


AN INTRODUCTION TO

PASSIVE HOUSE

BY JUSTIN BERE

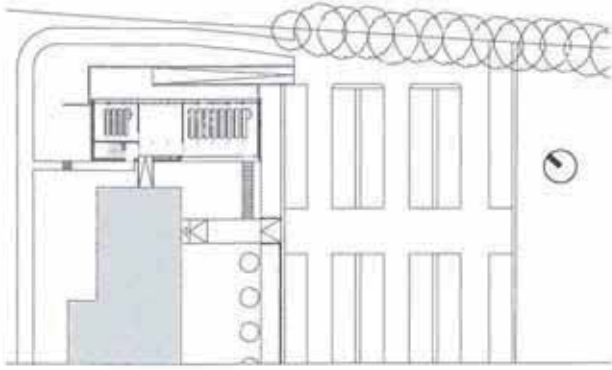


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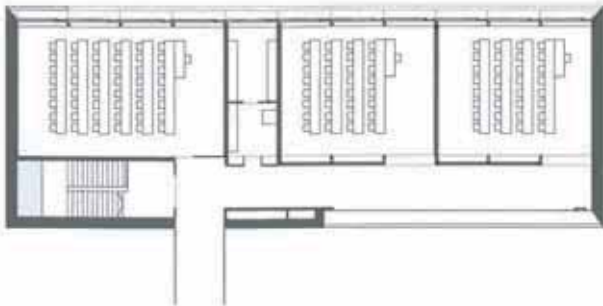
Salzburg University



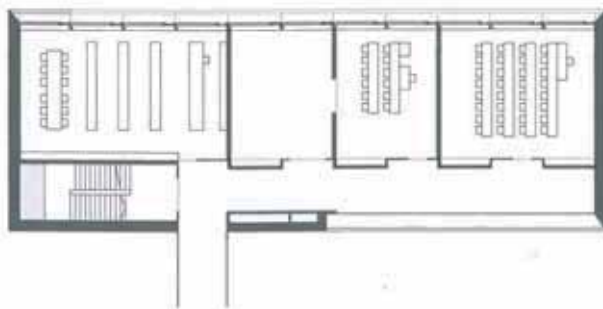




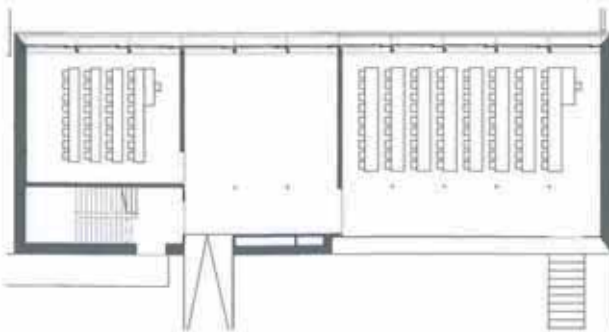
Site plan



Second-floor plan



First-floor plan



Ground-floor plan

Background

The extension to the Kuchl Campus of the Salzburg University of Applied Sciences is a state-of-the-art building both in terms of timber engineering construction and in the fact that it is Austria's first institute of higher education building to implement Passive House technology.

I first saw the beautiful work of Dietrich | Untertrifaller when I visited their secondary school at Klaus during the International Passive House Conference held at Bregenz in 2007. This showed me how Passive House architecture can be executed to a high level of refinement. Such work is very much of its time and place. Vorarlberg politicians, professionals and public have spent the last few decades on a sustainability and self-sufficiency drive, which has resulted in a rapid growth of local skilled tradespeople and manufacturers producing the necessary goods for a sustainable local economy. A steady demand for these commodities has enabled investment in product research and development, so that some of the best and most sustainable goods in Europe are now produced in the region. As exports have increased so have the skills of the workforce, to the point at which Passive House design and exceptionally beautiful aesthetics are now the new vernacular of the country.

Brief

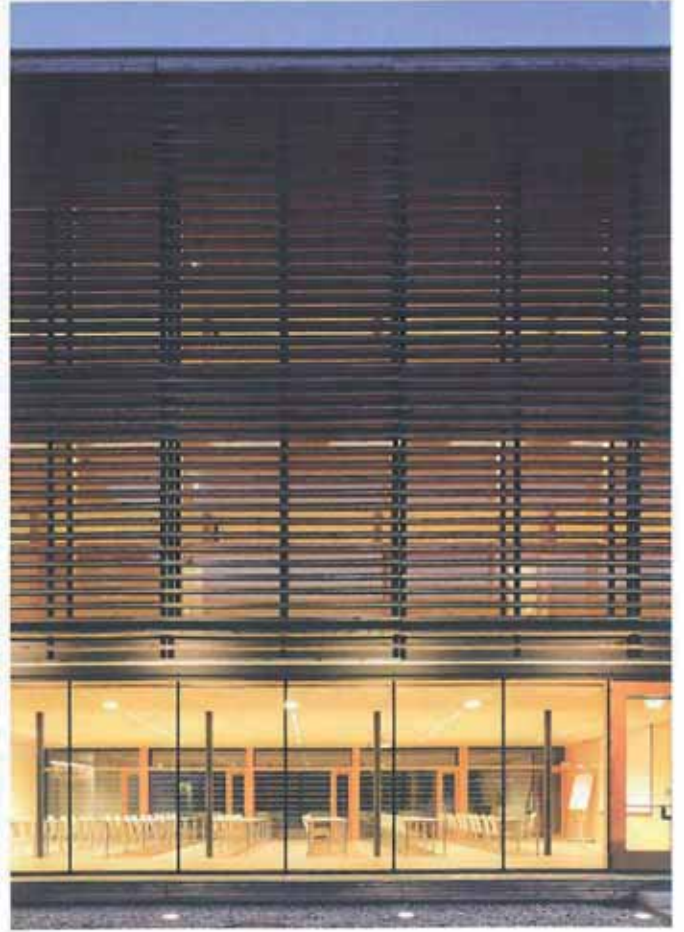
The extension to the Kuchl campus was completed as a modern timber construction in September 2009. The vision was that the students would be able to engage in their studies while absorbing the institute's ideals of "timber, design and sustainability". The university's own building was to serve as a "best practice example" in Kuchl – and what better way to spread this vision into the community than to give 400 students the positive benefit and experience of using this building every day for their studies?

The design

The campus, surrounded by farmland, is located approximately one kilometre north-east of Kuchl's centre. The campus area borders the forestry academy to the north and a student dormitory to the south. The adjacent, existing building was completed in 1995. Its central access corridor connects to the new building via a glazed service bridge.

A large art room on the ground floor, accommodating 200 people, is illuminated from both sides. On the upper floors, a wide corridor finished with floor-to-ceiling glass behind south-west-facing timber louvres provides access to seminar rooms and the library. The main glazed elevation of the building faces north-east. At night, the floors of this elevation seem to float unsupported above the site.

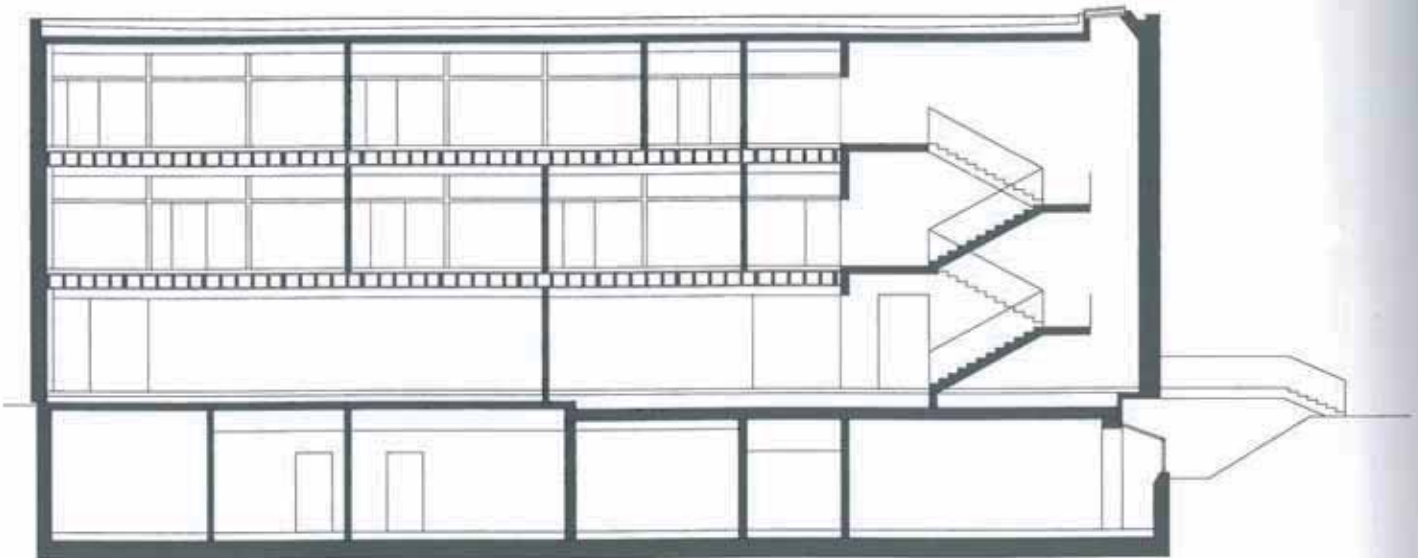
The building is made of timber on the inside and outside. The floors are made from huge, prefabricated, timber-box elements, with laminated timber beams and panels acting together and interlocking like three-dimensional



jigsaw pieces. Six slender, steel columns complement the timber frame, which is connected together by metal fitch plates and brackets. Suspended ceilings and framed walls are all clad with precisely jointed, oiled birch plywood. The concrete escape staircase acts as a stabilising core. Cross-laminated timber is used sparingly to demonstrate a wise use of precious resources; only the two full-height end walls are made from the material, in order to provide the necessary shear stiffness to the structure.

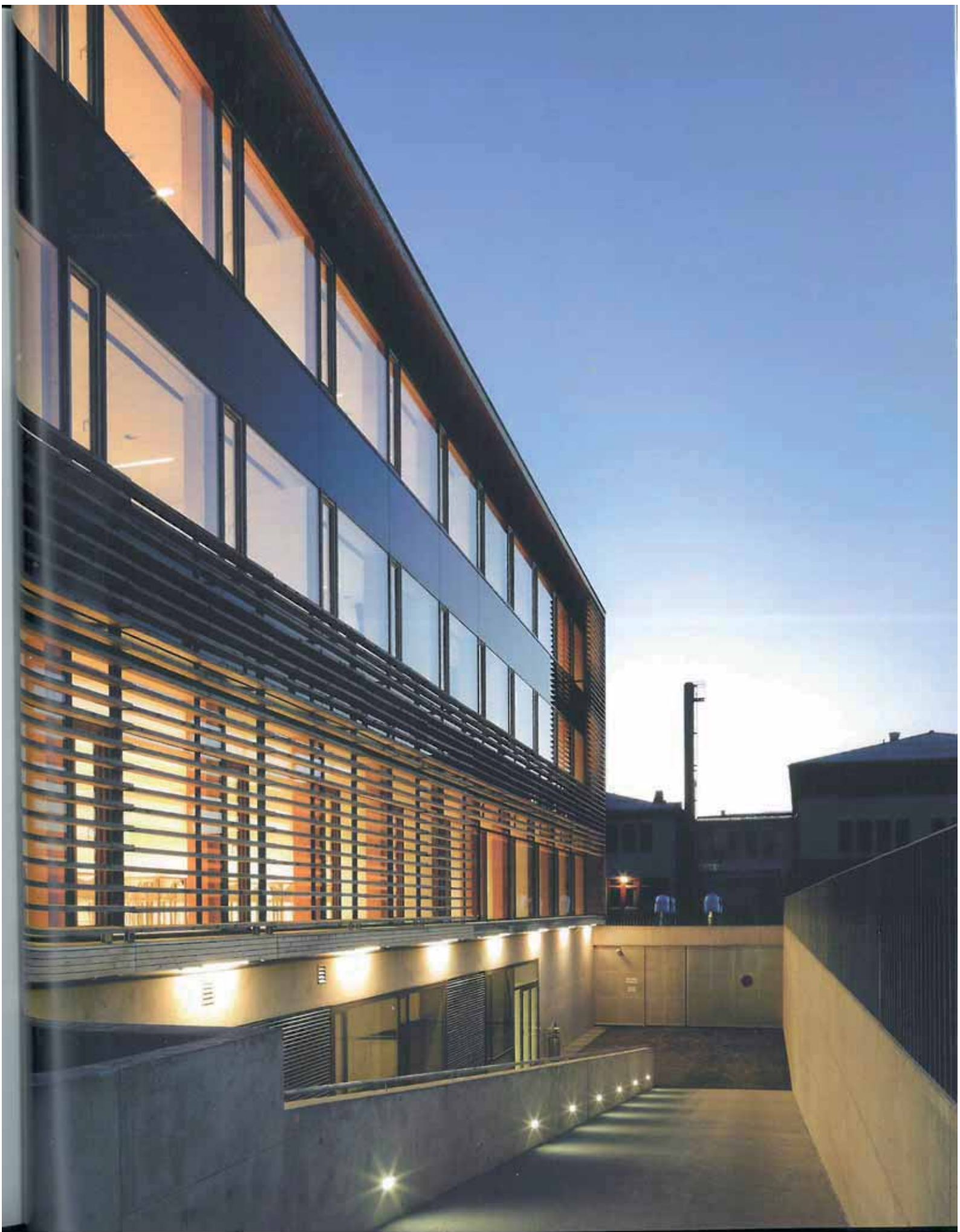
Evaluation

Building with prefabricated timber elements, when done with such refinement, is very convincing. The Salzburg University of Applied Sciences has successfully implemented a functional and beautiful multistorey timber construction according to the Passive House standard, which uses less than $15\text{kWh}/\text{m}^2$ of heating and cooling energy per year.



Section

Location	Markt, Kuchl, Austria
Date	2009
Client	Fachhochschule Salzburg (Salzburg University of Applied Sciences)
Team	Architect: Dietrich Untertrifaller Services engineer: Burggraf Structural engineer (timber): Pock Structural engineer (concrete): Gaderer Passive House consultant: Graml Contractor: Weco FH Holztechnikum
Energy	$10.0\text{kWh}/\text{m}^2/\text{yr}$ specific space-heating demand
Air test	0.49h^{-1} (50Pa pressure difference)



Villa Langenkamp

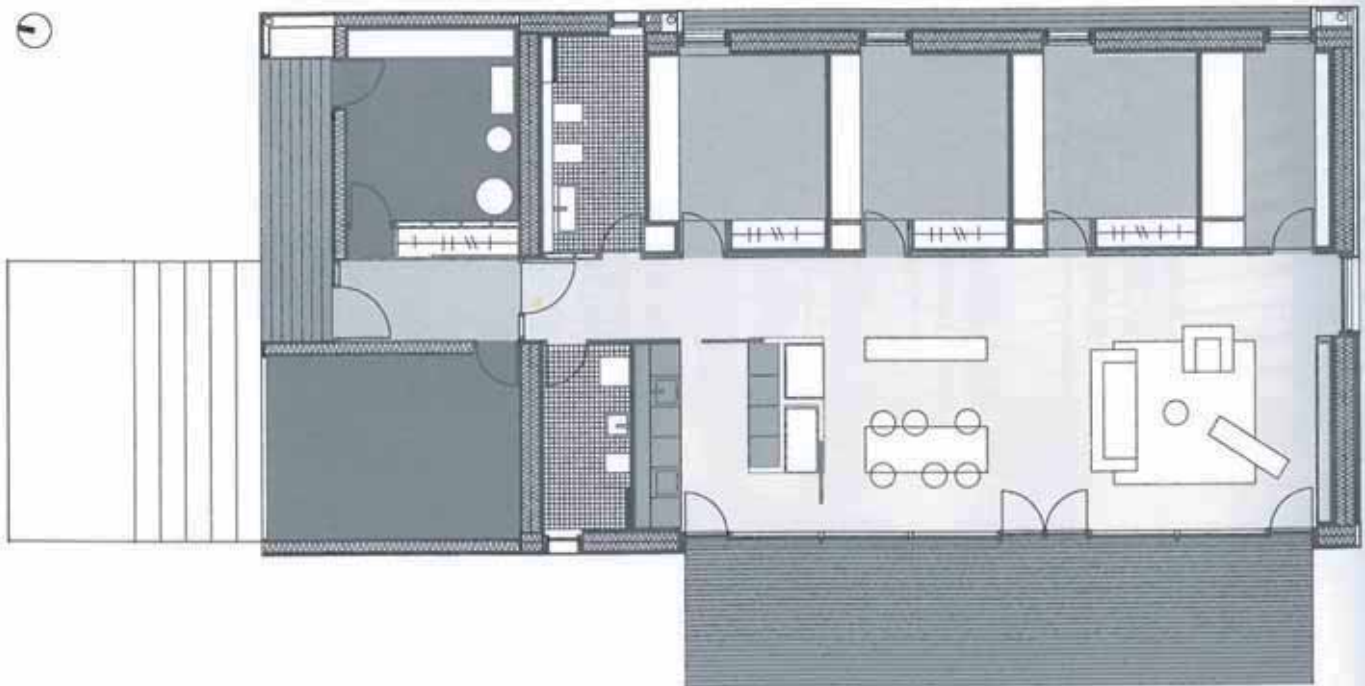
Background

This uncomplicated and contemporary design is built from prefabricated timber elements. The house has a compact geometry and clean, horizontal lines that sit beautifully in the wooded landscape of tall, majestic pines and long horizons. The sleek architectural design, the solar panels on the roof and the negligible energy consumption all speak of a functional yet minimal house adapted to the urgent need to design for minimal energy requirements.

Brief

At first, a two-storey design was considered because of the energy benefits of a compact form, and in order to split the spatial layout into social rooms on the ground floor and more private rooms on the first floor. However, the concept adopted in the end is that all the functions are contained and integrated in one unified, regular shape, resulting in a beautiful, economical, simple design.

Ideally, a northern-hemisphere passive house would be oriented towards south to gain optimum benefit from the sun. However, because the best views here are towards the west, and also to follow the layout of the site, the Villa Langenkamp faces west. This required the design to provide compensation by optimising other low-energy features.



Ground-floor plan