310D6223 GEOTEKNIK TAMBANG

NIRMANA FIQRA QAIDAHIYANI

PS TEKNIK PERTAMBANGAN

FT UNIVERSITAS HASANUDDIN

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Subjects

- Rock slope design methods
- Identification of modes of slope instability
- Stabilization of rock slopes
- Movement monitoring and mining applications

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Pemantauan Lereng Tambang

Pemantauan Lereng Tambang

- Peranan Pemantauan
- Pergerakan Lereng
- Instrumen Pemantauan Lereng

Kemunculan kekar tarik pada muka lereng adalah salah satu tanda yang mudah dikenali.

Kestabilan lereng dapat dipantau, antara lain dengan mengamati perubahan dimensi kekar atau pergerakan (*displacement*) muka lereng. Hal ini dilakukan untuk memutuskan tindakan pencegahan yang dapat dilakukan.

Jika pada akhirnya lereng tersebut harus dibiarkan runtuh, waktu terjadinya keruntuhan dapat diperkirakan sehingga dapat dilakukan evakuasi terlebih dahulu.

Peranan Pemantauan

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Peranan Pemantauan

- Untuk memahami perilaku massa batuan
- Mendeteksi adanya kondisi dinding lereng yang tidak stabil dan berpotensi longsor
- Untuk melindungi manusia dan peralatan

Pemantauan selama tahap operasi pada tambang terbuka

Pergerakan lereng (*displacement*)

Beban dan regangan (*load and strain*)

Ketinggian muka air tanah (*ground water level*)

Getaran akibat peledakan

Pergerakan Lereng

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Pergerakan lereng berdasarkan studi empiris oleh Broadbent dan Zavodni (1982)

Tipe I: **Tipe regresif**, dicirikan dengan terjadinya pergerakan lereng yang semakin lambat hingga akhirnya berhenti. Pergerakan ini berlangsung dalam periode yang singkat.

Tipe II: **Tipe progresif**, dicirikan oleh gerakan runtuhan yang menyeluruh dan lama-kelamaan lajunya semakin cepat.

Tipe III: **Tipe transisi**, diawali dengan tipe regresif dan diakhiri seperti tipe progresif. Hal ini biasanya terjadi akibat perubahan kondisi eksternal, seperti meningkatnya tekanan pori, atau kegiatan penambangan yang dilakukan secara terus-menerus sehingga laju pergerakan lereng melebihi batas normal.

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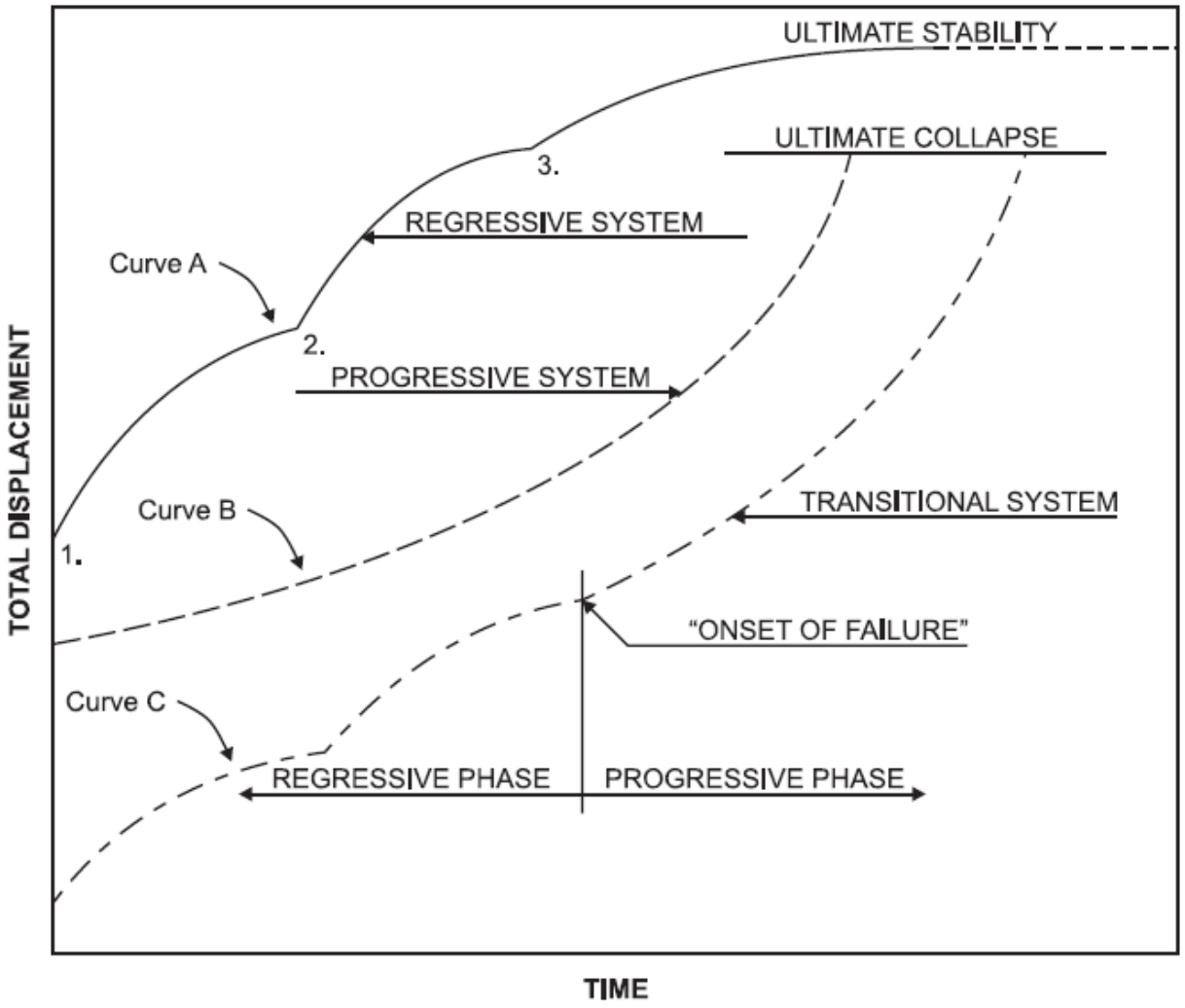

Tipe Kurva Perpindahan terhadap Waktu untuk Keruntuhan Lereng Pit (Broadbent dan Zavodni, 1982)

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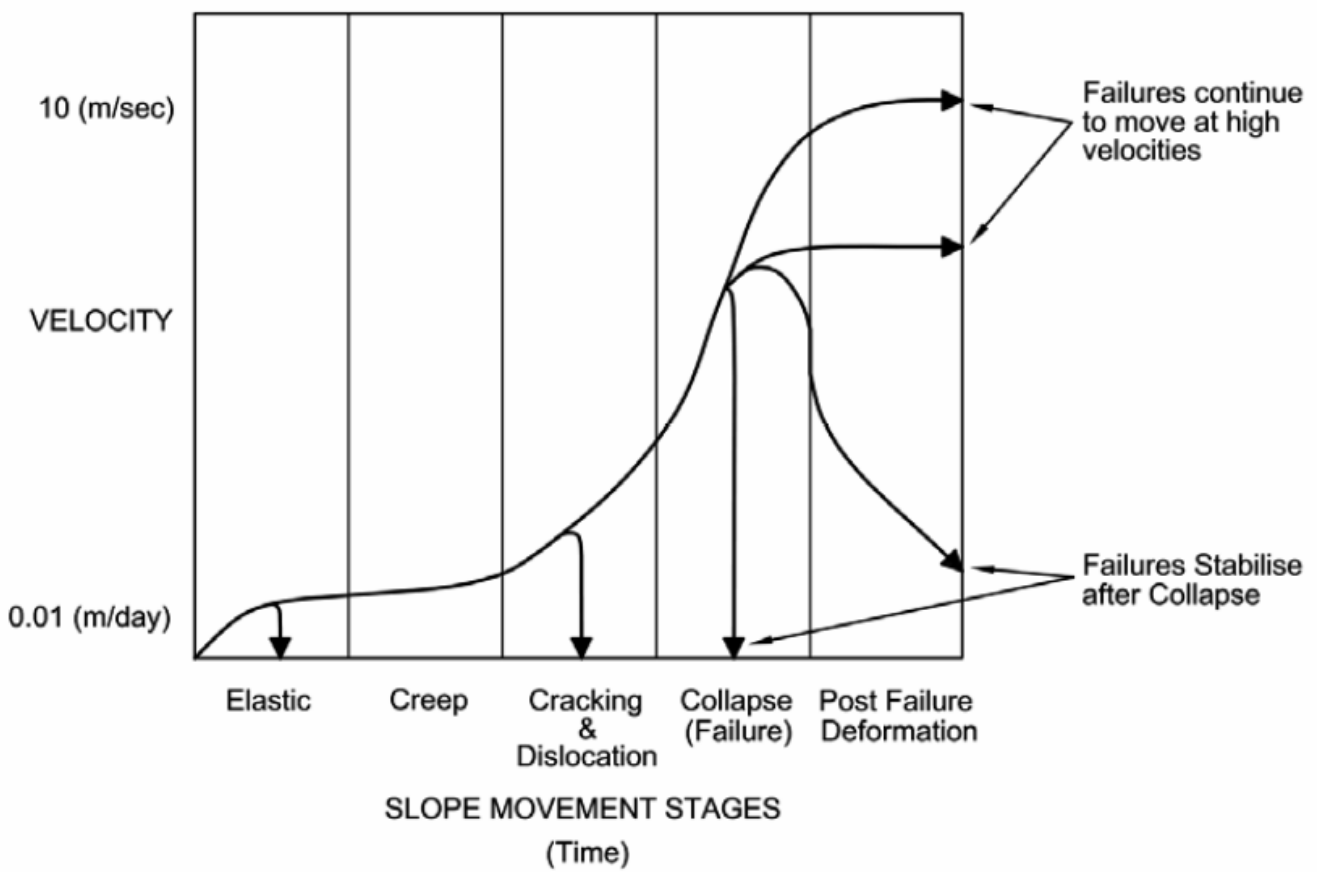

Ilustrasi Tahapan Keruntuhan Lereng (Sullivan, 2007)

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Instrumen Pemantauan Lereng

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- Pemantauan Pergeseran
- Pemantauan Beban dan Regangan
- Pemantauan Air Tanah

Pemantauan Pergeseran

PERMUKAAN DAN BAWAH PERMUKAAN

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Cross-Crack Measurement

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Automated Crackmeter System

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Leica TCA2300 Universal Total Station

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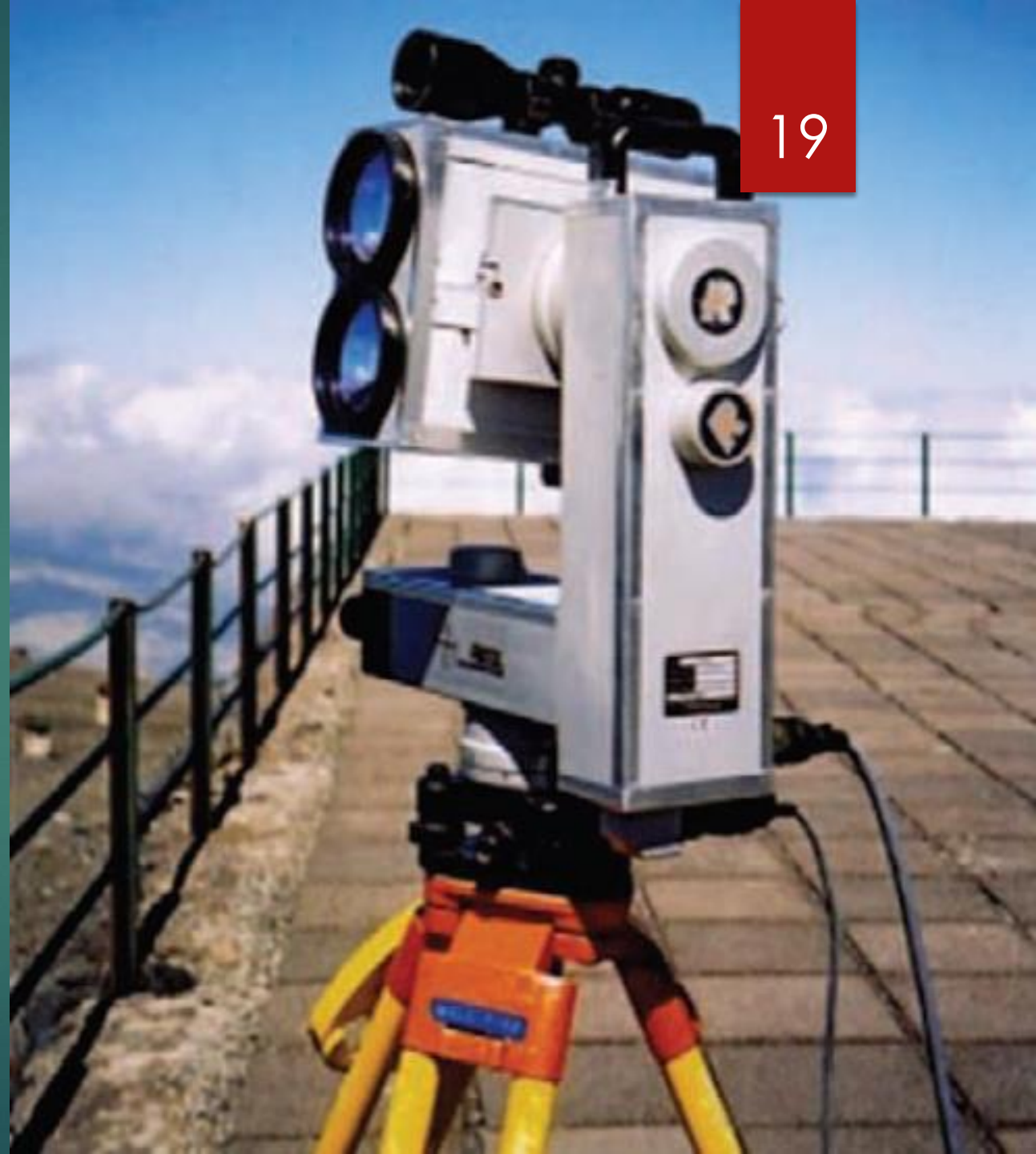
Laser Scanning Unit



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Slope Stability Radar Unit

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Portable Inclinometer Probe

Fixed Extensometers

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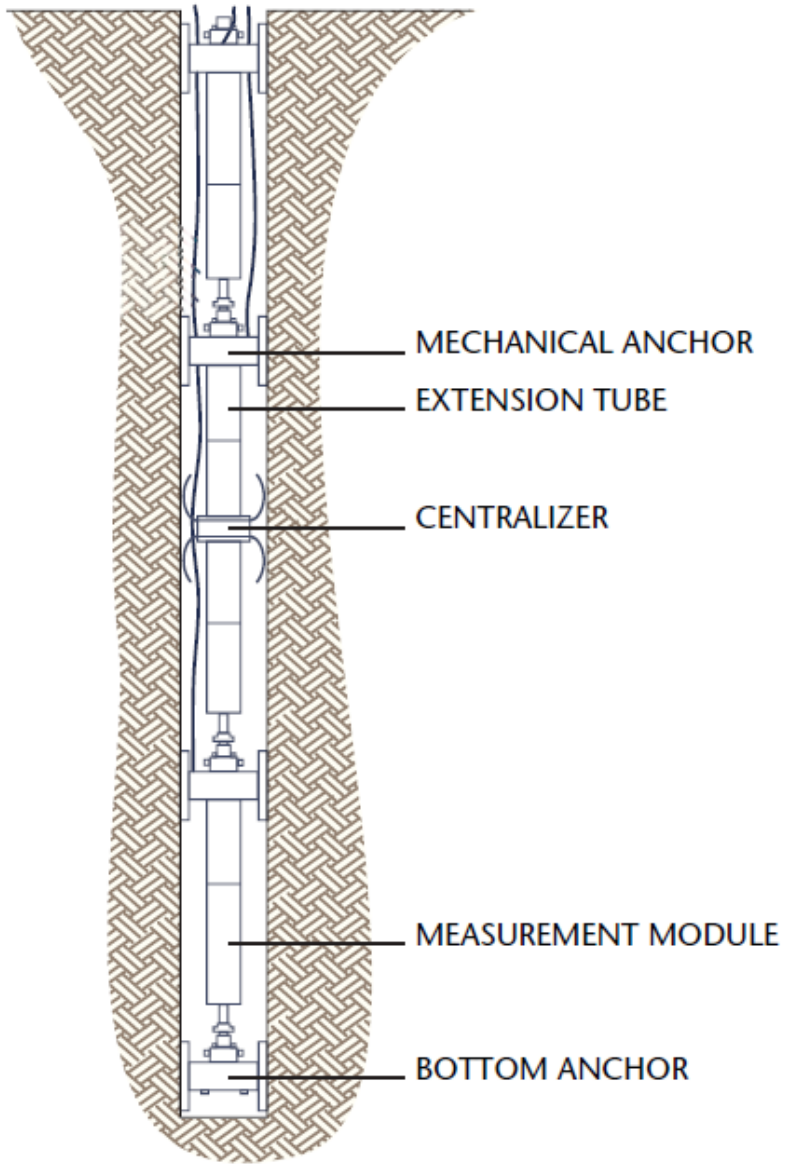
Multiple-Point Single-Tube Extensometer



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The **Geotech Monitoring Station (GMS)** replaces traditional total stations that rely on mirrored prisms to be attached to the slope. The system can scan these points, but can also reflect its signal directly off the rock without the need for prisms. It is first laser-based monitoring solution to give early warning of impending collapses of open pit mine walls, dams, mine dumps and vegetated slopes, which can begin months or years before a collapse occurs.
13 April 2018

The **SSR-Omni** is the newest addition to GroundProbe's comprehensive suite of products. The result is a real-time monitoring and alarming system for the most complex geotechnical and operational environments.
9 November 2018

The Maptek XR3 extra-long-range laser scanner can capture high-resolution digital images for geotechnical analysis at the same time as monitoring wall stability.
The need for slope monitoring at open-pit mines has been around for as long as these structures have existed.
22 May 2019

Hexagon has announced IDS GeoRadar RockSpot, a new early warning radar system for rockfalls and other fast-moving events. RockSpot creates real-time alerts that can be connected to on-site alarms such as sirens, automatic road closures or other alert devices. Georeferenced, recorded event data provides advanced statistics and analytics for risk assessment and vulnerability zone mapping.

30 May 2019

South African geotechnical monitoring specialist Reutech Mining has unveiled its latest slope-monitoring solution, the MSRIV Esprit, which it believes to be “the fastest-scanning and most sophisticated” radar in the industry.
26 July 2019

References

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- https://www.miningmagazine.com/geomechanics-ground-control/news/1364223/hexagon-announces-ids-georadar-rockspot
- https://www.miningmagazine.com/geomechanics-ground-control/news/1363634/back-on-the-slopes
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TERIMA KASIH

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