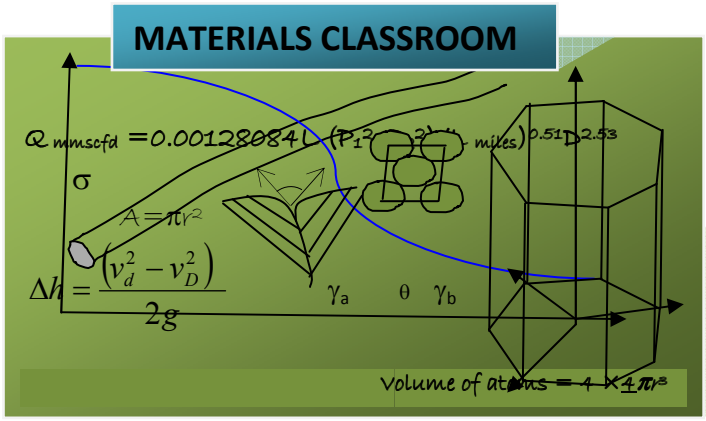
The cause of the recent grounding of the epic aircraft has been traced to a short-circuit found in one of the aircraft's Lithium ion batteries. The lithium-ion battery system on the 787 is a cluster of eight individual cells packed together in one box. The battery was said to have experienced a ''thermal runaway'', a chain reaction in which heat spreads rapidly from cell to cell in the battery.

Potential causes of the initiating short-circuit that are currently being investigated include battery charging, the design and construction of the battery, and the

possibility of defects introduced during the manufacturing process. The investigation has demonstrated that a short-circuit – in a single cell—can propagate to the adjacent cell, and result in smoke and fire.

Dangote/Benue Cement Plant Shortdown

The four million metric tons per annum Dangote Cement plant in Gboko, Benue State, has been shut down because of glut of cement in the market, according to the management of Dangote Cement Plc. The move was necessary because of increase in local production of cement and also the continued importation of subsidized cement into the country. Meanwhile, there have been several calls on the government to reopen the plant. The people of the community where the plant is located are said to be presently suffering untold hardship as economic activities have come to a halt. Cost of building materials are said to have risen, crime among the youths has also increased.



Material Structures Part 1

Material structures refer to the building blocks that compose a material. All elements (pure substances) are built up from the basic units called atoms. Atoms of different elements have unique physical features and, hence, properties that distinguish them. The atomic structures of elements account for the details of their differences. Atomic mass is the mass of an individual atom, whereas atomic weight is the average (weighted) of the atomic masses of an atom's naturally occurring isotopes. Rutherford conceived the subatomic components to be made of a positively charged nucleus, which carried the greater part of the mass of the atom, with negatively charged electrons clustering around it.

The arrangement of atoms in a material determines the behavior and properties of that material. Molecules in solids are bound tightly together. When the attractions are weaker, the substance may be in a liquid form and free to flow. Gases exhibit virtually no attractive forces between atoms or molecules, and their particles are free to move independently of each other.

Five Types of Materials Bonding

Ionic bond - An atom with one or more electrons are wholly transferred from one element to another, and the elements are held together by the force of attraction due to the opposite polarity of the charge. E.g. Sodium Chloride, Na^+ Cl^-.

Covalent bond - An atom that needs electrons to complete its outer shell shares those electrons with its neighbor. E.g. Diamond.

Metallic bond - The atoms do not share or exchange electrons to bond together. Instead, many electrons (roughly one for each atom) are more or less free to move throughout the metal, so that each electron can interact with many of the fixed atoms. Metals achieve engineering importance because of their abundance, variety, and unique properties as conferred by metallic bonding.

Molecular bond - When neutral atoms undergo shifting in centers of their charge, they can weakly attract other atoms with displaced charges. This is sometimes called the van der Waals bond. E.g. Solid Hydrogen molecule, H_2.

Hydrogen bond - This bond is similar to the molecular bond and occurs due to the ease with which hydrogen atoms displace their charge. It exists between some molecules with hydrogen as a constituent. E.g. Ice.

It should be noted that in many solid materials it is possible for bonding to be mixed, or even intermediate, in character. The type of bond not only determines how well a material is held together, but also determines what microscopic properties the material possesses. Properties such as the ability to conduct heat or electrical current are determined by the freedom of movement of electrons.

INTERNATIONAL PRICES OF PRECIOUS METALS FEBRUARY 1, 2013 (Source: LME)

	STEEL BILLET (USD/Metric Tonne)	GOLD (USD/Oz)	SILVER (USD/Oz)
Cash Buyer	270.00	1,666.90	31.81
Seller & Settlement	275.00	1,667.90	31.94

	PLATINUM (USD/Oz)	COPPER (USD/Metric Tonne)	PALLADIUM (USD/Oz)
Cash Buyer	1,679.00	8,214.00	755.00
Seller & Settlement	1,680.00	8,215.00	761.00

INTERNATIONAL PRICES OF NON FERROUS METAL JANUARY 31, 2013

All prices in US Dollar/metric tonne

	ALUMINIUM ALLOY	ALUMINIUM	COPPER

Cash Buyer	1,850.00	2,073.00	8,168.00
Seller & Settlement	1,855.00	2,073.50	8,170.00

10	5” Pipe	33,000
11	6” Pipe	35,000
12	8” Pipe	60,000
13	10” Pipe	85,000
14	12” Pipe	120,000

	LEAD	NICKEL	TIN
Cash Buyer	2,437.50	18,370.00	25,075.00
Seller & Settlement	2,438.00	18,375.00	25,100.00

High Tension Steel Rods (Made in Nigeria)

S/No	Description	Price (#)/Ton
1	12mm dia (93 psc)/ton	125,000
2	20mm dia (33 pcs/ton)	125,000

	ZINC	COBALT	MOLYBDENUM
Cash Buyer	2,138.50	26,000.00	24,300.00
Seller & Settlement	2,139.00	27,000.00	25,300.00

High Tension Steel Rods (Imported)

S/No	Description	Price (#)/Ton
1	12mm dia (93 psc)/ton	155,000
2	20mm dia (33 pcs/ton)	155,000

Steel Materials Price list as at 30/01/2013(Lagos)

Round Pipes-6m Standard Length

S/No	Description	Unit Price (#)
1	½” Pipe	1,900
2	¾” Pipe	2,300
3	1” Pipe	3,500
4	1¼” Pipe	4,200
5	1½” Pipe	4,500
6	2” Pipe	7,000
7	2½” Pipe	12,500
8	3” Pipe	15,000
9	4” Pipe	20,000

Steel Bars-6m Standard Length

S/No	Description	Unit Price (#)
1	25mm x 3mm Flat Bar	600
2	25mm x 5mm Flat Bar	1,300
3	25mm x 6mm Flat Bar	2,200
4	50mm x 5mm Flat Bar	2,800
5	50mm x 6mm Flat Bar	3,500
6	75mm x 6mm Flat Bar	6,500
7	100mm x 6mm Flat Bar	9,000
8	25 x 25 x 2.5mm **Angle Bar**	800
9	50x50x6mm **Angle Bar**	4,300

I-Beams, 12m Standard Length

S/No	Description	Unit Price (#)
1	152mm x 152mm	65,000
2	203mm x 203mm	105,000
3	305mm x 165mm	110,000
4	356mm x 171mm	125,000

U-Beams, 12m Standard Length

S/No	Description	Unit Price (#)
1	200mm x 75mm	40,000

BUILDING MATERIALS (LAGOS)

S/No	Description	Price (#)
1	A trailer load of Granite	140,000
2	A trailer load of Plaster Sand	30,000
3	A Bag of Cement	1,600
4	A Trailer load of Sharp Sand	30,000
5	A Trailer load of Filling Sand	27,000

Next Issue:

- **Turning waste heat into electricity on the nanoscale**
- **Ajaokuta Steel: What way?**
- **New carbon films improve prospects of solar energy devices**
- **Diamonds may heal a broken heart**
- **Nigeria Society of Engineers (MMM) investiture**

Regulars:

- **Materials Classroom**
- **Materials Price List**

This News Publication is the product of **Materials Consulting Limited**: 3rd Floor, 15B Awolowo Road, Ikoyi, Lagos.

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