KUPFER FORUM

DAS MAGAZIN FÜR KUPFER UND ARCHITEKTUR • 28/2010

WUNDERSCHÖN FÜR EIN JAHRHUNDERT – ODER LÄNGER • KUPFERINSPIRATION • KUPFER SCHLÄGT GOLD

GEWINNER DES COPPER AWARD 2009 • ISLAND COPPER

IST KUPFER IN DER ARCHITEKTUR UMWELTGERECHT? • HAKANIEMENRANTA 6 – RENOVIERUNGSPROJEKT

Herzlich Willkommen bei der ersten Ausgabe des Copper Forum im Jahr 2010

Wie üblich möchten wir eine vielseitige Auswahl an Kupferprojekten in Europa vorstellen - und noch einiges mehr. Der Schwerpunkt dieser Ausgabe sind jedoch neue Oberflächenbehandlungen, die Architekten, Innenarchitekten und Künstler heutzutage begeistern. Dabei geht es von dreidimensionaler Oberflächenmodellierung bis hin zu unterschiedlichen Vorpatinierungstechniken. Wir freuen uns besonders, Ihnen von mehreren Projekten berichten und Beispiele von Fassaden zeigen zu können, für die eine neue Kupferlegierung mit einem warmen, goldenen Schimmer verwendet wird, der zeitgenössischer Architektur eine einzigartige, reiche Qualität verleiht.

Kürzlich wurden bei einem gut besuchten Festakt in London die Gewinner des European Copper Award 2009 verkündet. Der Architekt Chris Hodson, der an den Beratungen der Jury teilnahm, berichtet vom Wettbewerb und hebt die faszinierenden Aspekte einiger nominierter Projekte, insbesondere des Spanischen Siegergebäudes, hervor.

Umweltaspekte gewinnen zunehmend an Bedeutung, besonders bei der Wahl des Baumaterials. Dabei fragt sich, ob Kupfer als Baumaterial mit den gemeinsamen Zielen der EU-Länder bezüglich des Umweltschutzes übereinstimmt. Pia Voutilainen und John Schonenberger vom European Copper Institute klären dieses wichtige Problem und teilen uns ihre eigene Meinung mit.

Das Copper Forum erscheint nun seit mehr als 15 Jahren und wir bemühen uns, das Magazin beständig zu verbessern, um den Anforderungen unserer Leser aus dem Bereich Architektur gerecht zu werden. Bitte wenden Sie sich an die Lokalredaktion, wenn Sie Meinungen zu unseren Artikeln oder neue, anregende Projekte haben, von denen Sie uns gern berichten möchten.

Viel Spaß beim Lesen dieser Ausgabe!

Lennart Engström, Hrsg.

Kupfer Forum, April 2010

Das Kupfer Forum gehört mit zur laufenden Kampagne "European Copper In Architecture Campaign" und erscheint halbjährlich mit einer Auflage von 24500 Exemplaren.

Das Magazin wird an Architekten und Fachleute der Baubranche in Russland, Polen, Dänemark, Norwegen, Schweden, Finnland, Ungarn, der Tschechischen Republik, Spanien, Frankreich, Italien, Deutschland und im Vereinigten Königreich verteilt.

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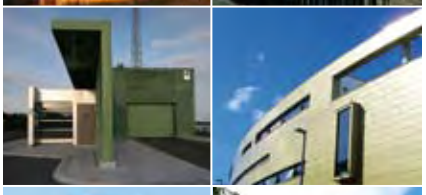
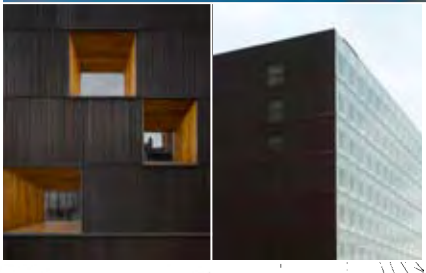
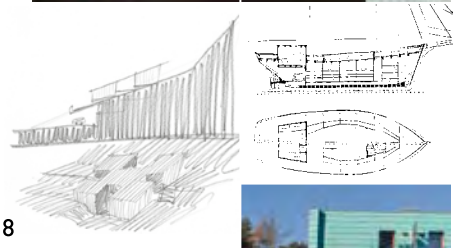
european copper in architecture campaign

INHALT







Text von Josef Eder der General Architecture Sweden AB

Wunderschön für ein Jahrhundert

"Es muss beständig sein"

- das sagte unser Kunde, als wir mit der Entwicklung des neuen Hauptsitzes von Skellefteå Power beauftragt wurden. In 2006 entschloss sich das Energieversorgungsunternehmen, sein Bürogebäude um ca. 10000 Quadratmeter Bürofläche zu erweitern, was jetzt abgeschlossen wurde. Der Haupteingang hat ein neues Design, befindet sich aber noch im ursprünglichen Gebäude, wohingegen das neue Gebäude Büros, Vorstandsräume und das Bedienungszentrum für die Fernsteuerung der Elektrizitätswerke des Unternehmens im ganzen Land beherbergt.

Das Gebäude verdankt sein Design einem globalen Standpunkt, bei dem der Eigentümer des Gebäudes auch der Nutzer und Verwalter ist. Daraus ergaben sich Lösungen und Systeme zur Optimierung der Lebensdauergesamtkosten, wobei Funktionalität, Wartungsaspekte und Betriebskosten berücksichtigt wurden. Der in hohem Maße handgefertigte und solide Stil spiegelt die Ambition des Gebäudeeigentümers wider, es zu einem Teil der Ortschaft zu machen und führte zu einem Gebäude mit sehr niedrigem Energieverbrauch.

Die solide Struktur und klare Tektonik des neuen Gebäudes basieren auf einer anspruchsvollen dreidimensionalen Ordnung. Das Design des Gebäudes entspricht der klassisch rationalen Tradition. Unser Ziel bestand darin, ein Gebäude zu errichten, das den Nutzern ermöglicht, es für ihre eigenen vielseitigen Bedürfnisse und Wünsche zu beanspruchen, und gleichzeitig die gemeinsame Identität zu stärken.

Das Gebäude ist als kollektiver Raum gestaltet, der, innerhalb der Grenzen des modularen Systems in das umgebende Stadtbild passt. Ein elfstöckiger Abschnitt weist im Westen Richtung Stadt, wobei seine eingerückte Position Abstand zum ursprünglichen Gebäude schafft. Nach Osten bildet das Gebäude einen niedrigeren Teil, der zum Innenhof des Blocks

– oder länger

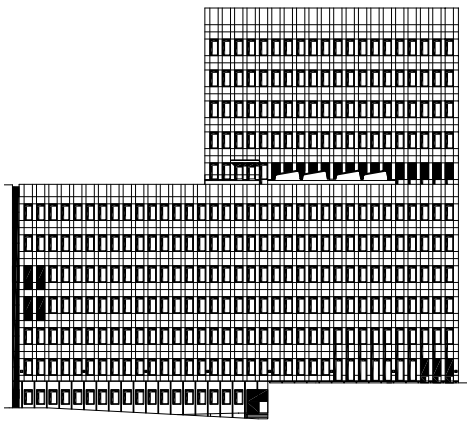
zeigt, wobei das Fundament aus Beton des Gebäudes die Höhenunterschiede mit einem Kellergeschoss ausgleicht.

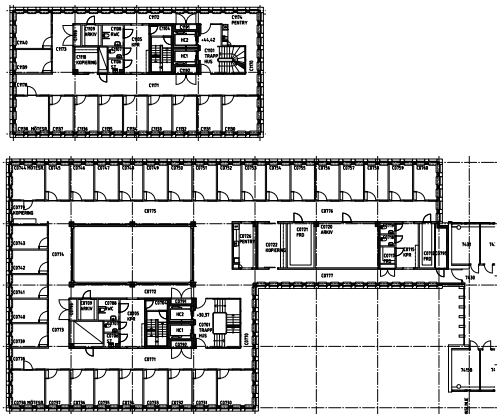
Das Äußere ist ein Gewebemantel aus Kupferkassetten, der dem Gebäude ein Erscheinungsbild von Beständigkeit und Zusammengehörigkeit gibt. Wir können bereits ahnen, wie schön die Kupferfassade altern wird, manchmal auf unerwartete Art und Weise und je nach Höhe und Position der Kassetten ganz unterschiedlich. An einigen Stellen gibt es bereits einen Grünschimmer, an anderen Stellen hat die Oxidation kaum begonnen. Die großen Flächen dunkeln schneller, was, wie auch beabsichtigt, die Beständigkeit des Gebäudes erhöht.

Das Äußere enthält keine organischen Werkstoffe und besteht aus einem Fundament, einer Wand aus Gips-Beton, Stahlträgern mit Isolierung hinter Faserzementplatten und der Kassettenfassadenabdeckung. Diese besteht aus 1,25 mm dicken Kupferblechen mit verborgenen Halterungen, die auf zwei Schichten von Stahlträgern montiert sind. Die Fassade ist mit 9000 dieser Kassetten bedeckt. Leisten, Gitter und Sockelanschlüsse sind ebenfalls als Kassetten ausgeführt. Die Aluminiumfenster sind auf die Hälfte der Wanddicke zurückgesetzt, was zusammen mit den Kupferkassetten und den Fenstereinfassungen aus Birkenholz die Dicke der äußeren Wand erkennen lässt.

Die Anordnung innen basiert auf dem Grundkonzept des Gebäudes als Stadt. Das Atrium, das Treppenhaus, das sich durch das Gebäude und die gemeinschaftlichen Kaffeepausenbereiche ausdehnt – all das fungiert als öffentlicher Bereich, zu dem die breiten Gänge führen. Diese allumfassende Lösung ermöglicht den Nutzern, ihre Räume individuell auf verschiedene Arten auszustatten und zu dekorieren und Besitz vom Gebäude in einem kohärenten und vereinigten Ganzen zu ergreifen. Die entstandene Gebäudefläche vermittelt dem Inneren Qualität, dominiert von der offensichtlichen Geschlossenheit zur Fassade, mit Licht und Ausblicken in viele Richtungen. Obwohl sie von außen massiv erscheinen, werden die Fassaden von innen mehr als Wände einer verglasten Veranda wahrgenommen, mit Fensteraussparungen, die das Tageslicht sammeln und direkt ins Innerste des Gebäudes weiterleiten.

Das Traggerüst und die Treppen wurden vor Ort in Beton gegossen. Die Bandbreite an Materialien, Buchenholz, Edelstahl und Details aus Kupfer vermitteln Beständigkeit und Qualität. Speziell entwickelte Bogenlampen mit einem Schirm aus Kupfer wurden von demselben Blechhersteller gefertigt, der die Kassetten auf der Fassade montiert hat. Die Griffe der Eingangstür, die aus solidem Kupfer und Edelstahlaufhängungen bestehen, werden durch Benutzung ansprechend altern.





Im Atrium des Gebäudes hängt ein monumentales, extrem himmlisches Kunstwerk. Entwicklung und Ausführung durch GA zusammen mit der Schmiede von Thomas Hydling. Es fungiert als Modell, das die Architektur des Gebäudes erläutert. Es zeigt alle Abmessungen dreidimensional, alle Linien und Ebenen sind mit Türen, Fenstern, Leisten und Säulen verbunden. 625 Meter von 2,9 mm Kupferrohr wurden mit 735 mit Silber gelöteten Kupfer-T-Stücken aus 4 mm-Kupferrohr verbunden.

Die robusten und massiven, in Designlösungen immer wieder verwendeten Materialien, ermöglichten gründliche Studien und ausführliche Beschreibungen der Fensterhalterungen, Kupferkassetten, Betonelemente usw. aus baulicher und tektonischer Sicht. Dieser Prozess ermöglichte die fertigungsaufwendigen Stufen in hochpräziser Fertigung und Montage.

Unsere Architektur findet ihren Ursprung eher in der Tektonik als in räumlichem Denken. Unabhängig von der Größe basieren unsere Projekte auf unseren Bemühungen, strukturelle Beziehungen im Design der Fassade und der Anordnung von Raum sowie bei der Planung und Gestaltung der Details sichtbar zu machen. Wir sind davon überzeugt, dass Räume mit einem bewussten Design komplexe und interessante Verbindungen schaffen können. Gegenwärtig arbeitet unser Büro an Projekten, bei denen recyceltes Bauholz, Kupfer, Messing, Marmor und Beton die vorherrschenden Werkstoffe sind.

Projekt: Kanalgatan 71, Skellefteå
Architekten: General Architecture Sweden AB, www.g-a.se
Josef Eder architect SAR/MSA
Olof Grip architect MSA
John Billberg architect SAR/MSA
Fabian Blücher architect SAR/MSA
Erik Persson architect MSA
Entwurf: WSP Skellefteå, Rolf Öberg
Eigentümer: Skellefteå Kraft AB
Auftrag von: Generalunternehmer
Auftragnehmer: NCC Construction AB, Skellefteå
Zulieferer der Kupferfassade: Luvata
Gesamtfläche: 9521 m²
Baukosten: 192 M SEK
Projektzeitraum: 2006–2009
Foto: Lindman Photography

CK9 ZOLLABFERTIGUNGSGEBÄUDE

Katajanokka, Helsinki

Topi Tuominen Architekt SAFA

Der im Zentrum Helsinkis gelegene Hafen Katajanokka Island wurde in den 70er Jahren zu einem Passagierhafen umgestaltet. Zur gleichen Zeit wurde ein neuer Gebäudekomplex mit Backsteinfassaden als Erweiterung des bisherigen Gebäudekomplexes im Jugendstil von Anfang 1900 gebaut. Der kleine Zollpavillon wurde 2008 im Passagierhafen gebaut. Die Pavillonfassade aus zwei Metallen passt optisch in beide Richtungen sehr gut – zum Meer hin und zur Stadt hin. Der klassische Farbkontrast von Kupfergrün und Backsteinrot passt gut ins Stadtbild. Der innovative Einsatz von Material und die innovative Ausführung des Projekts sind qualitativ hochwertig.

Esko Miettinen Architect SAFA.

Blick zum Meer, Aluminium und perforiertes Kupfer.

Als die neue Fährverbindung zwischen Helsinki und Tallinn fertiggestellt war und Pläne für eine neue Seeverbindung zwischen Helsinki und St. Petersburg entstanden, wurde der Austausch des alten Gebäudes für Zollabfertigung in Leichtbauweise zum Thema. Im März 2007 begannen die Architekten mit der Planung des neuen Gebäudes.

Das Gebäude wurde mit einem straffen Entwicklungs- und Bauplan errichtet und im Februar 2008 fertiggestellt.

Im hohen Teil des Gebäudes befinden sich die Fahrzeugabfertigung und die Belüftungsstation. Im niedrigeren Teil des Gebäudes befinden sich Kundendiensteinrichtungen, Abfertigungsbereiche und Nebeneinrichtungen. Im Gebäude befinden sich auch Einrichtungen, die mit dem Zoll nichts zu tun haben, z.B. ein Souvenirladen oder sanitäre Einrichtungen für die Fahrer, die auf die Einschiffung warten. Die gesamte Geschossfläche beträgt ca. 280 m^2.

Der Standort des Gebäudes wurde durch die Neugestaltung der von der Hafenbehörde zum Zeitpunkt des Bauprojekts geplanten und umgesetzten Verkehrsführung festgelegt. Die Gestaltung der Verkehrsführung hatte auch Einfluss auf das lange aber schmale Baugelände.

Der Kaibereich wird auch von Transatlantikkreuzfahrtschiffen genutzt, die im Sommer Helsinki besuchen.

Der Skelettbau des Gebäudes besteht aus Stahl. Die Konstruktion des hohen Teils und die Unterstandskonstruktionen sind mit perforiertem Kupferblech abgedeckt, das grün vorpatiniert ist. Die Seitenkonstruktion des Unterstands besteht auf beiden Seiten aus 50% durchlässigem Blech. Das Meer glitzert durch den Unterstand, wenn man vom Land aus hindurchsieht, und die doppelt perforierten Bleche erwecken bei vorbeifahrenden Reisenden den Anschein von „lebendigem" Blech.

Der untere Teil ist mit Aluminium in seiner natürlichen Farbe ummantelt. Die Bleche wurden mit großen Nieten und vertikal überlappend befestigt, damit es wie die Seiten eines alten Schiffes aussieht.

Bei den äußeren Wandkonstruktionen

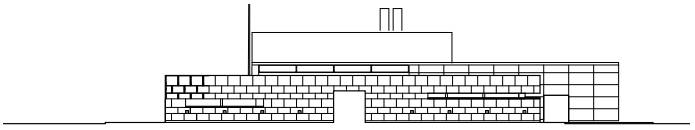
Der Pavillon vom Meer aus gesehen

unter der Ummantelung handelt es sich um vorgefertigte Blech-Wolle-Blech-Elemente.

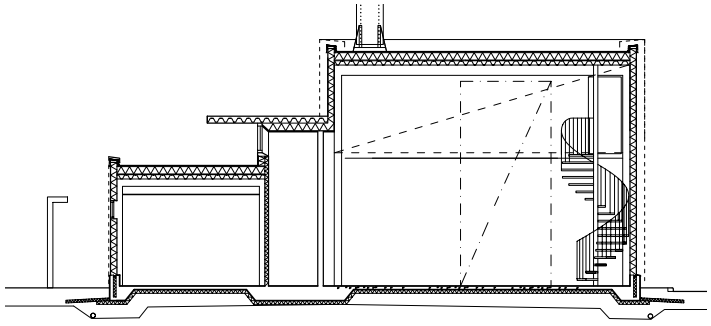
Abgesehen von Boden und Sockeln besteht nur die Sichtschutzwand vor der langen Fassade auf der Landseite aus Beton. Die Farbgebung der Wand wurde vom Künstler Pertti Kukkonen mittels seines eigenen Farbbetonverfahrens ausgeführt, das auf der Oxidation von Kupfer basiert.

Gemäß dem ursprünglichen Plan sollte das Gebäude mittels vorgefertigter Raumelemente umgesetzt werden, was Auswirkungen auf die Materialwahl hatte. Aufgrund des Zeitplans und der Kapazitätsprobleme der Hersteller entschied man sich für das Bestandsgebäude der Hersteller. Dadurch änderte sich die ursprüngliche Auswahl des Fassadenmetalls nicht. Die Leichtbauweise ist die natürliche Lösung für ein Gebäude, das dem Seeverkehr und anderen Hafeneinrichtungen dient. Es bietet auch einen Kontrast zu den mächtigen Backsteinblöcken von Katajanokka.

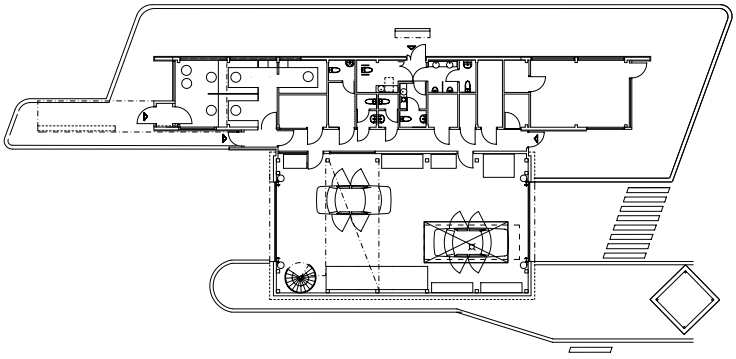
Das perforierte Kupferblech, das dem hohen Hallenteil Helligkeit geben soll, wurde mittels Auslegern 20 cm über die äußere Wand hinausgezogen. Jedes Blech wurde von Hand in der Fabrik patiniert, um das lebendige Erscheinungsbild der Fassadenoberfläche sicherzustellen. Die endgültige Patinierung wird die Natur mit der Zeit vollziehen.



Die Nordfassade.



Querschnitt



Grundriss

Entwickler/Kunde: Hafen in Helsinki
Projektleiter: YIT-Rakennus Oy
Fassadenarbeiten: Metallummantelung: Plekitööde Keskus Oy
Lieferant äußerer wandelemente: Paroc Oy
Architekt: Archivolta Oy, Topi Tuominen architect SAFA
Strukturelle gestaltung: Finnmap Consulting Oy
Elektroanlagen: Insinööritoimisto Tauno Nissinen Oy
Hvac design: Tuomi Yhtiöt Oy
Umsetzung von farbbeton: Pertti Kukkonen
Foto: Topi Tuominen

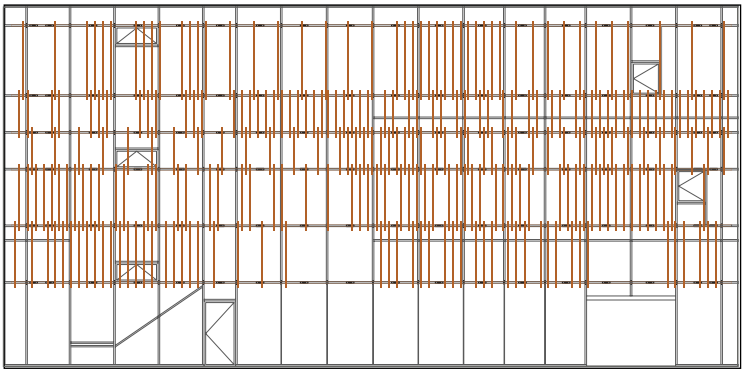
MUSIK WIE ZU KUPFERNEM EIS ERSTARRT

Der neue Hauptsitz der Sydbank in der norddeutschen Stadt Flensburg befindet sich im Zentrum der Stadt. Das Gebäude umfasst 4000 Quadratmeter, die sich auf drei Etagen und ein Parkhaus verteilen. Das Gebäude besteht aus einem gut gestalteten Backsteinbau und einem Anbau aus Glas mit einem Sichtschutz aus vertikal angeordneten Kupferlamellen.

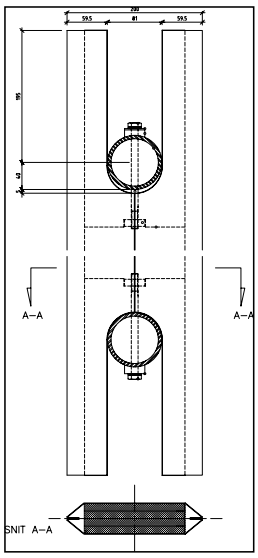
Die Behandlung der Fassade ist von den unterschiedlichen Standortbedingungen und den unterschiedlichen Funktionen des Gebäudes abhängig. Die Fassade nach Süden ist zum Schutz gegen hohes Verkehrsaufkommen und Sonnenlicht relativ abgeschlossen. Die Fensteröffnungen wurden mit einem Muster aus diagonal angeordneten Natursteinen ausgefüllt, was eine Begrenzung ergibt und natürliches Lichtspiel zulässt. Nach Westen liegen am Gebäude entlang offene Balkone hinter einer Reihe großer abgeschrägter Backsteinsäulen, die nicht nur vor der Nachmittagssonne schützen, sondern auch den Blick auf das Rathaus und eine Grünfläche freigeben.

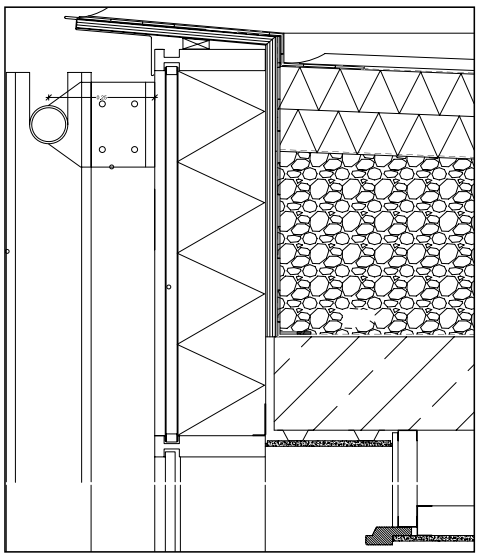
Die Nordfassade weist auf den Roteplatz und schafft mit ihren großen Frontfenstern eine ruhige Atmosphäre. Die Glasfassade auf der Ostseite des Gebäudes zeigt auf eine der Einkaufsstraßen der Stadt und fungiert als Haupteingang, Foyer, Treppenhaus und Konferenzraum.

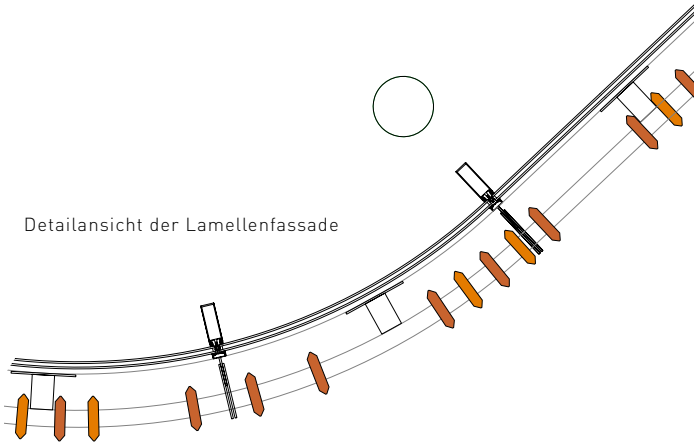
Die vertikal angeordneten Lamellen bestehen aus einem mit Kupfer ummantelten Profilträgermaterial, das von einer Aluminiumfassade unterbrochen wird. Abstand und Länge der Lamellen variieren je nach gewünschter Offenheit oder Geschlossenheit der dahinter befindlichen Räume. Dadurch besteht die Fassade aus zufälligen Mustern fließend angeordneter vertikaler Elemente, die den Eindruck von „zu Eis erstarrter Musik“ hinterlassen sollen. Bei Nacht ist das Licht der poetisch gestalteten Fenster ein beruhigendes Element im Stadtbild.



Projekt: Sydbank Hauptsitz, Flensburg
Kunde: Sydbank
Architekten: Exners Tegnestue A/S, Louise Lind Jacobsen, architect m.a.a.
Århus, Dänemark







Detailansicht der Lamellenfassade

Dir-Pia Voutilainen von der Scandinavian Copper Development Association (SCDA)
CEO-John Schonenberger vom European Copper Institute (ECI)

IST KUPFER IN DER ARCHITEKTUR UMWELTGERECHT?

Pia Voutilainen von der Scandinavian Copper Development Association und John Schonenberger vom European Copper Institute zeigen auf, wie der Einsatz von Kupfer in der Architektur mit dem EU-Aktionsplan für Nachhaltigkeit in Verbrauch und Produktion (SCP) im Einklang steht.

Svalbard Science Centre

Die Nachhaltigkeit ist gegenwärtig eine der Prioritäten innerhalb der EU-Politik. Am 16. Juli 2008 hat die Europäische Kommission den Aktionsplan für Nachhaltigkeit in Verbrauch und Produktion und für eine nachhaltige Industriepolitik (SCP/SIP)vorgelegt. Im Mittelpunkt des Aktionsplans steht ein dynamisches Rahmenkonzept zur Verbesserung der Umwelt-Performance von Produkten und zur Steigerung der Nachfrage nach nachhaltig gefertigte Waren und nachhaltige Fertigungstechnologien. Die Bauprodukten-Richtlinie und die anstehende Regulierung haben dieselben Ziele für die Baubranche.

Innerhalb der letzten Jahrzehnte hat die Kupferbranche außerordentliche Fortschritte im Bereich Umwelt und Energieeffizienz gemacht. Dank der Innovationsarbeit der Ingenieure dieser Branche konnten Prozesse entwickelt werden, die bis zum heutigen Tag zum Einsatz kommen und zu den „besten verfügbaren Technologien" in der EU zählen.

ENERGIEEFFIZIENZ

Der eigentliche Durchbruch bestand darin, die chemische Energie des zugeführten Kupfererzes zu verwerten und damit zu verhindern, dass externe Energie zum Schmelzen des Metallgehalts des Erzes zugeführt werden muss. Tatsächlich führt dieser „Schwebeschmelzverfahren" (Flash smelting) zu einem Energieüberschuss, der in anderen Stufen des Produktionsprozesses verwendet oder in das Heizungsnetz einer nahegelegenen Stadt eingespeist wird. Zugleich wird das Schwefeldioxid, das beim Schmelzen freigesetzt wird, aufgefangen, um ein kommerziell hochwertiges Nebenprodukt zu erzeugen, und zwar die Schwefelsäure. Dadurch wurde ein wichtiger Beitrag hinsichtlich der Verringerung des so genannten „sauren Regens" in Europa geleistet.

Die Ingenieure haben auch beständig daran gearbeitet, die vielen verschiedenen metallhaltigen Verbindungen, die in den natürlich vorkommenden Erzen enthalten sind, besser zu trennen. Heute eingesetzte Verfahren können sowohl die wertvollen Begleitbestandteile von Kupfererzen wie Gold und Silber herauslösen, als auch die verschiedenen im Produktionsprozess anfallenden Stäube sammeln und entweder vor Ort recyceln oder Drittunternehmen zur Aufbereitung zuführen. Das dann noch verbleibende mineralische Material wird insbesondere im Straßenbau verwendet.

EMISSIONSBESCHRÄNKUNG

In den 1970er und 80er Jahren haben Unternehmen mehrere Millionen in Ausrüstung investieren, um die Emissionen in Wasser und Luft zu verringern und so den immer schärferen Vorgaben bezüglich der Umwelt zu entsprechen. Bei der Festlegung der Standortzulassungsbestimmungen spielten lokale und nationale Behörden eine wichtige Rolle. Dadurch konnte ein angemessenes Gleichgewicht zwischen dem Schutz der Umwelt und der Erhaltung von Arbeitsplätzen und Investitionen vor Ort erreicht werden.

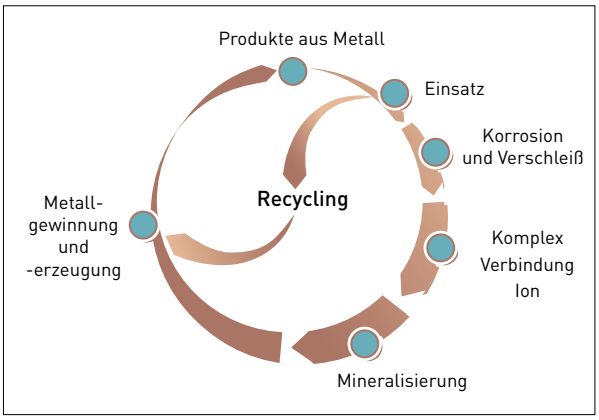
Kürzlich führten die neuen EU-weit geltenden Rahmenrichtlinien zur Reinhaltung von Luft, Boden, Wasser und Sedimenten zu einem neuen stärkeren Schwerpunkt auf Emissionen, sowohl für die Fertigung als auch für die Verwendung der Produkte. Zum Festlegen sicherer Grenzwerte für Chemikalien, einschließlich der Metalle, muss eine wissenschaftlich abgesicherte Methodik angewandt und ein umfangreicher Bestand an wissenschaftlichen Daten ausgewertet werden. Das alles ist sehr komplex und zeitaufwendig. Unter dem Druck, den Bürgern eine zunehmend risikofreie Umwelt zu bieten, geht die Tendenz dahin, für die Zukunft Grenzwerte festgelegt werden, die deutlich unterhalb der bisherigen Grenzwerte liegen.

Dabei sollte mehr als in der Vergangenheit einer ausgewogenen Kosten-Nutzen-Analyse bezogen auf die Verringerung der Grenzwerte Nachdruck verliehen werden, insbesondere für natürlich vorkommende Elemente wie Kupfer, wobei dessen Rolle als essentielles Spurenelement in allen Lebewesen und die Risiken eines Mineralstoffmangels bei Menschen, Tieren und Pflanzen zu berücksichtigen sind.

BETRÄCHTLICHE INVESTITION DER KUPFERBRANCHE

Um die Behörden bei ihrer Arbeit zu unterstützen, hat die Kupferbranche in den letzten acht Jahren mehrere Millionen Euro in die Entwicklung einer umfassenden Risikobewertung der Fertigung, der Verwendung und der Lebensdauer kupferhaltiger Produkte investiert. Sie wurde umfassend von den Behörden geprüft und dann von der EU-Kommission und den Mitgliedsstaaten genehmigt. Sie bildet jetzt die Grundlage für Erfüllung der Pflichten der Branche gemäß der neuen REACh-Verordnung.

Die Verwendung von Kupfer in der Architektur ist in ganz besonderer Weise umweltgerecht. Außenanwendungen haben eine ungewöhnlich hohe, oft in Jahrhunderten zu messende Lebensdauer. Am



Natürlicher Ablauf der Gewinnung und Mineralisation von Kupfer

Ende seiner Nutzung kann Kupfer immer wieder ohne jeglichen Qualitätsverlust recycelt werden. Dabei erfordert der Recyclingprozess nur zwischen 10 und 20% der Energie, die benötigt wurde, um das Rohmetall zu gewinnen und zu verarbeiten. Die Branchenrisikobewertung hat auch festgestellt, dass architektonisch verwendetes Kupfer zu weniger als 1% zu allen diffusen Emissionen von Kupferprodukten in der EU beiträgt. Und selbst dann, so zeigt die Forschung, wird diese kleine Menge sehr schnell von den inerten und komplexbildenden Verbindungen, wie z.B. Beton in der Umgebung eines Gebäudes, gebunden.

Schließlich liegt ein besonderer Nachhaltigkeitsaspekt gerade in der Art, wie das aus der Erdkruste gewonnene Kupfererz seine in ihm enthaltene Energie im Verhüttungsprozess zur weiteren Nutzung abgibt. Die Herausforderung besteht sowohl für die Unternehmen als auch für die Politiker darin, diesen klaren Nutzen in die unzähligen Ökodesigntools, Nachhaltigkeitsbewertungen, sozioökonomischen Analysen, die mit Verwendungs- und Lebenszyklusbewertungen verknüpft sind, einzubeziehen. Eine lange Lebensdauer und eine endlose Wiederverwertbarkeit werden gegenwärtig noch nicht ausreichend in die derzeit in Entwicklung befindlichen Indikatoren eingebunden. Doch damit muss man sich befassen. Von besonderer Bedeutung für die Leser des Copper Forum ist, dass die Branche durch die Bemühungen seiner nationalen Copper Development Associations weiterhin nationale Behörden z.B. bei Umweltdeklarationen (EPD = Environmental Product Declaration) unterstützt. Unsere Lebenszyklusbestandsdatenbank – www.kupfer-institut.de/lifecycle/ – existiert seit 2003 und wurde in die EU-Datenbank aufgenommen.

Somit lautet die Antwort auf meine anfängliche Frage, ob Kupfer in der Architektur umweltgerecht ist, auf jeden Fall ja. In der Architektur liefert Kupfer eine lange Lebensdauer, ist unbegrenzt wiederverwertbar und stammt aus einer Branche, die klar gezeigt hat, dass sie innerhalb des gesetzlichen Rahmens der EU agieren kann.

The Core, Eden Project, Cornwall, GB

Versuchshaus in GB mit Höchststufe 6 bei der Bewertung zukunftsfähiger Häuser.
Foto: Denis Jones

THE RESULTS

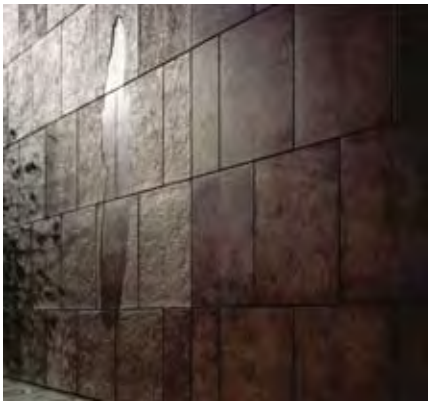
The previous issue of Copper Forum (27/2009) highlighted five very different, exemplary projects from around Europe, shortlisted for the European Copper in Architecture Awards 14. Winners of these Awards were announced at a presentation ceremony in London at the end of September 2009, as architect Chris Hodson reports.

This event proved to be as lively as ever, bringing together the Awards judges and designers of entered projects, as well as craftsmen and copper industry representatives. It was a clear demonstration of the growing interest in the architectural use of copper by European architects and their clients. It was particularly impressive that the architects of all five shortlisted projects presented their designs in detail at the event, and in some cases revealed more about them than was covered in the last Copper Forum. As a result, we are revisiting two shortlisted projects later – but first, the winners.

Selected from five shortlisted projects, the outright **Winner** was the Archaeology Museum of Vitoria, Spain, designed by Mangado y Asociados. Extensive use of cast bronze elements creates contrasting elevational treatments. From the street it seems tough and hermetic with a real air of mystery enticing the visitor in. Then, it reveals more of its nature and grows increasingly open with the changing architectural rhythm on entering the courtyard (more about this project on page 16–17). The judges were particularly impressed with the building's stunning effect of a timeless fortress in its urban setting.

Also from Spain, Mediacomplex 22@ in Barcelona by Patrick Genard y Asociados and Ferrater & Asociados was **Highly Commended** by the judges for its superb response to a tight, complex urban setting, forming new public spaces of lasting value. Here, a solid, horizontal block clad with panels of perforated copper contrasts with a vertical tower shrouded in a strong vertical grid of deeply recessed, copper-faced screens.

Ticino House in Switzerland



Stanton Williams' Bristol Department Store

The Clip House in Madrid, Spain

The Bristol Heart Institute, UK

Private house, Mortsel, Belgium

Acharacle Primary School, Scotland, UK

Frederikskaj project in Copenhagen, Denmark

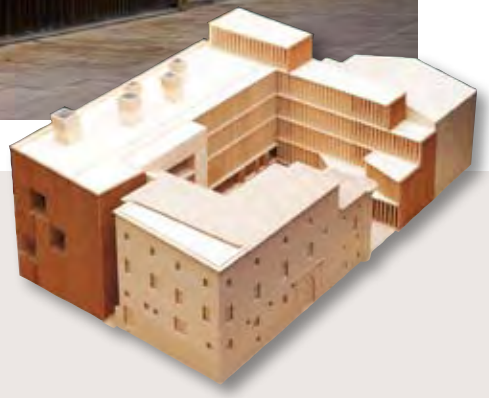
In addition, a discretionary award for **Innovation** was made for the inventive use of art applied to bronze panels on Stanton Williams' Bristol Department Store. The essential role of craftsmen in realising designers' aspirations for copper in architecture was also recognised with three **Craftsmanship** awards for projects in Belgium and the UK.

Article by Chris Hodson

Three other projects received **Commendations.** Davide Macullo Architects' sensitive design for the Ticino House responds to its beautiful rural setting in Switzerland and incorporates an extensive arrangement of copper mesh panels (more about this project on page 18–19). In complete contrast, the Clip House in Madrid, Spain, by Bernalte-León Asociados is a highly sculptural design defined by sinuous curving copper bands cantilevered from a vertical concrete spine. Finally, the judges considered Dissing+Weitling Architecture's copper-clad Frederikskaj project in Copenhagen, Denmark to set the standard for high-density urban housing.

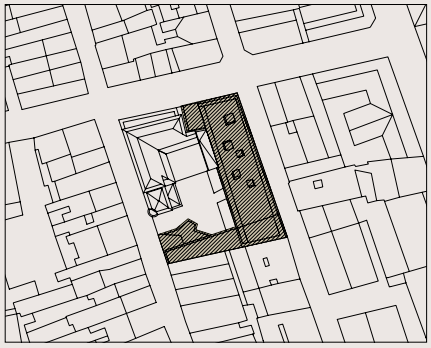
The well-established Copper in Architecture Awards recognise architectural excellence and celebrate the use of copper in all its forms. The last two decades have seen their transformation from a UK-based programme highlighting craftsmanship, into a major, design-led Awards event for projects across Europe. For the first time, the 2009 Awards considered all entries together - judged by a European panel of eight architects and editors, chaired by Paul Finch, the recently appointed chairman of CABE - the UK government's advisors on architecture and urban design.

The European Copper in Architecture Awards programme is part of the European Copper in Architecture Campaign, promoted by the UK Copper Development Association and participating copper fabricators. All five shortlisted projects were explored in the last issue of Copper Forum (27/2009) and full details of Awards 14 and previous Awards can be found at: www.copperinfo.co.uk/arch or www.copperconcept.org



WINNING BRONZE

The Archaeology Museum of Vitoria in Spain, designed by Mangado y Asociados is a worthy winner of the 2009 European Copper in Architecture Awards. In the last issue of Copper Forum (27/2009) the architect described the design's development, illustrated by photography of the finished project. But other material continues to reveal more about this multi-faceted and influential building. Here, Catherine Slessor, Editor of the Architectural Review magazine and one of the Awards judges, reviews it and interviews its architect.



CONTEXT

In the heart of Vitoria's crumbling historic core, Francisco Mangado's new archaeological museum stands out. Soberly accoutred in a corrugated bronze carapace, it is a conspicuous contemporary intervention, yet it seems determined to blank out its surroundings. Windows set in exaggeratedly deep reveals are like sightless eyes, reflecting back only peeling walls, tottering balconies and scudding skies. From a distance it appears as a dense, dark, almost geological presence that has somehow erupted out of the ground.

CONCEPT

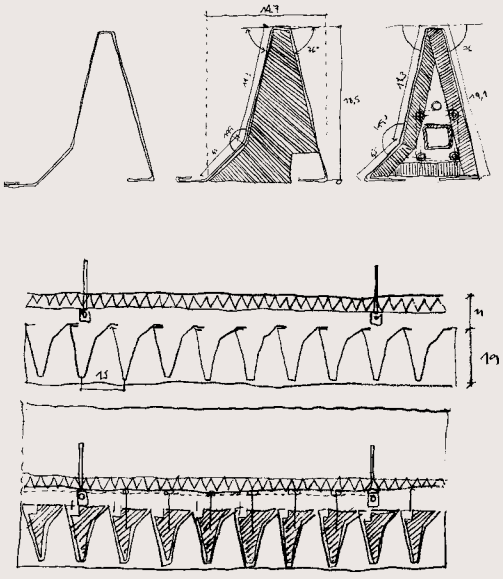
The character of the building is strongly defined by the choice of bronze, an alloy of copper, and the way it has been appropriated to devise an inventive and visually distinctive cladding system. But the material is also both functional and economical. For Mangado, bronze was the obvious option because 'it has a strong archaeological resonance.' Bronze was one of the first metals to be exploited by humans and it is particularly appropriate for a museum that explores very ancient history and has many bronze artefacts in its collection. Up close, the ribbed walls appear less like a carapace and more like a kind of woven metal textile. In most places, the bronze weave is tight and impermeable, but around the courtyard it is much looser, with glazing exposed behind.

COPPER

And though the facade has an impressive sense of weight and sobriety, there's a sleight of hand at work. As it would have been too costly and impractical to cast the larger pieces as solid elements, a wafer thin veneer of bronze is simply wrapped around timber forms.

'*You have to reconcile ideological and metaphorical aspirations with the practical qualities of the material*,' says Mangado.

'*The ancient Egyptians did the same kind of thing with stone to create an illusion of mass. So architecture is all about fooling people, but in a wonderful way.*'



ALPINE COPPER IN CONTEXT

In complete contrast to the previous project, this House in Ticino, southern Switzerland – Commended in the Awards and featured in the last issue of Copper Forum (27/2009) – is a modest building forming an integral part of its Alpine setting. But it is also firmly rooted in a developing heritage of important modern movement houses in Ticino and rigorously carries through its essential character from concept to detail. Its architect Davide Macullo made the following presentation at the 2009 Awards event.

CONTEXT

Ticino is located in the southernmost part of Switzerland, an area characterised by a pre-Alpine landscape of peaks and deep valleys. Early in the 20th century, "cultural immigrants" began moving to the area, including some of the great modern movement architects with ideas and projects that sought to explore a new way of building in this Alpine context. The Anatta House (1) was built early last century to house a family that was part of this community of foreign intellectuals who had settled in this territory in order to enjoy a way of life in harmony with nature. This house is the first sign of modernisation in a rural area. It introduces large horizontal planes that contrast with the landscape and uses the concept of framing the landscape through large openings.

Many other architects of the modern movement have attempted to deal with the area: Neutra, Breuer, Le Corbusier and Mies van der Rohe are some that proposed projects here. Neutra's Tuia House (2) and Bucerius House (3), both built in the 1960s, adopt the modern construct in emphasising the horizontal and create an object that detaches itself from its context. The Koefer House (4) by Marcel Breuer, built not far from those of Neutra, again adopts the idea of horizontality and, in addition, uses planting as an integrated element of the project.

With the second generation of Ticinese architects, we see a shift in attitude whereby the relationship of the building to the landscape becomes much more dominant. We see a move away from the horizontal planes towards a volumetric architecture that rises up from the terrain, allowing the landscape to continue to roll with its natural contour. The Rotalinti House (5) by Galfetti is an example of this. Rising up as an extension of the rock and dominating the landscape, it places the constructed volume as the new protagonist of the place.

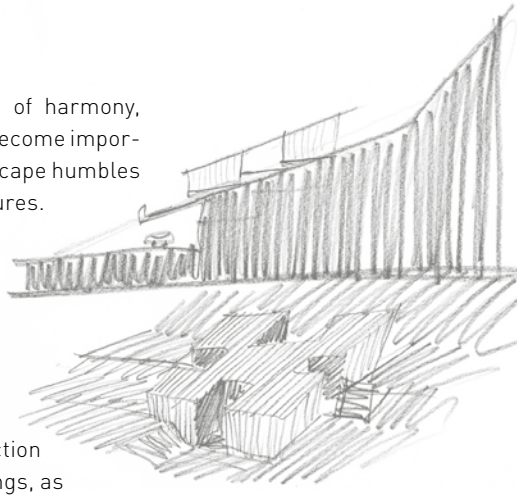
In a similar way Botta's architecture (7) dominates the landscape as an element inserted between the earth and the sky, recalling a memory of a building anchored to the ground as a solitary bastion. In the 1970s, we see the emergence of another approach to building in the landscape with local architect Luigi Snozzi's Kalman House (6) which places the dominant object within the folds of the landscape. Since the early 1970s urban development in the area has witnessed a rapid growth – a growth that still shows no signs of slowing. The existing modern models described here continue to be emulated by speculators and there is no longer a distinction between the fabric of the urbanised valleys and that of the natural slopes. Both areas are dealt regarded as the having the same or, at best, similar, building typology.

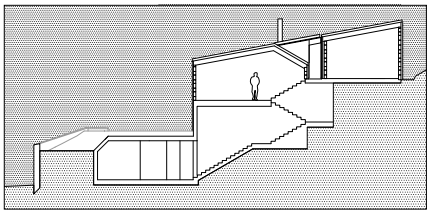
But, in today's climate, this attitude requires reassessment. It needs to become one more of reading and working with the existing folds and lie of the land, rather than one of reproducing past models, detached from their context.

8–9. House in Carabbia

CONCEPT

The approach advocated here is one of harmony, where the smallest of folds in the land become important and where the majesty of the landscape humbles even the greatest of architectural gestures.





The house is characterised as a series of small monolithic volumes perched on the natural slope of the land and is surrounded by nature. The site was previously home to a cluster of typical old rural buildings and elements of the new house echo this. The new construction retains the footprint of these old buildings, as four volumes with a 14 meter-square ground perimeter and, with its sloped roof recall the form of these former structures.

The design concept fits into the contextual argument in as much as its constructed volumes embrace the land organically. The construction follows the slope in a fluent sequence of spaces, each relating to each other and to the surrounding landscape. In order to relate an identity and a language to the inhabitants, the project has a strong and precise geometric form. The living spaces at different levels ensure that all the surrounding natural landscape can be 'lived in'. All spaces - even at different levels - have a direct relationship with the external environment. The landscape appears to flow through these volumes that become protected living spaces: a continuation of the green environment integrated into the house.

COPPER

The house follows the principles of building with organic recyclable materials such as wood and copper. In addition, parts of the house such as the foundations and basement have been constructed in reinforced concrete. The emerging structure is made of wood and clad with copper. The cladding is made up of copper plates and the facade elements, in stretched copper mesh, also act as a rain screen. The vertical pattern of the copper mesh cladding renders the construction system visible and reduces the scale of the building.

The use of copper in the House in Ticino highlights how extraordinary a material it can be when its transparent and reflective characteristics are exploited. It gives a depth to surfaces whereby across the day they are continually rendered differently, much like a monochromatic painting. As the sun moves about the house, each surface is constantly morphing colours. Used in this sense, the material demonstrates an unexpected expressiveness.

COPPER STRIKES GOLD

By Chris Hodson

One of the most exciting recent developments for copper as a modern architectural material for facades is the introduction of an alloy with a striking warm golden surface.

This material is an alloy of copper with aluminium and zinc, which is very stable and keeps its golden shade over time. It behaves differently to pure copper, which develops a dark brown colour with oxidisation followed by its distinctive green patina. The golden alloy has a thin protective oxide layer containing all three alloy elements when produced. As a result, the surface retains its golden colour indefinitely and simply loses some of its sheen as the oxide layer thickens with exposure to the elements, with a matt appearance.

As well as exuding a sense of visual richness and quality, the golden alloy offers outstanding mechanical abrasion resistance, extremely high corrosion resistance and durability as well as excellent stability and material rigidity. The material can be easily cold-shaped and processed using standard techniques. Both leading copper fabricators offer very similar versions of the golden copper alloy, demonstrated on the two recent UK projects which follow. Luvata's Nordic Royal is used to envelope an intriguing lakeside visitors shelter (page 22–23) while KME's TECU Gold highlights a concert hall's new foyer building (page 24–25).

Finally, as we go to print, two more projects are being built using golden copper alloy which we plan to revisit in detail in future issues, once completed.

A 'PRECIOUS METAL' MUSEUM FOR STOCKHOLM

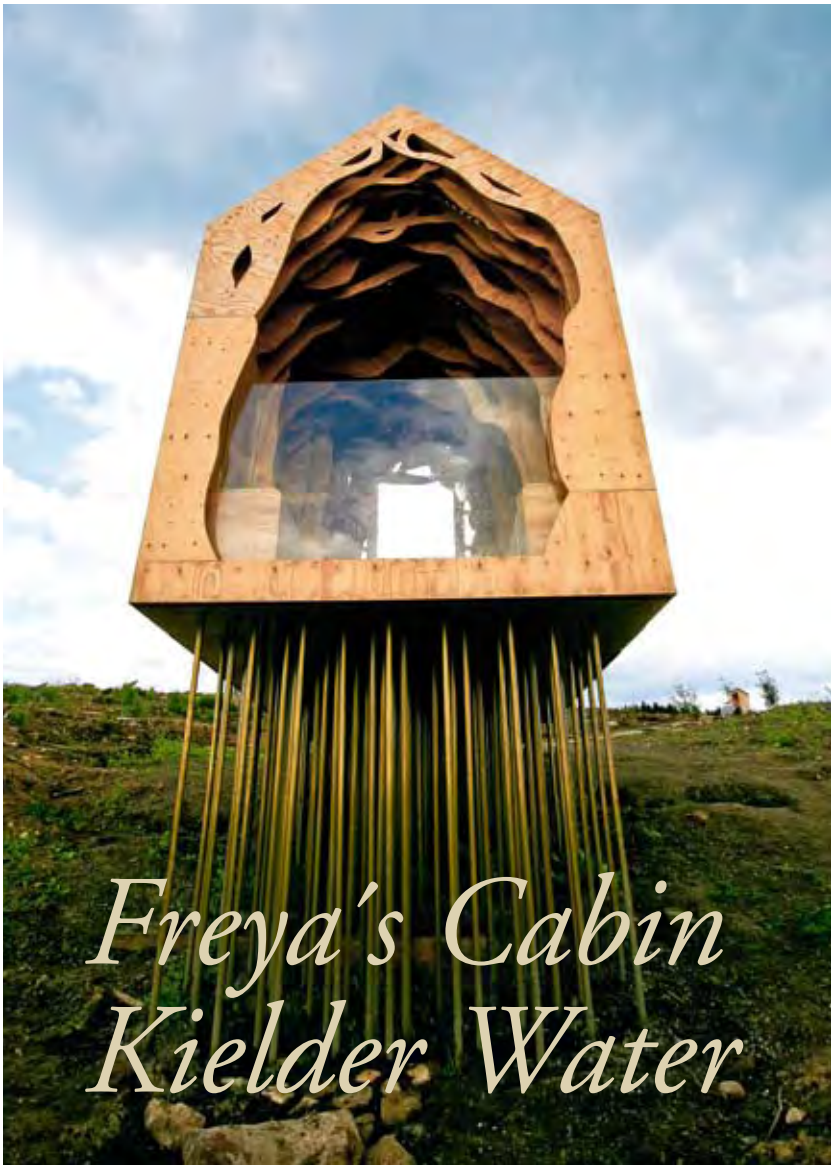
Near Vasaparken in the heart of Stockholm, the building of a new art museum has recently started, designed with facades and roofs in cassettes of golden copper alloy, due for inauguration at the beginning of 2011. Architect Anna Höglund of Wingårdhs Arkitektkontor AB describes the building as: "Like a piece of jewellery made of a precious metal and with a sparkling diamond on top of the roof. Severe on the outside but surprising inside – culture meets everyday life. The Nordic Royal facade gives a solid impression, matching the brick and render facades of the surrounding buildings, all familiar materials that will age with dignity. The building is raised on a platform with a tall, glassed-in entrance floor that erases the boundaries between inside and outside and will attract visitors. A big park, Vasaparken, reaches all the way to the building, where the greenery continues with plants climbing up the facade. Nordic Royal wires stretch around the facade, conjuring up images of a wrapped parcel with ribbons of gold."

CREATING AN IMPRESSION IN TROMSØ

Diagonally mounted panels of Nordic Royal define the architecture of this extension to the Quality Hotel Saga in a central location of Tromsø, Norway. The golden facade cladding gives an air of exclusivity and reinforces the building's central importance in the townscape for passers-by. The facade is not striving to create a superficial 'wow factor' but rather to become a long-term, high-class and convincingly craftsman-like edifice that lives-up to its location in the centre of town near the cathedral. The detail and craftsmanship of the golden facade aim to reflect other examples of quality in the surroundings – including nearby brick facades, the roughcast elevations of the art museum and the wooden facades of other historic buildings.

Design: Arkitektkontoret Amundsen AS, Tromsø and Foundation 5+, Germany

By Chris Hodson



Freya's Cabin Kielder Water

The first project using Luvata's Nordic Royal alloy in the UK is a symbolic lakeside shelter informed by a fairytale created by its designers Studio Weave.

Studio Weave create places through playing into and exploring the narratives of spaces. They are fascinated by the powerful role that stories play in creating a sense of place. Their work explores how writing stories stemming from the history, geography and eccentricities of a place can create engaging and distinctive design proposals.

Freya's Cabin is one of a pair of allegorical visitors' shelters by Studio Weave overlooking Kielder Water, northern Europe's largest man-made lake. These and four other new shelters along the Lakeside Way – a 27-mile long walking trail around the reservoir – form part of a series of new artistic and architectural interventions within the Kielder Water and Forest Park.

With Freya's Cabin and Robin's Hut, Studio Weave have embraced the man-made nature of the reservoir and park, thinking of it as a stage set against which a story can be told. Their two structures have been imagined within a fairytale that the designers wrote specifically for Kielder, inspired by the two sites, mythology and folklore. Within the story, Freya's Cabin and Robin's Hut are designed and built by the characters: the real structures offer visitors evidence of these characters and their adventures.

The Cabin is raised up on golden metal 'stems'

The Story of Freya and Robin

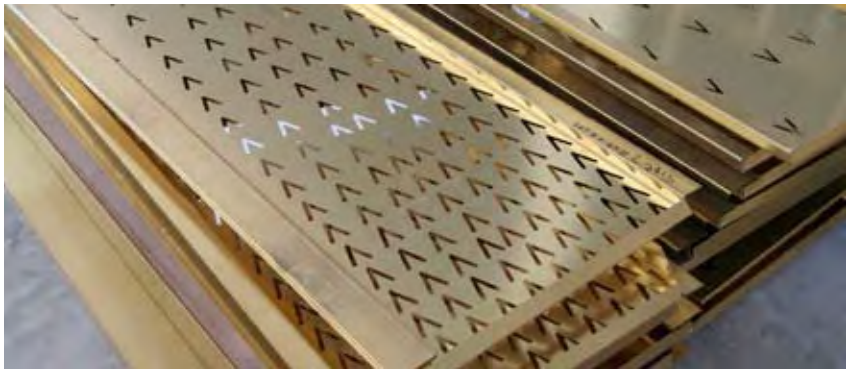
Robin's Hut is on the North bank, on the edge of the woodland amongst fir trees and rocks. Robin built himself a simple wooden structure that he covered in timber shingles on this site surrounded by water that he felt gave it a remote, island-like feel.

Freya is named after the Norse goddess of love, beauty and fertility. The goddess loves spring, music and flowers, is very fond of elves and fairies, and is known - on occasion of great sadness - to cry tears of gold. Freya loved to take long walks collecting flowers and pressing them to decorate everything around her.

Freya fell for Robin and showed her affection by making him the gift of an intricate cabin in the image of the woodlands he so loved. She chose a spot opposite and aligned with Robin's Hut to give Robin the best chance of seeing the Cabin. She modeled it on her flower press, arranging carefully collected branches to make an enchanted forest. She put Foxgloves at the entrance to invite the fairies in, then pressed everything tight together so the cabin would be strong and crisp and last forever.

When she sees Robin rowing off on an adventure, Freya cried tears of gold and wrapped the cabin in them. Meanwhile, Robin turned his head to look back at the lake he loved and noticed something glinting in the distance. He was so curious that he decided to row back and find out what it was and there, of course, was the golden Cabin and Freya. He was moved by the cabin and invited Freya on his adventure with him.

They didn't leave very long ago, so they are still away adventuring, but if you can find it, you can see Robin's wooden hut and the golden cabin that Freya made for him, facing each other across the lake, awaiting their return.



The prefabricated Nordic Royal sheets are pierced to represent golden tears

Freya's Cabin is the same size as Robin's Hut, measuring 2.5 m x 3.6 m x 3.75 m tall, and sits about 3 m above the Lakeside Way. The Cabin is constructed from CNC-cut plywood layers pressed together, with each layer having a cutout shape like a stage set. The structure is held together with glue and tension rods that fix through pre-drilled holes in every layer. Some of the layers, including the balustrade of the lake-side front, are clear acrylic. This allows light into the middle of the structure and creates a forest-cover-like affect.

The structure is raised up off the ground with lots of golden metal "stems" randomly arranged and "planted" into the concrete foundations. Pre-formed trays of Luvata's Nordic Royal sheets have been used to wrap the roof, sides and underside of the Cabin. The sheets were perforated to symbolise Freya's golden tears.

Robin's Hut, a simple timber construction, looks towards Freya's Cabin across the lake

Although the same form as Robin's Hut, Freya's Cabin contrasts with intricate layers and a golden copper covering

Project: Freya's Cabin, Kielder Water and Forest Park, Northumberland, UK

Client: Kielder Partnership

Designers: Studio Weave

Structural Engineers: Price and Myers

Contractor: Millimetre

Copper Supplier: Luvata Sales OY (UK)

Photos and illustration: courtesy of Studio Weave. Snow photo: Peter Sharpe

By Chris Hodson

COLSTON HALL FOYER BUILDING BRISTOL

TECU® Gold copper alloy cladding defines the architecture of a new foyer building helping to transform Bristol's premier music venue from a tired municipal concert hall into one of the UK's leading performance centres.

The Colston Hall is Bristol's principal music venue. The main hall was opened in 1867 as an assembly hall to rival St. George's Hall in Liverpool. It has been radically remodelled three times since then, the last occasion being in 1951. But now an ambitious three-phase project aims to update all the facilities and create a modern complex attracting audiences of all ages and all musical tastes. This first phase is a spacious new foyer, with its own informal performance area, which forms a link between Bristol's Centre and its West End.

Transforming the Concert Experience

The new foyer building design by architects Levitt Bernstein has an independent architectural identity, expressing the desire to provide Bristol's public with an entirely new concert-going experience. It accommodates foyers, interval bars, cafes, administrative offices, education studios and an open performance area. The purpose of the new foyer building is to transform Bristol audiences' perceptions of concert-going. It is a new participatory space, providing better facilities for all visitors and aiming to attract people who may find aspects of concert-going etiquette aloof and challenging. Its vast central space is a showcase for people and events, available to the citizens of Bristol throughout the day.

The development of this pivotal site in the centre of the city is intended to act as a transformational catalyst for the future of the surrounding area. When first built the Colston Hall occupied a prime position, just yards from the old city boundary and Bristol's thriving docks, located on a new road cut through the medieval streets to speed the progress of goods through the city towards the north. Since then, however, its position has become increasingly peripheral and, during the 20th century, an unsympathetic traffic-clogged backwater.

The design of the new foyer extension attempts to remedy this by creating a local landmark with a strong independent character which can be clearly identified within a densely developed part of the city's centre. There is a contextual basis to many of the major design decisions concerning the building's distinctive shape and organisation, even though the result is unlike anything nearby. Its curved form relates to its immediate, essentially medieval context and its scale mediates between the old houses in Pipe Lane and the larger bulk of the Hall itself. It effortlessly accommodates substantial level changes between adjoining streets by incorporating entrances of equal importance on each street.

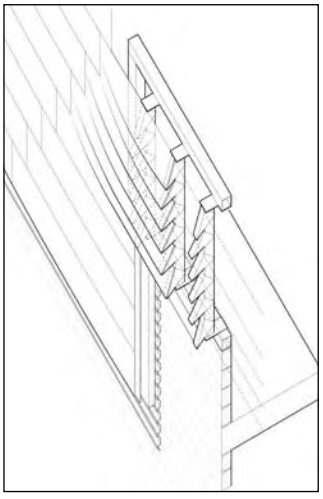
Golden Copper Identity

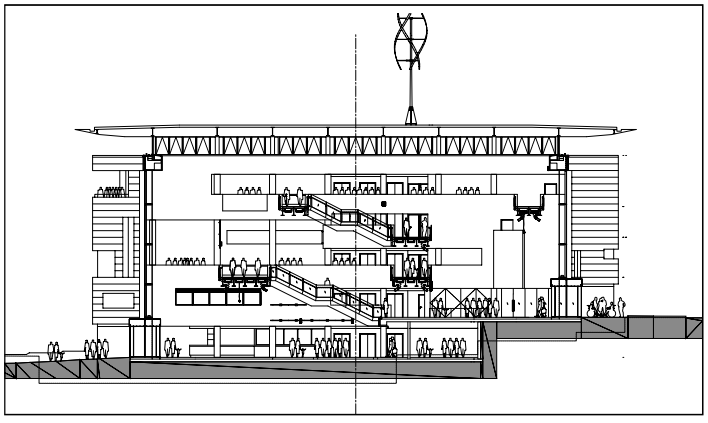
The principal cladding material is an alloy of copper and aluminium chosen to respond to the brief for a bold and visible building. Its gold colour has a tonal relationship with the beige and red bricks of the adjoining buildings. Just as the timber internally resonates with the string instruments of an orchestra, the copper shingles evoke the brass section, with constant variations of light enhanced by the curved geometry of the building form. The malleable nature of the material is expressed in the detail of the shingles, which are peeled back to form gill-like openings to ventilate the plant rooms.

The windows recall the punched holes of an old music roll or the texture of encoded data on a CD, and have a relationship to the shingle size, being multiples of a 300 mm module, based on the rhythms denoted by musical time signatures; and there is also the hint of a graphic representation of a sheet of music. These ideas have provided a framework for an apparently random pattern of window openings which increase in scale as they move from the private functional parts of the building to the public spaces that face towards the centre of Bristol.

Sustainable building technologies and construction have been important factors underlying the design. The selection of building materials and construction techniques has been driven by environmental considerations and the copper cladding is made up of at least 70% recycled material.

The golden copper skin is peeled back to form gill-like ventilation openings





Project: Colston Hall Foyer Building, Bristol, UK
Client: Bristol City Council
Architects: Levitt Bernstein
Structural Engineers: Arup
Copper Installer: Richardson Roofing
Copper supplier: KME UK
Photos: Andrew Cross, KME

By Chris Hodson

A LANDMARK HOTEL FOR DONCASTER

A distinctive new hotel in the centre of Doncaster, an historic town in South Yorkshire in the north of England, is the first UK project to be clad with Luvata's Nordic Green Living pre-patinated copper.

The pivotal site is on the corner of High Fisher Gate and Church Way, and close to the Market Conservation Area. The design – by Cartwright Pickard Architects - is intended as a landmark reconciling two different urban characters: the intimate, small scale of the Market Conservation Area contrasting with the larger, broader scale of Church Way with its bigger buildings including the 19th century St. George's Church designed by Sir Gilbert Scott (the architect of London's St Pancras International Station).

RECONCILING DIFFERENT GEOMETRIES

The new 140-bed hotel also includes shopping facilities, continuing existing retail uses in High Fisher Gate and introducing them into the potentially high-profile Church Way. The new building recognises the two existing geometries of these streets. Two distinctive blocks follow the existing roads and are linked by a prow-like corner, helping to reconcile the two geometries and creating a distinctive feature on the prominent corner.

The northern block is six storeys high at its West side. Here, a distinctive vertical element sits on the corner of the site, at the base of which is the entrance to the hotel. To the East, and towards the Market, the northern block steps down to three storeys. The southern block is visually five storeys, with the sixth sitting well back from Church Way. This block is lower to maintain a scale in sympathy with St George's Church, and to replicate the height of the eaves of the church. Throughout, vertical emphasis is reinforced by the composition of the fenestration, the expressed structure and projecting bays.

DESIGN FREEDOM WITH COPPER

A key element of the building's design is the use of Luvata's Nordic Green Living pre-patinated copper cladding to create an abstract surface made up of horizontally orientated bands of varying heights. Nordic Green Living offers architects unparalleled design freedom and the ability to determine the type and intensity of patina. The factory process can be accurately controlled so that, as well as the solid green patina colour, other intensities of patina flecks can be created revealing some of the dark oxidised background material. On this project, three different intensities – ranging from solid Traditional Nordic Green to a special finish developed to meet the architect's requirements - were used in apparently random combinations, adding richness to the flat facades.

Cartwright Pickard Architects Director Peter Cartwright explains: "We had seen some really good photographs of pre-patinated copper buildings in Finland. We were excited by the potential for 'variegated' copper to add life and real interest to the façades both in texture and colour. The variation in the copper on the final building had to look quite random but we actually specified the positions of each panel to ensure that the facades met our design and satisfied the local planners – which it certainly did.

"We were excited by the potential for 'variegated' copper to add life and real interest to the facades"

Photo courtesy of Cartwright Pickard.

ENVIRONMENTALLY SOUND MATERIALS

"We believe that this variegated copper gives us a contemporary façade suited to such a prominent site and contrasting well with the adjoining terracotta panels. Sustainability is also very important to us as a practice, including selection of environmentally sound materials. The local planners' design guide led to the use of living, planted roofs and required other materials that will be easy to maintain and improve with age."

The new hotel aims to set a high standard for design and construction, as well as for quality materials – which are particularly important with the building's close proximity to the historic St. Georges church.

Copper panel layouts

South East

North West

North East Elevation

Typical floor plan

Project: Premier Inn Hotel, Doncaster **Client:** Premier Inn **Architects:** Cartwright Pickard Architects **Copper Installer:** Varla UK **Copper Supplier:** Luvata Sales OY (UK) **Photos:** Where indicated, photo courtesy of Cartwright Pickard Architects (copyright Daniel Clements). **Other photos:** Graeme Bell, Luvata.

COPPER INSPIRATION

Exploring the latest techniques including press modelling, perforation and surface treatments

Throughout history copper has always fascinated people with its naturally changing surface, malleability and unique visual characteristics. Architects and artists continue to find inspiration and seek new possibilities with this most adaptable material and the copper industry is keen to work closely with them in realising new concepts.

Elsewhere in this issue of Copper Forum there are numerous examples of the diversity that copper offers architects, ranging from the new golden alloys to the development of variable pre-patinated finishes. In this and in previous issues we have also seen the many different cladding and roofing techniques available, as well as the individual work of artists and interior designers using copper.

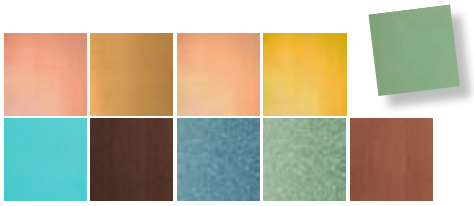
But innovation in response to the imaginative demands of today's designers continues. Here, we explore just some of the latest copper techniques available now.

SHAPING THE FUTURE

A completely new kind of press modelling technology for copper offers a new design freedom by introducing three-dimensional shapes and decorative elements into façade design. It also provides endless opportunities in interior design and decoration, cladding and mouldings. Digital press modelling is a highly automated system for sheet copper which takes three-dimensional design straight from the designer's desk to the finished product.

TRANSPARENCY AND OPACITY

The use of copper mesh and perforated copper sheets offers a fresh design dimension for buildings. They can be used externally as rain-screens, solar shading and opaque cladding - or internally as partitions, screens and other interior design elements. Transparency can be generated by stretching or piercing copper sheet, or weaving copper wire into a mesh. Copper sheet is easy to water-cut and perforate in various ways and the different shades of colour and surface treatments widen the design possibilities even further. An impressive example of perforated copper technology is the Parventa Library building in Latvia (featured in the last issue of Copper Forum CF27/2009). Here, the sizes of perforations were varied to generate text graphics quoting the lyrics of Latvian folk songs!

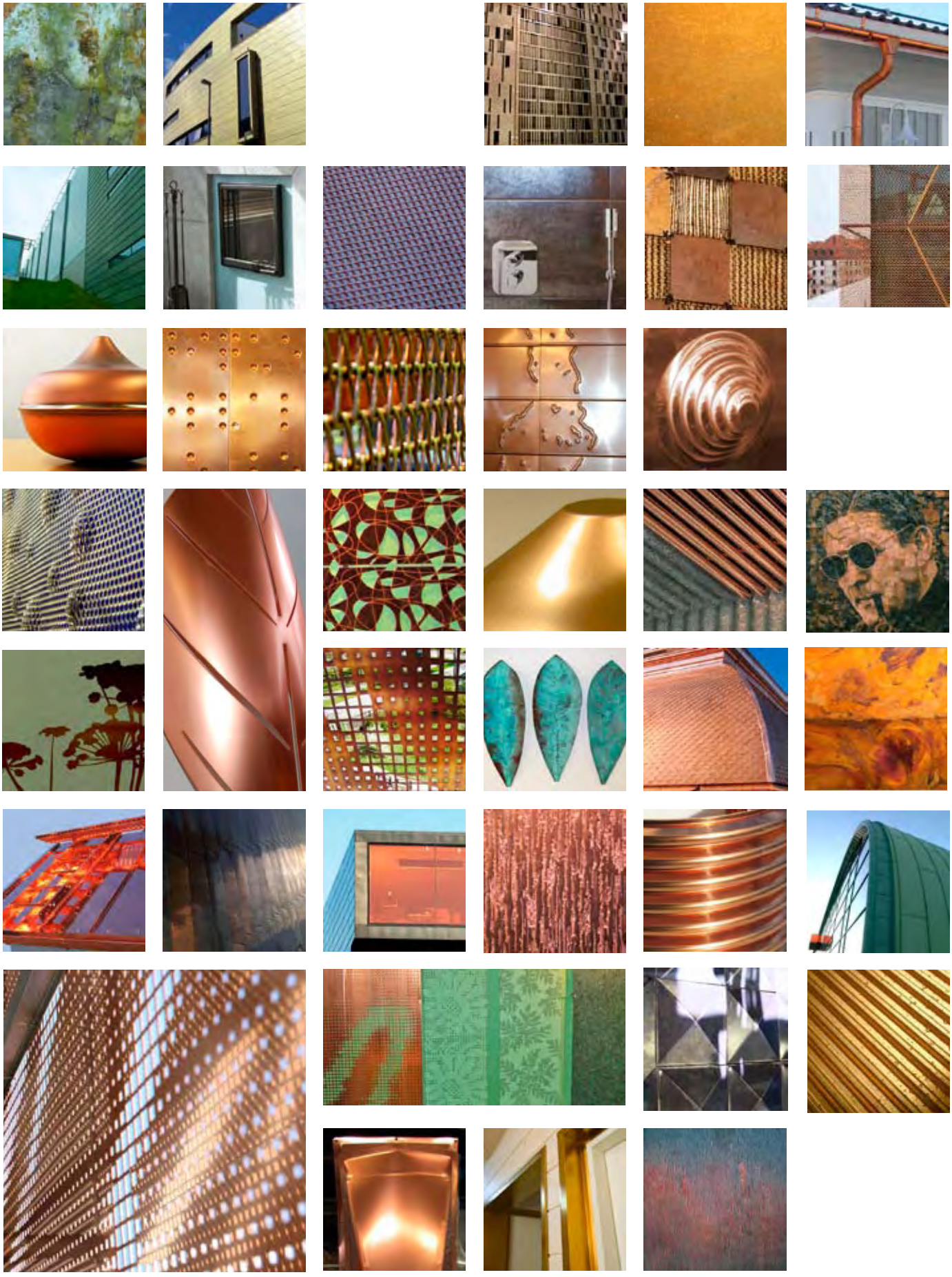


RICH AND VARIED SURFACES

The surface of copper is vibrant, multi-faceted and ever changing: the glowing, lively surfaces and individual colours are a source of inspiration for creative minds. But advanced technology provides scope for a rich diversity of colour shades enable applications beyond architecture. Copper is a versatile and durable natural material the surface of which is easy to vary by patinating, moulding or dyeing. Individual surfaces can be produced for either custom-made bulk products or one-off projects. Copper withstands different treatments extremely well and moulding, shaping or patination does not weaken the quality of the material. It is certainly worth experimenting with these new types of products.

INTERIOR INSPIRATION

Copper is ideal for interior design instead of conventional materials or in combination with them. The surface of copper can be varnished or waxed to preserve its distinctive colour and shine indoors. The applications for copper internally are endless - on ceilings, kitchen cupboards and surfaces (where the material's anti-microbial properties are important), corner mouldings and detailing (to provide continuity throughout an entire building), and feature elements such as fireplaces and light fittings.



ISLAND COPPER

Designing a holiday home for this sensitive location on an island surrounded by nature and lakes, situated in the northern part of the Netherlands presented architect Paul van den Heuvel with various challenges. A planning regulation limiting the floor area to 75 m² conflicted with the client's need to maximize usable space. The house also had to fit into the natural landscape in a subtle way without compromising its contemporary design.

MEETING CONFLICTING DEMANDS

Two distinct roof volumes – separated and perpendicular to

A simple but clever holiday home takes a thoroughly modern approach to copper roofing, maximizing usable space while respecting its water-side setting.

one another – define the building. Their surfaces have been devised using pre-patinated copper of three different intensities of green speckled against a dark oxidized background. These varied colours are used in a composition of long, narrow copper strips with different widths to give a rich, natural texture. Beneath one roof volume is the living room while the other sits over the bedrooms and an extra bathroom.

A freestanding staircase sits outside the main house area, so that it does not count towards the area limit of the house. A glazed skin folds around this staircase and lands on top of the copper roof. This glazing is decorated with enlarged images of micro-organisms living locally in the water. To address winter flooding, when the water can encroach onto the garden, the house is constructed on a wide wooden deck 'bridge' above the lawn and the lake, which gives the impression of the house floating independently of the landscape.

MAXIMISING NATURAL SURROUNDINGS

To maximize the relationship between interior design and exterior nature, glazed facades are used around the house of which several can be slid open. This enables the natural surroundings to give a spectacular internal setting. As the 75 m^2 maximum floor area requirement excludes roof overhangs, these have been added generously, providing solar shading to the glazed facades. The roofs rest on columns running up from the wooden deck around the house. Together, the rhythmically placed columns and overhanging roof volumes give the house depth and stratification with a structured, abstract quality.

Internally, walls and cupboards have been devised in one material, fleeting into each other and becoming one entity. Gentle colours referenced from outside are used internally. The colour palette is light grey/green for the walls and light oak wood for floors and furniture. The individual objects of furniture are lightweight elements within the space.

Externally, a landscape architect has carefully reinstated the surrounding to minimize the impact of the house. A wooden wharf and paths form the connection between the water-side and the house.

Hakaniemenranta 6

Renovation building projects make it possible to develop the existing building stock and the built-up environment. **Hakaniemenranta 6** is an excellent example of the renovation of a 1970s office building. The new innovatively designed windows as well as the glass and copper façades integrate the building in a natural manner in the townscape of Helsinki. The rhythm of the new façades is also an outward reflection of the new functional structure of the building.

Esko Miettinen, Architect SAFA

Text by Antti-Matti Siikala

Background

The eight-storey office building designed by architect Kaj Salenius was originally built in 1975. The building was designed according to the values and structural engineering principles of the time in the boundary zone between the built-up downtown block structure of Hakaniemi and the open 1970s prefabricated concrete estate of Merihaka.

The powerful screen-like façade and the small windows were realised using load-bearing prefabricated concrete façades. The total size of the building rendered it a monotonous, enclosed appearance. The location is excellent and for its part creates the Hakaniemi façade toward the Cape of Helsinki.

The building has by no means been indifferent to the townspeople.

For almost 35 years it has stood as a recognisable landmark of Hakaniemi. As a product of its own era, it received also criticism and in the 2000s won in a public vote the title of the ugliest building in Helsinki.

The townscape was only part of the problem, however, since the usability and the engineering systems of the building had become obsolete.

The prefabricated concrete technology of the 1970s failed in the façades and the external envelope of the building had to be completely replaced for technical reasons. The frame dimensioning of the building and the location of the stairwells inside the building frame, on the other hand, represent a good standard.

Design solutions

The character of the old building should never be destroyed in a renovation project, but new structures should be designed to reinforce the significant characteristics of the building. History is not denied but combined with a new layer into a synthesis.

It is easier to understand this principle if we consider e.g. the renovation projects carried out on the red brick buildings of early nineteen hundreds where skilful old details preserve the layered feeling of the time periods. The buildings built in the 1970s pose a different challenge, but it is still a question of a synthesis of the old and the new.

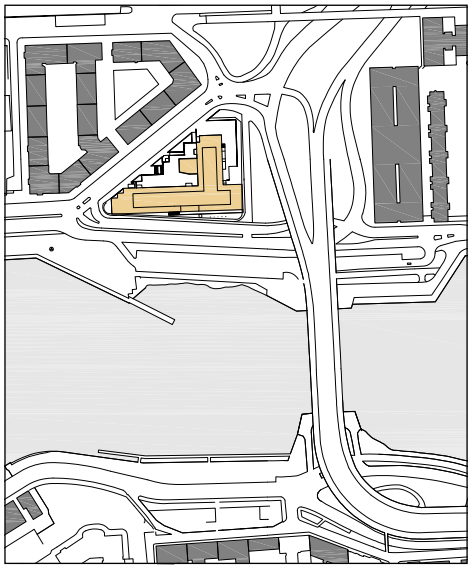
The building mass is great and cannot be integrated in the surrounding town structure. Yet, we did not want to lose and fragment the handsome body of the building.

We wanted to create an interesting and positive contrast and dialogue with the environment and introduce new small-scale elements to the building.

The starting point was to open up the building into its environment and most of all in the prominent direction; toward the sea. With the building mass divided into parts by means of a recessed façade, the new entrance becomes apparent in one glance.

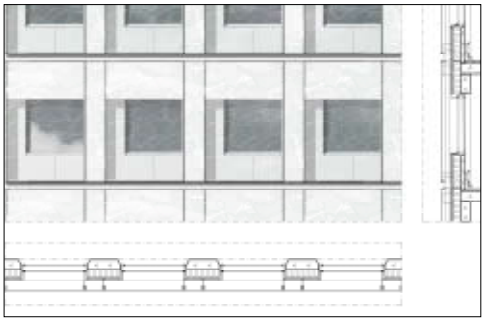
The load-bearing inner concrete shell of the façades was enclosed in a white and clean screen-printed glass cladding with a matte surface. Textile artist Outi Martikainen from our office also contributed to the design of the elaborate screen-print pattern. The pattern is not distinguishable from a distance, but at close range adds another layer in the pedestrian's scale. Light and shade are also part of the façade. The theme of ice boulders is well suited to the shore area in Hakaniemenranta.

This also repeated the historical tradition of including art as a part of the design process and the resulting architecture.



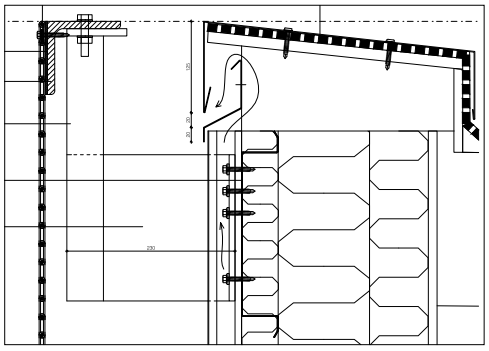
Layout plan, Hakaniemenranta, Siltasaari Strait, Cape of Helsinki.

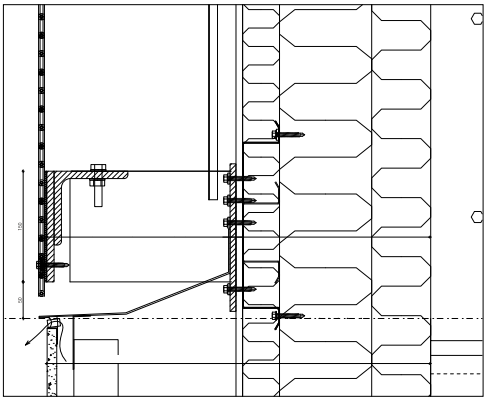
Connection of the copper net to the building plinth.



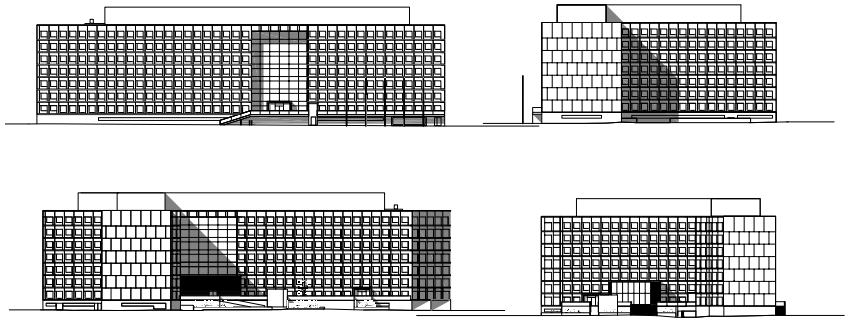
The construction of the new glass façade.

The copper façade, view from west. The transparency of the copper net varies to some degree according to lighting conditions.





Top and bottom joint details of the copper net façades.



South, east, north and west elevations.

Project: Hakaniemenranta 6 Renovation

Completed: 2009

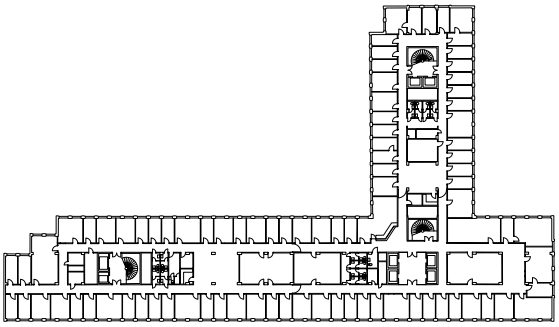
Client: Senaatti-kiinteistöt

Architect: Arkkitehtitoimisto Sarc Oy,
Antti-Matti Siikala, Architect SAFA

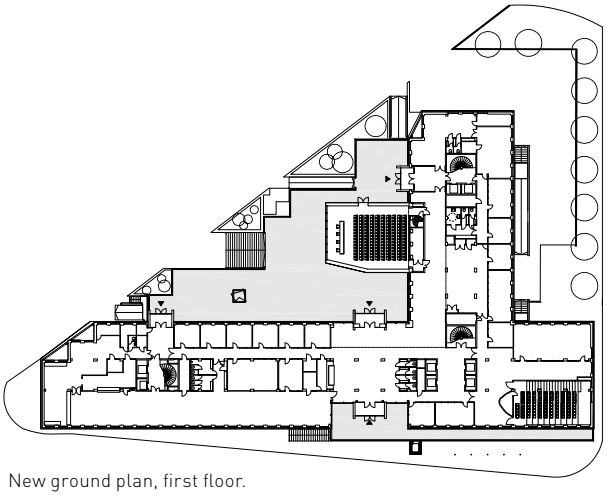
Main contractor: SRV

Copper supplier: Tammet Oy

Photo: Jussi Tiainen, Eark



Original ground plan, third floor.



New ground plan, first floor.

A view from the new interior to the patio.

Activities and internal areas

The renovation of the outward appearance of the building and the enhancement of the quality level are also reflected in the design of the interior spaces, with attention paid to increasing the amount of daylight and external views, to creating a general feeling of space and to bringing rhythm to long corridors.

Key alterations compared with the old solutions include:

The main entrance to the building is in the old place, but the associated lobby has been expanded into a partly two-storey common space running through the whole building with Kruunuhaka town block visible over the sea. A new entrance into the lobby was added on the side of the sea, complete with a terrace. These activate the building in the direction of the town and make the building more accessible for customers. Various public and common facilities, a restaurant, meeting rooms as well as service facilities of the end-users are collected round the lobby on the ground floor. The multi-activity area, where we are located, is also a new building part.

Floors 1-6 are office floors. On each floor a central zone of assembly areas and break rooms is provided as a common area with tall glass walls that offer views of the townscape. Prefabricated partition wall elements running in parallel with the corridors are also primarily glass walls to support the transparency and lightness of the facilities.

The end-users of the building – the National Board of Education, CIMO and Fullbright Center – have contributed to the design of the new facilities from the very beginning. The strategies and objectives of the user organisations were defined and analysed to produce a work environment that serves the users in the best possible manner.

The service-intensive nature of the user organisations and their philosophy based on transparency has also influenced the architectural solutions used in the building. The design solutions for their part support the users' objective of sustainable operation. This has been translated into flexibility of spaces and a possibility to implement modifications in an economically viable manner during the life cycle of the building.

All the parties involved in the design process utilised product modelling in their design efforts. The existing building was measured by means of laser scanning and modelled into a scale model for use by the designers and the Client.

The product models of the various designers were combined and the resulting model was utilised in many ways for the needs of design, procurement, and implementation, and will also later be used for building maintenance purposes.

One concrete advantage of the use of product modelling at the design stage is the use of the model to perform overlap analyses, particularly as the existing floor heights are exceptionally low for modern technology.

In Finland new building projects only increase the building stock by ca. 1.5% annually. In terms of the climate change, it is important that stricter standards are applied to the energy efficiency of new buildings, but it is the existing building stock and renovation projects that play a singularly crucial role.

For 6 Hakaniemenranta Street, the replacement of the engineering systems and the external shell has reduced the energy consumption of the building to the level required by current standards.

Copper at sea

In this article we take a short break from architecture to explore a very different application of copper sheet – in boat building.

Today's pleasure boats are usually made of fibreglass or metal but boating enthusiasts are keen to preserve traditional ways by building new boats from timber using old designs. This is how the two-masted schooner "Ihana" came into being at the small coastal community of Luvia located in western Finland.

Luvia is a centre for boating enthusiasts and the community offers them a modern marina with restaurants and other services. It has a long nautical history and cargo ships, some of which were timber sailing vessels, used to call at the local harbour. The town is still well-known for boat-building and the renowned Skylla boats are made in Luvia. So, it is not surprising that a local enthusiast came up with the idea of building a new sailing boat identical to a traditional schooner – and it has been named "Ihana", meaning 'wonderful'.

The entire boat has been built by volunteers and mainly of donated materials. Construction of the ship was started in 2005 when large logs were felled to get material for the curved ribs of the hull. Between five and ten volunteers worked on the schooner every day and it was launched in July 2009. The design of "Ihana" is faithful to the drawings of the original schooner.

COPPER PROTECTION

Because the schooner is over 28 metres long and six metres wide, it will not be taken out of the water for the winter. However, in the frozen sea the wooden hull has to be able to withstand extreme pressures and, if unprotected, there could be a risk of serious damage. Therefore a decision was made to install copper sheets to the keel and wooden hull up to the water line for protection.
The material used is 1 mm thick copper sheet pre-cut into 0.50 x 100 mm pieces and about 250 m^2 was used.

The wooden sides were first treated with bitumen mass, which in turn was covered with a layer of polypropylene, and another layer of bitumen applied onto it. Then the copper sheets were overlapped a couple of centimetres and nailed at two-centimetre intervals with barbed copper nails. For extra safety, there are another two rows of nails in the middle of each sheet but more widely spaced. The sheets had to be heated on site to mould them into the shape of the boat's hull. Another important reason for the use of copper was to prevent seaweed and marine micro fauna from attaching to the bottom of the schooner: without it the bottom would be extremely hard to keep clean. The copper surface of the hull also helps the boat to glide through the water with less resistance.

The schooner "Ihana" has attracted enormous interest round the world and there have been numerous enquiries and proposals for cooperation. The ship's sail area is approximately 300 m^2 and the engine is a 6-cylinder 280-hp Sisu engine. For more information and photos of the "Ihana", please visit www.kaljaasi-ihana.fi

The keel and the bottom are protected with copper up to the water line.

The wooden deck of the schooner getting its shape.

The copper has been annealed to follow the contour of the hull.

Photo: Hannele Kuusisto

A modern Marine Villa

VILLA LAZUR enjoys a stunning marine location in Jurata on the south coast of Poland's Hel Penninsula – a long, thin, tongue of land extending into the Baltic Sea above Gdansk Bay. Its beach-front site in this popular holiday destination is surrounded by pine forests with extensive local flora and prestigious apartment buildings.

The Villa itself consists of ten apartments, all facing south towards the sea. Just three primary facade materials are used: white stucco, naturally coloured timber panels and pre-patinated copper sheet. The horizontally banded copper facades to the top level use 430 mm x 3000 mm TECU Patina sheets, jointed with a single welt system. The substructure consists of an aluminium frame with 18 mm OSB boarding and a double ventilation void protected by perforated sheet metal.

The different geometric forms used in the design and choice of materials provide light, smooth surfaces – some curved, others flat. The overall effect is typically marine in character, with overtones of Art Deco architecture from the early 20th century, but contemporary and entirely suited to its coastal situation.

Architect: Zbigniew Reszka, PA Arch-Deco, Gdynia, Poland

Wrestling with Copper

A soaring, lightweight copper roof protects an open sports arena in a dramatic lakeside setting.

The village of Riaño – in the province of León, northern Spain – sits between the Cantabrian Mountains and a man-made lake. At a pivotal location within the village, a circular amphitheatre was built 10 years ago to accommodate traditional wrestling competitions, which have a long history in the region, and other community events. The building consists of rugged stone walls forming a circle, with an umbrella-like canopy floating above – providing protection from the weather but essentially retaining an open-air character.

The roof is defined by ten radial, laminated timber beams converging at the centre and supported at the perimeter on massive concrete pillars. The slim, stainless steel connections between beams and pillars allow structural movement but also add to the impression of a weightless floating canopy. This combination of massive and lightweight elements is reminiscent of the "Roman Coliseum" with its unfolded canopy. The open interior space is organised by stands at both sides of an imaginary and visual line connecting the lake and village.

The copper forms a continuous skin over the lower sections of the shallow dome roof, with a central area of glazing above. It is laid on a thin, continuous wooden substrate, supported on cross purlins and incorporates standing seam joints running down the roof curvature. The raised main beams are also clad with copper sheet, including where they pass through the glazed roof. Here, single lock seam joints are used in the direction of the slope.

Project:	Wrestling Arena, Riaño, León, northern Spain
Architects:	Felix Compadre Diez
Copper Installer:	Amilcar
Roof area :	700m²
Completed:	2000

COPPER IN HARMONY

In this issue of Copper Forum we have seen several examples of copper applied extensively throughout facades as the predominant material, effectively defining the architecture of the building. But in this new housing development, copper is used in harmony with other quality materials to develop an urban language appropriate to its sensitive historic setting.

Appropriately named, Harmony is a new development of contemporary apartments in Isleworth, West London. It is being developed as a joint venture between Willmott Dixon Homes, Notting Hill Housing Group and the Homes and Communities Agency. When complete, Harmony will consist of 280 one, two and three-bedroom apartments in low-rise buildings separated by areas of attractive landscaping. 106 of the homes are for private sale, with the remainder available for key workers, for shared ownership under the government's New Build HomeBuy scheme or for social rent.

The design – by architects Hunter & Partners – aims to create good modern buildings that relate to the context of this sensitive site. The use of 3 and 4 storey buildings with pitched roofs and gables results in an appropriate domestic scale but with contemporary detailing that eschews pastiche. The layout creates blocks with strong street frontages that clearly define public and private areas and allow informal surveillance to contribute to a sense of personal safety. A feeling of enclosure is generated within the internal street, whilst gaps between the blocks afford views across and out beyond the immediate site.

VISIBLE FROM A WORLD HERITAGE SITE

The site is close to Syon House, the London home of the Duke of Northumberland, and its impressive parkland, as well as other protected historic buildings and a cemetery. It is also visible from the famous Royal Botanical Gardens at Kew on the River Thames, designated a World Heritage Site. This was a particular challenge for the designers, as Paul Wellings-Longmore of Hunter & Partners explains: "The limited palette of external materials is drawn from those with 'natural' hue and colour. The use of high quality, subtle materials – brickwork, grey roofing and pre-patinated copper – softens the visual impact of the buildings when seen from Syon Park and Isleworth Cemetery and avoids jarring with the surroundings.

"The lift and stair cores are expressed as vertical stacks equivalent to traditional features such as chimneys, emphasised through the green copper cladding. They provide a rhythmic punctuation breaking up the street elevations. Where the cores support roof-mounted plant, the enclosure is integrated into the design so that they read as single unified elements. Although there were financial constraints, copper proved to be the most appropriate material given the site's historic context and we were certainty steered in that direction by the local planning authority. Pre-patinated copper was used to give the finished impression and to blend immediately with the surrounding older buildings. We selected a specific intensity of patination to suit this context. Copper provides a 'living' surface – not just a single colour – with a changing character, almost like abstract art."

Vertical stacks of pre-patinated copper rhythmically punctuate the block elevations.

SUSTAINABLE MATERIALS

Sustainability is important to all those involved with the project and Harmony meets the Code for Sustainable Homes Level 3 standard. External materials have been selected that are durable and have integral rather than applied finishes: copper's extremely long-life, heritage of recycling and relatively low embodied energy were all recognised at the design stage.

Copper is also used in stacks to highlight entrances and for more sculptural elements.

Project: Harmony, Isleworth, London, UK
Client: Willmott Dixon Homes, Notting Hill Housing Group and the Homes and Communities Agency.
Architects: Hunter and Partners

Copper Installer: Full Metal Jacket
Copper supplier: Luvata Sales OY (UK)
Illustrations: Hunter and Partners
Photos: Chris Hodson and courtesy of the Client

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