Professor Hilsdorf opened the session with an introduction to the practical problem of demolishing reinforced concrete. Increased energy will be needed for this because in the initial building the reinforcement was included to improve tensile strength and ductility through optimum bond. However bars in concrete to be demolished could be used in electric and thermal conductivity methods to obtain quicker bond failure, also there remained the possibility of dismantling whole reinforced components for reuse elsewhere.

A list was drawn up of special demolition problems, including the use of techniques to locate reinforcement before demolition, drilling aids, zetapotential and the recycling of the bars.

American participants stated that there was no recommended demolition practice in the U.S.A., whereas Lindsell was able to outline the British Code of Practice under revision which fails to distinguish between demolition of plain and reinforced concrete, mentions only traditional techniques and makes no distinction between the different types of structures to demolish.

Hilsdorf seized the opportunity of immediately formulating research needs for methods based on material and safety aspects, also on breaking bonds for example producing split by yielding of bars.

Molin was then called upon to present Swedish research involving the use of small explosive charges for localized cutting. Explosives take the form either of a V-shaped strip producing blasting and cutting forces on small cartridges from 5-20 g. These techniques were illustrated by slides which emphasized the advantages of localized blasting - controlled cracking, safety, small debris ready for re-
cycling, interest for structural alterations where noise, and dust must be restricted. Ishai, following Molin's slides showing cracking within the reinforced concrete slab after application of the "hole-demolishing" technique, asked for the type of failure, mere debonding or separation of the slab. Molin answered that whatever the type of failure, it did not seem to be too harmful for the structure. Ishai further wondered if there is known any static demolition technique which uses the concept of an inverse loading pattern of the concrete structure. In such a technique the destruction could, for example, be effected by inducing tensile tresses into what originally was designed as an unreinforced compressive zone. Molin asserted such a technique has been developed in Japan: upward loading is applied by powerful jacks positioned between the floor and ceiling of a building.

De Pauw's research presentation (see contribution, 5.3.2., workshop 2) also covered fragmentation by blasting, since by calculating charges when demolishing beams he produced rubble of reusable size without further crushing, coupled with recovery of bars. As most promising crushing technique he mentioned a hammermill in which the hammers turned through adjustable grates in such a direction that the fragments are thrown up and not as usual are pressed through the hammers, leading to tensile loading of the concrete. In throwing up, the concrete is crushed until the fragments are small enough to fall through the grates, while bars stay above the grates and can be removed.

Lindsell's introductory lecture outlined the reasons for the sharp increase in the demolition of prestressed concrete: obsolete structures, structural alteration or failure, chemical conversion, corrosion of tendons, accidents mainly through impact. Using two case histories of selective demolition (faulty prestressed bridge beams with displaced cable ducts and deteriorated high alumina prestressed concrete beams in a school building) he stressed the problems encountered: release of prestress in-situ, avoiding damage to adjacent members and hinges, providing temporary support and stability, imperative need for safety. His conclusions fell under three headings - economics and the need to develop alternative demolition techniques, - safety to be ensured by training of workers and demolition contractors, appropriate planning and supervision - and information in the shape of long-term records of design calculations, as - built drawings, erection sequence, demolition procedure and archiving of case histories. This last point should be organized at national level by professional bodies. The associations of demolition contractors are now trying to insist that all buildings be marked for demolition procedures by the designer. Complete records should be kept by engineering and local authorities of all construction details including structural function, erection procedure, location of tendons, anchorage design, chemical details of grouting, concrete mix, strength, composition.